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☑ Additional comments / Commentaires supplémentaires:

Various pagings.

In Sessional paper No. 7, Financial returns, 1898-99, page 111 is incorrectly numbered page 11.

In Sessional paper No. 8, page 125 is incorrectly numbered page 1.

In Sessional paper No. 8a, page 194 is incorrectly numbered page 94.

SESSIONAL PAPERS

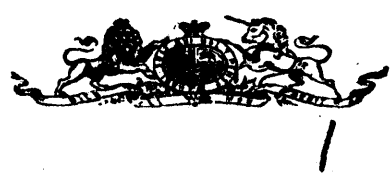
VOLUME 6

FIFTH SESSION OF THE EIGHTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1900



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SESSIONAL PAPERS

OF THE

PARLIAMENT OF CANADA

FIFTH SESSION, EIGHTH PARLIAMENT, 1900.

See also Alphabetical Index, page 1.

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8. Report of the Minister of Agriculture, for the year ended 31st October, 1899. Presented 15th May, 1900, by Hon. A. S. Fisher. ..... *Printed for both distribution and sessional papers.*

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REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED 30TH JUNE

1899

PART I.—EXCISE, &c.

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1899

No. 7—1900.]

To His Excellency the Right Honourable The Earl of Minto, Governor General of Canada, &c., &c.

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to transmit to Your Excellency the RETURNS AND STATISTICS of Inland Revenues of the Dominion of Canada, for the Fiscal Year ended 30th June, 1899, as prepared and laid before me by the Commissioner of Inland Revenue.

All of which is respectfully submitted.

H. G. JOLY DE LOTBINIÈRE,
Minister of Inland Revenue.

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FINANCIAL.

STATISTICS (APPENDIX A.)

EXCISE.

CULLING TIMBER.

HYDRAULIC AND OTHER RENTS.

SESSIONAL PAPER No. 7

EXPENDITURE—(APPENDIX B.)

REPORT

OF THE

COMMISSIONER OF INLAND REVENUE

To the Honourable Sir HENRI G. JOLY DE LOTBINIÈRE, K.C.M.G.,
Minister of Inland Revenue.

SIR,—Herewith I have the honour to submit statements of the Inland Revenues collected by this department during the fiscal year ended the 30th June, 1899, with the usual information as to the cost of collection and statistics respecting the sources whence these revenues were derived.

The following summary comparison shows the accrued revenue for the years ended 30th June, 1895, 1896, 1897, 1898 and 1899 respectively.

—	1895.	1896.	1897.	1898.	1899.
	$	$	$	$	$
Excise, including Methylated spirits	7,829,848	7,956,740	9,182,042	7,916,483	9,722,967
Public Works	9,883	5,639	13,632	8,915	5,090
Culling Timber	8,334	9,794	10,356	17,107	10,624
Weights and Measures, Gas and Law Stamps	56,932	54,184	58,228	64,570	73,499
Electric Light	.....	8,688	6,844	9,425	11,520
Other Revenues	7,080	6,041	770	720	642
Totals	7,912,097	8,041,086	9,271,872	8,017,220	9,824,342

These figures indicate an increased revenue from excise over the previous year of about $1,800,000 of which, in round figures, one million dollars arises from spirits, half a million from tobacco and cigars, and a quarter of a million from malt. The exact figures may be learned by consulting the next table :—

Details of Excise Revenues accrued during

—	1.	2.	3.	4.	5.
	1895.	1896.	1897.	1898.	1899.
	$	$	$	$	$
Spirits	3,901,579	4,011,288	4,772,369	3,593,980	4,609,619
Malt liquor	6,536	6,748	6,805	6,851	6,807
Malt	766,080	781,554	1,032,727	589,896	849,468
Tobacco	2,369,831	2,351,899	2,557,011	2,894,285	3,320,168
Cigars	647,241	660,937	690,280	688,798	781,319
Petroleum	41,389	40,323	42,018	44,648	46,060
Manufactures in bond	47,780	49,269	37,237	32,598	49,572
Seizures	3,280	8,000	3,363	7,373	10,713
Other receipts	26,429	26,150	17,965	21,163	24,192
Methylated spirits	19,703	20,571	22,267	36,891	25,049
Totals	7,829,848	7,956,739	9,182,042	7,916,483	9,722,967

The quantity of spirits produced during the year was 3,443,965 proof gallons, as compared with 1,753,186 proof gallons produced in the previous fiscal year. The raw material used in its production being as follows :—

	Lbs.
Malt	4,532,010
Indian corn	44,059,364
Rye	9,182,257
Wheat	225,406
Oats	573,520

The transactions of the several distilleries will be found stated in detail in Appendix A (Statement No. 3), pages 62 and 63.

	Proof Galls.
There were on the 1st July, 1898, in process of manufacture	118,627
Manufactured during the year	3,443,965
Returned to distilleries for re-distillation—Duty paid 1,015	
" " " In bond . 475,006	
	476,021
Received into distilleries from other sources—Duty paid	2,788
Total	4,041,401

This was disposed of as follows :—

	Proof Gallons.
Placed in warehouse under crown lock	3,914,094
Fusel-oil written off	5,349
Deficiency arising from rectification	5,471
Remaining in process of manufacture, 30th June, 1899, by actual stock taking	116,487
	4,041,401

The following statement shows the warehousing transactions in spirits during the year ended 30th June, 1899, and the four preceding years:—

Fiscal Years.	1 In Warehouse at beginning of Year.	2 Warehoused during the year. Ex-distillery.	3 Otherwise Warehoused.	4 Taken for consumption.	5 Exported.	6 Used in Bonded Factories.	7 Otherwise accounted for.	8 For Re-Distillation.	9 In Warehouse at end of year.
	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.
1894-95	11,906,826	2,803,410	98,542	2,509,019	117,218	333,838	181,823	232,023	11,434,857
1895-96	11,434,857	4,479,209	118,511	2,332,859	140,304	362,453	161,149	166,098	12,869,714
1896-97	12,869,714	2,596,485	125,692	2,779,946	158,943	340,176	212,500	214,212	11,886,114
1897-98	11,886,114	1,766,030	94,798	1,874,479	87,471	321,515	135,318	68,123	11,260,036
Totals	48,097,511	11,645,134	437,543	9,496,303	503,936	1,357,982	690,790	680,456	47,450,721
Annual average of four years ended 30th June, 1898	12,024,378	2,911,283	109,386	2,374,076	125,984	339,495	172,698	170,114	11,862,680
1898-99	11,260,036	3,914,094	145,805	2,404,599	120,161	360,876	138,300	475,007	11,820,992

The quantities exported being as follows :—

	Proof Gallons.
1894-95	117,218
1895-96	140,304
1896-97	158,943
1897-98	87,471
1898-99	120,161

The following statement exhibits the entire quantities upon which duties were collected during the several years recited therein. The total column will be found to accord with the figures shown in Financial Statement No. 13, page 23 :—

Fiscal Years.	Canadian Spirits.		Imported Spirits used in Bonded Factories. Paid difference between Customs and Excise Duty.	Total quantities upon which duty was collected.	Memorandum of Revenue accrued including License Fees.
	Paid duty Ex-distillery.	Paid duty Ex-warehouse.			
	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	$
1894-95	36,035	2,509,019	95,255	2,640,309	3,901,579
1895-96	11,908	2,332,859	118,291	2,463,058	4,011,287
1896-97	2,568	2,779,946	125,378	2,907,892	4,772,370
1897-98	3,866	1,874,479	94,681	1,973,026	3,593,980
Totals	54,377	9,496,303	433,605	9,984,285	16,279,216
Annual average of four years ended 30th June, 1898	13,594	2,374,076	108,401	2,496,071	4,069,804
1898-99	5,571	2,396,735	145,689	2,547,995	4,609,619

SESSIONAL PAPER No. 7

MALT :

The following statement shows the transactions in malt during the year 1898–99, and the four preceding years :—

Fiscal Years.	1 In Warehouse at beginning of Year.	2 Manufactured during the Year.	3 Increase by absorption.	4 Taken for consumption.	5 Exported.	6 Otherwise accounted for.	7 In Warehouse at end of Year.	8 Memorandum of Revenue accrued, including License Fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1894-95.....	20,112,672	43,645,516 *1,826,252	710,168	50,659,627	573,246	991,463	23,070,272	766,080
1895-96.....	23,070,272	52,919,241 *1,976,661	769,756	51,690,278	379,114	325,308	26,341,230	781,554
1896-97.....	26,341,230	47,514,706 *2,368,763	572,765	68,443,353	377,771	339,698	7,666,642	1,032,727
1897-98.....	7,666,642	45,478,529 *2,497,134	678,738	38,954,715	228,000	561,782	16,576,546	589,896
Totals.....	86,190,816	189,587,992 *8,668,810	2,731,427	209,747,973	1,558,131	2,218,251	73,654,690	3,170,257
Annual average of four years ended 30th June, 1898...	21,547,704	47,396,998 *2,167,202	682,857	52,436,993	389,533	554,563	18,413,672	792,564
1898-99.....	16,576,546	61,020,839 *2,387,782	552,363	56,212,822	301,774	2,240,747	21,782,187	849,468

*Imported.

TOBACCO :

The following table shows the transactions during the Fiscal Years ended 30th June, 1895, 1896, 1897, 1898 and 1899 respectively, in Tobacco, Snuff and Cigarettes.

Fiscal Years.	1	2	3	4	5	6	7	8	9	10
	In Warehouse, 1st July.	Manufactured during the year.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse, 30th June.	Raw Leaf taken for consumption.	Canadian Twist taken for consumption.	Total Tobacco taken for consumption.	Duty collected thereon, including License fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1894-95	1,996,002	9,511,373	9,768,210	302,771	99,826	1,336,568	111	65,710	9,834,026	2,369,831
1895-96	1,336,568	10,632,155	9,633,585	231,469	47,090	2,056,579	287	51,903	9,685,775	2,351,899
1896-97	2,056,579	8,797,845	10,323,472	197,310	50,622	283,020	*648,688	78,370	11,050,530	2,557,012
1897-98	283,020	10,519,500	9,001,157	174,595	33,526	1,593,242	8,506,199	55,379	17,562,735	2,894,285
Totals	5,672,169	39,460,873	38,726,424	906,145	231,064	5,269,409	9,155,285	251,362	48,133,066	10,173,027
Average for four years ended 30th June, 1898	1,418,042	9,865,218	9,681,606	226,536	57,766	1,317,352	2,288,821	62,840	12,033,266	2,543,257
1898-99	1,593,242	10,358,434	10,166,084	136,431	25,967	1,623,194	10,239,863	84,115	20,490,062	3,320,168

*Duty imposed on raw leaf April, 1897.

Cigars:

The following statement shows the transactions in Cigars during the fiscal year ended 30th June, 1899, and the four preceding years:—

Fiscal Years.	1. In Warehouse 1st July.	2. Manufactured during the Year.	3. Assessment to bring production up to Standard.	4. Taken for consumption.	5. Exported.	6. Otherwise accounted for.	7. In Warehouse 30th June.	8. Memorandum of Revenue accrued including License Fees.
	No.	No.	No.	No.	No.	No.	No.	$
1894-95	17,674,280	103,832,388	6,786	106,131,294	166,625	259,750	14,955,785	647,241
1895-96	14,955,785	106,171,691	20,949	108,290,260	161,025	12,950	12,684,190	660,940
1896-97	12,684,190	109,234,900	5,575	113,276,105	145,425	.....	8,503,135	690,280
1897-98	8,503,135	116,399,610	38,358	113,132,223	131,300	37,225	11,640,355	688,797
Totals	53,817,390	435,638,589	71,668	440,829,882	604,375	309,925	47,783,465	2,687,258
Annual average of four years ended 30th June, 1898	13,454,347	108,909,647	17,917	110,207,470	151,094	77,481	11,945,866	671,814
1898-99	11,640,355	133,134,122	9,106	128,919,098	88,250	.....	15,776,235	781,319

The revenue derived from goods manufactured in bond during the past five years has been as follows :—

1894–95	$47,780
1895–96	49,269
1896–97	37,237
1897–98	36,977
1898–99	49,572

INSPECTION OF PETROLEUM :

The following statement shows the number of packages of each kind of petroleum inspected during the year, and the fees collected thereon by the Department of Inland Revenue :

	Packages.	Fees.
Canadian	318,232	$27,044 85
Imported	288,214	19,014 96
Total	606,446	$46,059 81

PUBLIC WORKS :

The revenue from this source was as follows :—

	1897–98.	1898–99.
Hydraulic and other rents	$3,641	$3,717
Minor public works	5,274	1,373

CULLING TIMBER :

The amount accrued upon culling of timber was during 1898–99, $10,624.38 ; the cost of the service (including $5,600 for annuities to retired cullers) having been $17,601.39.

WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT :

The usual special reports in relation to these services have been prepared, containing full statistical information.

The aggregate revenue accrued from these services was $80,741.85.

The cost of the three services being $89,705.28.

PREVENTION OF ADULTERATION OF FOOD AND AGRICULTURAL FERTILIZERS :

The usual supplementary report in relation to this service will be submitted containing details of the work done and the report of the analysts.

INSPECTION OF STAPLES :

The usual statistics in relation to the service will be found in Appendix [illegible].

METHYLATED SPIRITS :

The quantity of methylated spirits manufactured during the year was 114,991 proof gallons ; 115,646 gallons were sold. A statement of details appears on pages 54 and 103.

Appendix C contains, as usual, the details concerning illicit stills seized during the year.

Appendix B shows the amount of Excise Revenue collected at each out-office and under various headings, separately.

I have the honour to be, sir,

Your obedient servant,

E. MIALL,
Commissioner.

OTTAWA, 25th September, 1899.

APPENDIX A.

TABLE showing the Annual Consumption per head of the undermentioned articles paying Excise and Customs Duties, and the Revenue per head derived annually.

YEARS.	DOMINION OF CANADA.									
	Quantity.					Duty.				
	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.
	Galls.	Galls.	Galls.	Lbs.	Galls.	$	$	$	$	$
1869	1·124	2·290	·115	1·755	·575	·761	·092	·037	·193	·041
1870	1·434	2·163	·195	2·190	1·103	·962	·085	·049	·259	·061
1871	1·578	2·490	·259	2·052	1·591	1·059	·095	·056	·336	·077
1872	1·723	2·774	·257	2·481	1·302	1·160	·108	·070	·422	·076
1873	1·682	3·188	·238	1·999	1·387	1·135	·120	·066	·350	·084
1874	1·994	3·012	·288	2·566	1·618	1·363	·119	·086	·442	·103
1875	1·394	3·091	149	1·995	1·589	1·127	114	·069	·428	·098
1876	1·204	2·454	·177	2·316	1·360	1·182	·098	·075	·513	·105
1877	·975	2·322	·096	2·051	1·103	·949	·109	·057	·446	·084
1878	·960	2·169	·096	1·976	.....	·927	·147	·052	·439	.....
1879	1·131	2·209	104	1·954	.....	1·005	·125	·057	·449	.....
1880	·715	2·248	·077	1·936	.....	·772	·081	·055	·428	.....
1881	·922	2·293	·099	2·035	.....	·990	·081	·073	·443	.....
1882	1·009	2·747	·120	2·150	.....	1·084	·098	·092	·485	.....
1883	1·090	2·882	·135	2·280	.....	1·186	·103	·097	·473	.....
1884	·998	2·924	·117	2·476	.....	1·074	104	·082	·365	.....
1885	1·126	2·639	·109	2·623	.....	1·198	·111	·074	393	.....
1886	·711	2·839	·110	2·052	.....	1·007	·091	·074	·502	.....
1887	·746	3·084	·095	2·062	.....	1·045	·100	·066	·514	.....
1888	·645	3·247	·094	2·093	.....	·944	·110	·066	·509	.....
1889	·776	3·263	·097	2·153	.....	1·107	·114	·068	·529	.....
1890	·883	3·360	·104	2·143	.....	1·257	·121	·072	·539	.....
1891	·745	3·790	·111	2·292	.....	1·094	·137	·080	·590	.....
1892	·701	3·516	·101	2·291	.....	1·156	·211	·075	·680	.....
1893	·740	3·485	·094	2·314	.....	1·235	·218	·070	·691	.....
1894	·742	3·722	·089	2·264	.....	1·235	·205	·060	·683	.....
1895	·666	3·471	·090	2·163	.....	1·124	·161	·056	·645	.....
1896	·623	3·528	·070	2·120	.....	1·159	·164	·047	·639	.....
1897	·723	3·469	·084	2·243	.....	1·341	·213	·041	·671	.....
1898	·536	3·808	·082	2·358	.....	1·306	·126	·041	·615	.....
1899	·661	3·995	·086	2·174	.....	1·367	·174	·045	·841	.....
Average		2·	·	2·179	.....	1·106	·127	·064	·500	.....

APPENDIX B.

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected under provisions of 37 Vic., Cap. 45 during the year ended 30th June, 1899, and the Fees accrued thereon, as returned to the Department of Inland Revenue by the respective Inspectors.

WHEAT AND OTHER GRAIN.

DISTRICTS.	WHEAT.																			
	Manitoba Hard.					Ladoga.	Northern.					Spring.					Goose.			
	Extra	No. 1.	No. 2.	No. 3.	Rejected		No. 1.	No. 2.	No. 3.	Rejected	American No. 2.	No. 1.	No. 2.	Spr'ng Scoured.	Rejected.	American No. 2.	No. 1.	No. 2.	No. 3.	Rejected
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	300	181,120	600	900	1,200	...	27,900	2,100	9,060	300	42,000	72,780	23,400	....	.....	688,860	12,300	31,020	1,140	.....
Kingston	.....	3.000	393,000	....	.....	.....	.....	57,000	..	..	...	35,958	6,366	.....	.....	....	.....	23,585	500	.....
Toronto	.....	154,300	24,000	3,600	30,000	.....	11,400	98,100	1,500	17,100	.....	.....	.....	.....	.....	.....	900	56,100	7,500	2,100
Port Arthur	71,280	3,617,140	1,096,940	41,240	.....	.....	2,498,040	519,700	19,800	.. .	.....	122,560	5,280	10,120	.....	.....	.....	.....	.....	.....
Winnipeg	5,700	1,349,800	285,000	25,080	.....	4,560	1,216,380	132,240	25,840	.....	.....	146,680	3,420	....	No. 2, 53,960 / No. 1, 91,580	.....	.....	.....	....	.. .
Totals	77,280	5,305,360	1,799,540	70,820	31,200	4,560	3,753,720	809,140	56,200	17,400	42,000	377,978	38,466	10,120	145,540	688,860	13,200	110,705	9,140	2,100

WHEAT AND OTHER GRAIN—*Continued.*

DISTRICTS.	WHEAT—*Continued.*																				
	Frosted.				Mixed Winter.				White Winter.				No Grade.	Condemned.	Red Winter.						
	No. 1	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.	Extra			No. 1.	No. 2.	No. 3.	Rejected	American.	American Hard.
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	300	.....	.....	.....	.....	300	.....	3,000	5,400	11,460	10,740	.....	22,500	Nthrn. 300	16,080	164,400	900	....	68,280	129,840
Kingston	.....	.....	.....	....	1,500	.....	.....	.....	7,127	2,000	..	700	.....	.....	27,402	2,400	.....	.....	.....	..
Toronto	1,500	600	....	600	. ..	6,000	300	300	18,600	49,500	1,500	....	.....	.....	53,700	288,200	7,800	2,400	.....	.....
Port Arthur	12,940	440	880	...	.....	....	.	.....	.....	.....	.....	.....	Stg. 985,740	Spng. 6,160	.....	.....	...	....	.....	.....
Winnipeg	3,420	2,660	....	.....	.....	.....	....	.	..	....	....	....	Spg. 977,360	Spng. 1,140	.....	.....	.....	....	.....	.....
Totals	18,160	3,700	880	600	1,500	6,300	300	3,300	31,127	62,960	12,240	700	1,985,600	7,600	97,182	455,000	8,700	2,400	68,280	129,840

STATEMENT showing the Quantity of certain Staple Articles of Canadian Commerce, &c.—*Continued.*

WHEAT AND OTHER GRAIN—*Continued.*

DISTRICTS.	White Fife.		OTHER GRAIN.																
			Indian Corn.				Buckwheat.			Oats									
	No. 1.	No. 2.	No. 2.	No. 3.	No Grade	Rejected	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.	Mixed No. 1.	Mixed No. 2.	Mixed No. 3.	Mixed Rejected	No Grade	Rejected	American No. 2.
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	..	..	9,988,180	1,120	2,520	1,400	148,176	960	2,400	104,992	2,886,620	295,052	31,994	....	....	..	....	76,840	179,860
Kingston	...	....	.....	.....	.....	.....	.....	....	.....	114,024	2,460	.....	.....	.....	.....	.....	.....	.....	.....
Toronto	.....	..	1,680	336	..	772	2,880	....	.....	5,923	655,100	14,592	..	29,768	1,596	1,824	.....	2,280	.....
Port Arthur	14,960	5,280	.....	.....	....	....	.....	....	.....	.....	440	.....	.....	.....	.....	.....	1,760	.....	.....
Winnipeg	6,080	2,280	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	21,040	7,560	9,989,860	1,456	2,520	2,172	151,056	960	2,400	224,944	3,544,620	309,644	31,994	29,768	1,596	1,824	1,760	79,120	179,860

WHEAT AND OTHER GRAIN—*Concluded.*

DISTRICTS.	OTHER GRAIN—*Concluded.*															FEES.
	Rye.				Barley.						Pease.					
	No. 1.	No. 2.	No. 3.	American No. 2.	No. 1.	No. 2.	No. 3.	No. 3 Extra	Feed.	Rejected	No. 1.	No. 2.	No. 3.	Rejected		
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	$	cts.
Montreal	1,120	131,824	1,120	164,640	46,000	7,776	288	5,856	1,152	.....	79,100	1,139,640	41,700	19,800	12,018	40
Kingston	8,063	5,410	.....	.....	8,161	.....	.....	.....	.....	.....	19,839	13,065	.....	.....	295	60
Toronto	.....	11,088	672	.....	32,256	14,152	.....	5,368	1,952	488	900	359,700	63,900	9,000	4,654	80
Port Arthur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	12,953	90
Winnipeg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,561	60
Totals	9,183	148,322	1,792	164,640	86,417	21,928	288	11,224	3,104	488	99,839	1,512,405	105,600	28,800	34,484	30

SESSIONAL PAPER No. 7

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected, &c.—*Continued.*

PICKLED FISH.

Districts.	Salmon.			Sea Trout.	Mackerel.		Herrings.		Gaspereaux and Alewives.	Codfish.		Other Fish.		Fees.
	Tcs.	Brls.	½ Brls.	Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	Brls.	½ Brls.	
														$ cts.
Quebec	3	124	3	77	..	....	1,147	54	.....	2	1,606	155	3	191 03
Carleton, N.B.	.	...	..	.....	....	...	47	108	223	....	.. ...	....	..	15 80
St. John	....	....	..	.....	....	....	1,814	12,095	970	.....	.....	....	..	495 02
Lunenburg	....	....	.	.....	37	3	...	.....	.....	. ..	....	. ..	..	3 90
Arichat	....	....	..	.....	...	...	... ..	. .....	.....	.. ..	....	...	..	.....
Totals	3	124	3	77	37	3	3,008	12,257	1,193	2	1,606	155	3	705 75

FISH OIL.

Districts.	Seal Oil.				Porpoise Oil.			Cod Oil.						Hake Oil.	Herring Oil.		Fees.
	No. 2 Pale.	No. 3 Straw.		No. 4 Bro'n.	No. 1 Pale.	No. 2 Straw.		A.			B.			A.	A.	B.	
	Tcs.	Tcs.	Brls.	Tcs.	Tcs.	Tcs.	Brls.	Pun.	Tcs.	Brls.	Pun.	Tcs.	Brls.	Brls.	Brls.	Brls.	
																	$ cts.
Quebec	1	412	..	26	.....	2	....	...	210	.....	..	1	..	.....	....	....	97 80
St. John	.....	....	..	... ..	.....	....	9	....	....	386	...	..	4	748	22	37	180 90
Lunenburg	.....	....	..	....	.. .	....	..	39	168	.....	..	3	....	.....	....	....	42 00
Totals	1	412	..	26	.....	2	9	39	378	386	..	4	4	748	22	37	320 70

BEEF AND PORK.

District.	Beef.		Pork.			Fees.
	Mess.	Prime Mess.	Mess.		Rejected.	
	Brls.	Brls.	½ Brls.	Brls.	Brls.	$ cts.
Quebec	87	.. ..	... ..	475	11	143 25

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected, &c.—*Concluded.*

LEATHER AND HIDES.

Districts.	Leather.	Hides.			Calf Skins.			Fees.
	No. 1.	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 3.	
	Sq. ft.							$ cts.
Hamilton	.....	10,997	4,089	561	74	17	....	786 90
Kingston	.....	2,998	181	349	...	.....	....	176 40
Ottawa	.....	.....	.....	.....	.....	.....	.....	.....
Toronto	.....	49,153	17,980	4,830	.....	...	.....	3,596 65
Lévis	.....	5,336	932	2	.....	.....	.....	313 50
Montreal	.....	59,515	19,430	9,776	.....	....	.....	4,412 00
Quebec	6,122	16,696	6,924	982	.....	.....	.....	1,302 22
St. John	.....	7,181	559	286	.....	..	.....	400 53
Winnipeg	.....	1,392	758	100	208	128	2	129 40
Totals	6,122	153,268	50,853	16,886	282	145	2	11,117 60

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX C.

STATEMENT of Seizures on account of Illicit Manufactures for Fiscal Year ended 30th June, 1899.

Divisions.	Number.	Names.	Schedule Value.	Residences.	Dates.	Remarks.
			$ cts.			
Belleville....	3	Thos. Loch ..... / Coleman Robinson.	10 00	Sydney.....	Aug. 23, '98	Robinson was sentenced to $100 fine, or in default of payment to 2 months' jail. The case against Loch was left in abeyance.
Brantford....	43	Joseph and James Griffin.	25 00	South Norwich..	June 21, '99	Sentenced to $100 fine and 3 months' jail.
Guelph. ...	88	James Farrelly.....	4 00	Peel.....	Mar. 14, '99	Dept. of Justice for prosecution.
London.	61	Michael McCairn...	0 25	Troy.....	" 7, '99	No action, confiscation considered sufficient.
Peterborough.	22	John Crawford	34 00	Haliburton.....	Oct. 12, '98	No action.
Toronto....	343	George Bilbrough...	9 00	Oakley T'nship..	Sept. 10, '98	Sentenced to $200 fine and 6 months in jail, and in default to 6 months extra.
	345	James Clarke.	5 00	Parry Sound....	" 21, '98	Sentenced to $100 fine and 1 month in jail, and in default to 6 months extra.
	346	Adélard David,.....	.....	Muskoka Distrc't	" 21, '98	No action taken.
	347	William Foster... .	15 50	Holland Landing.	Nov. 18, '98	Sentenced to fine of $100 and 1 month in jail, and in default to 6 months extra.
	348½	Isabella Lippett....	0 50	Bradford	Dec. 29, '98	Paid $50 penalty.
	349	Isabella Lippett. ..	2 00	" . . .	Jan. 9, '99	" "
Joliette.	140	Marcel Lefebvre...	2 00	St. Barthelemy .	Aug. 17, '98	Sentenced to $100 fine and 1 month in jail, and in default to 2 months extra.
Montreal. ...	950	Eméry Brunet . ..	0 20	Montreal.....	July 14, '98	Paid $50 penalty.
	951	Abraham Duperré ..	0 50	"	Aug. 4, '98	No action taken.
	953	Wilfrid Desjardins..	2 00	St. Faustin.....	" 18, '98	Dept. of Justice for prosecution.
	955	Joseph Bezeau . .	1 00	St. Henri	" 25, '98	Confiscation considered sufficient.
	957	A. Maisonneuve	0 40	St. Louis (Mile End).	Sept. 2, '98	Paid $50 penalty.
	958	Paul Maisonneuve ..	20 20	" " ..	" 2, '98	Maisonneuve paid 100 penalty, and Chapleau connected with Maisonneuve also paid $100 penalty.
	961	F. A. Chagnon.....	1 00	Montreal.....	Oct. 3, '98	No action taken.
	962	Alex. Lefebvre	8 68	"	" 17, '98	Paid $100 penalty.
	965	Théodore Doré .. .	2 50	St. Régis.....	Nov. 8, '98	Case dismissed.
	966	Hermas Fournelle...	0 50	Montreal. . . .	" 12, '98	No action taken.
	972	Mrs. D. Demartigny	0 45	St. Constant ..	Dec. 28, '98	" "
	973	Antoine Bélanger. .	1 00	Montreal.....	Jan. 16, '99	" "
	975	Joseph Guertin.. ...	8 20	"	" 18, '99	" "
	979	Simon Gadona ..	50 00	Côte St. Paul...	Feb. 11, '99	Paid $100 fine and costs.
	980	Armand Trouillard..	1 50	Montreal.	" 17, '99	No action taken.
	981	The Bushell Oil Co..	1 50	St. Louis (Mile End).	" 18, '99	" "
	983	Lyon Silverman.....	27 36	Montreal. . .	" 27, '99	Paid $10 penalty.

STATEMENT of Seizures on account of Illicit Manufactures for Fiscal Year ended 30th June, 1899.—*Continued.*

Divisions.	Number.	Names.	Schedule Value.	Residences.	Dates.	Remarks.
			$ cts.			
Montreal—*Concluded.*	984	V. Sanscerre dit Massé.	18 50	Montreal.....	Mar. 1, '99	No action taken.
	986	Etienne Langlois...	7 50	St. Jérôme.....	" 11, '99	Sentenced to $100 fine and 1 month in jail, and in default to 1 month extra.
	988	C. Rochon.....	40 64	Montreal...	June 21, '99	Paid $100 penalty.
	989	H. F. Bellemare....	23 60	"	" 24, '99	" "
Quebec.	472	Israël Bois.....	8 45	Ste. Perpetue...	Oct. 3, '98	Sentenced to $100 fine and 1 month in jail.
	473	Arthur Bérubé....	3 95	" ...	" 4, '98	Sentenced to $50 fine and 1 month in jail.
	474	Unknown	5 00	Rivière du Loup.	" 26, '98	No action taken.
	475	Elzéar Huot.....	215 10	L'Ange Gardien.	Nov. 4, '98	Paid $600 penalty.
	477	George Gervais.....	15 60	St. Casimir.....	" 29, '98	Sentenced to $200 fine and 1 month in jail, and in default to 6 months extra.
	478	V. A. Emond.	37 50	St. Roch.....	Dec. 1, '98	Dept. of Justice for prosecution.
	481	Ed. Lapointe.... / C. E. A. Langlois	1,130 92	Quebec.....	" 19, '98	Lapointe sentenced to $500 fine and legal costs
	482	O. Thibault	30 00	Fraserville.....	" 28, '98	Sentenced to $100 fine, 1 month in jail, and in default to 6 mos. extra.
	483	George Bernard.....	1 60	St. Gervais...	" 26, '98	Dept. of Justice for prosecution.
	484	Damase Boulanger..	23 60	Ste. Agathe	" 28, '98	No action taken.
	486	Marc Cloutier.....	9 00	Témiscouata....	Feb. 17, '99	Dept. of Justice for prosecution.
	487	François Brisebois ..		St. Clément.....	" 21, '99	Sentenced to $100 fine or 6 mos. jail.
	488	Flavien Jobin.....	10 00	Standon.....	" 17, '99	Penalty of $25 inflicted.
	489	O. Ouellette.....	0 50	Témiscouata....	Mar. 2, '99	Paid $25 penalty.
	491	Jos. Albert.....	23 61	Ste. Claire....	" 7, '99	No action taken.
	492	Elzéar Savard.	687 51	St. Roch.....	" 10, '99	Dept. of Justice for prosecution.
	494	Louis Emond.....	5 00	Pointe aux Boulaux	May 12, '99	" "
	495	Philias Savard ...	10 00	Bergeronne.....	June 12, '99	" "
	496	Xavier Simard.....	8 00	"	" 12, '99	" "
	497	Mrs. Jer. Tremblay..	5 00	Chicoutimi.. ..	" 13, '99	" "
	498	Jean Lacroix.....	10 00	Tadousac..	" 13, '99	" "
	499	Louis Emond..... ..	10 00	Pointe aux Boulaux.	" 12, '99	" "
Sorel.....	74	Michel Moreau.....	5 50	St. Marc.....	Sept. 10, '98	" "
	75	Onésime Blain ...	22 60	Ste. Julie de Vercheres..	June 27, '98	Sentenced to $100 fine or 3 mos. jail.
St. Hyacinthe.	69	François Arpin.....	2 00	Marieville..	Mar. 11, '99	Fined $15.
Three Rivers..	113	J. Bte. Danville	4 00	St. Stanislas....	May 29, '99	Dept. of Justice for prosecution.
	114	François Normandin	.....	St. Narcisse	April 1, '99	Released.
Victoriaville..	1	André Viens.....	4 00	St. Bonaventure.	" 6, '99	Dept. of Justice for prosecution.
	2	Louis Nourri.....	15 00	St. Léonard	May 23, '99	" "
Cape Breton..	61	Alex. Corbett.....	31 2	Carny's Lake...	Aug. 15, '99	" "
Pictou.....	76	Murdoch Fraser	10 88	Pinkietown	" 22, '98	Sentenced to $100 fine and 3 mos. in jail.
	78	Donald McDonald..	30 00	Antigonish.....	Sept. 9, '98	Fined $159.50.
	79	Neil McDonald.. / Arch. McDonald.	25 60	Mabou.....	Jan. 12, '99	Archibald McDonald sentenced to $100 fine and 3 mos. jail.
	80	Neil McDonald.....	1 75	"	" 12, '99	Acquitted.

SESSIONAL PAPER No. 7

STATEMENT of Seizures on account of Illicit Manufactures for Fiscal Year ended 30th June, 1899—*Concluded.*

Divisions.	Number.	Names.	Schedule Value.	Residences.	Dates.	Remarks.
			$ cts.			
Pictou— *Concluded*..	81	Arch. Kennedy.....	13 30	Strathlorn.....	Jan. 19, '99	Sentenced to $100 fine and 1 month jail.
	82	Alex. John Kennedy	3 90	Sigth Point.....	" 20, '99	" "
	83	Dorothy Kennedy...	.....	"	" 20, '99	" "
St. John..	90	George Geautreau...	.....	Kent County...	Aug. 13, '98	" "
	91	Chas. Gothro	.....	Galloway Co....	Feb. 16, '99	Dept. of Justice for prosecution.
Winnipeg.....	57	Oct. Dutilleuil.....	40 00	Dauphin.....	April 3, '99	Sentenced to $100 fine, 1 month in jail, and in default to 6 mos. extra.

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B.

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Outoffices, during the Fiscal Year ended 30th June, 1899.

Divisions.	Outoffices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Deseronto	20 00	1,239 12			2,526 58						3,785 70
	Trenton	20 00	3,339 52									3,359 52
Brantford	Ingersol	150 00				506 80	1,628 55				25 00	2,310 35
	Norwich	50 00							2,315 95	600 00	10 00	2,975 95
	Paris	75 00				277 90	868 26				10 00	1,231 16
	Port Dover	50 00							828 78	1,819 27	10 00	2,708 05
	Simcoe	112 50				437 40	1,018 80				10 00	1,578 70
	Tilsonburg	100 00			2,082 17						10 00	2,192 17
	Woodstock	145 00	5,066 26		2,192 10	603 60	1,836 15	91 30		100 00	35 00	10,069 41
Guelph	Berlin	432 50	40,278 79			13,962 85	26,686 95					81,361 09
	Galt	450 00			1,597 35	574 90	1,472 70					4,094 95
	New Hamburg	50 00			4,136 46							4,186 46
	Preston	250 00			3,280 74	658 60	2,275 80					6,465 14
	Salem	50 00										50 00
	Waterloo	275 00			18,200 58	1,430 40	4,979 40					24,885 38
	Waterloo Distillery	250 00	351,752 59		2,340 00					3,266 96		357,609 55
Hamilton	Dundas	200 00			41,845 83							42,045 83
	Greenville	150 00			12,990 00							13,140 00
Kingston	Napanee	40 00	7,134 12			2,815 87					20 00	10,009 99
London	Alvinston										10 00	10 00
	Aylmer										10 00	10 00
	Forest										10 00	10 00
	Glencoe										10 00	10 00
	Parkhill										10 00	10 00
	Petrolea	20 00	8,823 87					3,678 75			25 00	12,547 62
	Sarnia	110 00	19,921 57	57 00		13,541 50		5,828 02		60 80	25 00	39,543 89
	St. Thomas	162 50	1,683 68		453 75	2,300 30	8,724 00	415 00			25 00	13,764 23
	Strathroy	120 00	2,917 45		4,320 00	68 51		0 30			10 00	7,436 26
	Watford										10 00	10 00
Owen Sound	Collingwood	200 00	2,814 24			17,434 00	1,184 55					21,632 79
	Kincardine									521 20	10 00	531 20
	Meaford	20 00	2,387 02			2,627 00						5,034 02
	Neustadt	100 00			3,181 87							3,281 87
	Walkerton	100 00			3,894 68							3,994 68

Perth	Almonte										25 00	25 00
	Arnprior	40 00	6,430 63								25 00	6,495 63
	Carleton Place										25 00	25 00
	Eganville	20 00	2,085 57			748 25					20 00	2,873 82
	Mattawa										10 00	10 00
	North Bay										10 00	10 00
	Pakenham										10 00	10 00
	Pembroke	135 00	11,934 66			8,297 31	941 64			202 00	25 00	21,535 61
	Renfrew	20 00	6,280 12								20 00	6,320 12
	Smith's Falls					21 40	462 90	343 30			50 00	877 60
	Sudbury	20 00	820 85								10 00	850 85
Peterborough	Cobourg	120 00	6,020 69		688 16						35 00	6,863 85
	Lindsay	50 00									35 00	85 00
	Port Hope	270 00	2,610 77		5,049 78						25 00	7,955 55
Prescott	Brockville	307 50	6,410 44		5,435 91	1,113 53	3,950 70	284 28			25 00	17,527 36
	Gananoque	40 00	3,592 93								25 00	3,657 93
St. Catharines	Caledonia										10 00	10 00
	Cayuga										10 00	10 00
	Dunnville	75 00				132 60	485 11				25 00	717 71
	Grimsby										10 00	10 00
	Niagara										10 00	10 00
	Niagara Falls	75 00				250 20	731 20				25 00	1,081 40
	Port Colborne	100 00			3,761 39							3,861 39
	Thorold										10 00	10 00
	Welland	95 00	1,381 94			68 70	417 00	105 90			10 00	2,078 54
Stratford	Goderich	170 00	4,321 60		2,154 00			0 30				6,645 90
	Listowel	125 00			1,954 50	990 60	3,090 00	250 20				6,410 30
	Palmerston	200 00			33,853 77							34,053 77
	St. Mary's	20 00	3,353 60			2,099 76						5,473 36
Toronto	Barrie	295 00	3,539 89		4,011 96	1 00	33 00			100 00		7,980 85
	Hornby	100 00			2,890 50							2,990 50
	Orillia	100 00			1,119 42					10 40		1,229 82
	Sault Ste. Marie	95 00	1,405 34			3,219 60	288 00				25 00	5,032 94
	Whitby							52 90				52 90
Windsor	Chatham	115 00	16,064 57			3,192 75	5,081 49	7 90			10 00	24,471 71
	Leamington	75 00				395 20	1,149 00				10 00	1,629 20
	Ridgetown	85 00	1,668 11			145 70	339 00					2,237 81
Montreal	St. Jérôme	95 00	10,260 48			6,729 10	15,921 00					33,005 58
	St. Thérèse	94 00				489 60					10 00	593 60
Quebec	Chambord							12 00				12 00
	Chicoutimi	95 00	1,198 88			259 00	1,123 95				10 00	2,686 83
	Gaspé	20 00	740 11			230 00						990 11
	Magdalen Islands	20 00				183 75						203 75
	Paspébiac	20 00				696 50						716 50
	Rivière du Loup	40 00	11,990 44							401 70	10 00	12,442 14
Sherbrooke	Granby	215 00				120,401 95	25,498 29	24 60				146,139 84
	St. Johns	215 00	21,377 88		324 00	1,797 90	6,758 61	5 30	4,253 56	538 97		35,271 22
Victoriaville	Drummondville							78 20			10 00	88 20
St. John, N.B.	Bathurst	20 00	1,596 54			1,782 62						3,399 16
	Fredericton	20 00				16,776 00		112 50		7 50		16,916 00

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Outoffices, during the Fiscal Year ended 30th June, 1899—*Concluded.*

Divisions.	Outoffices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
St. John, N.B. —*Concluded.*	Moncton	40 00				16,074 38		1,953 85				18,068 23
	New Castle	20 00	139 65			6,455 50						6,615 15
	Sackville	20 00				3,617 25						3,637 25
	St. Stephen	75 00				2,894 40	3,056 67	124 50			25 00	6,175 57
	Sussex	40 00	186 07			1,543 50					10 00	1,779 57
	Woodstock	40 00	220 68			1,457 47				1 00	10 00	1,729 15
Halifax	Amherst	20 00	2,966 25			1,056 00						4,042 25
	Truro	20 00				6,082 39						6,102 39
	Yarmouth	135 00				8,147 32	471 20	27 40				8,780 92
Pictou	Antigonish	30 00				2,128 22					10 00	2,168 22
	New Glasgow					6,550 25		0 20			25 00	6,575 45
	North Sydney	20 00				4,180 75		51 95			25 00	4,277 70
Winnipeg	Brandon	165 00	20,179 34			2,750 30	2,935 80			100 00	25 00	26,155 44
	Fort Francis	20 00	1,580 11									1,600 11
	Gretna	20 00	2,844 57			1,128 75						3,993 32
	Portage la Prairie	60 00	13,769 00			2,736 40					25 00	16,590 40
	Prince Albert	220 00	945 23		874 16	265 90					10 00	2,315 29
	Rat Portage	120 00	23,371 71		1,204 03						25 00	24,720 74
	Regina										10 00	10 00
	Virden	20 00	10,001 08			55 38						10,076 46
	West Selkirk	20 00									10 00	30 00
Calgary	Edmonton	360 00	5,330 57		1,118 54	2,512 51					25 00	9,346 62
	Lethbridge	20 00	3,152 19					19 43			10 00	3,201 62
	Macleod	20 00	453 57					74 00				547 57
Vancouver	Cascade City	20 00	1,933 72									1,953 72
	Cranbrook	10 00	2,176 91									2,186 91
	Fort Steele	50 00			1,180 07							1,230 07
	Glenora	50 00										50 00
	Golden	20 00	2,900 72			131 25						3,051 97
	Grand Forks	95 00	5,037 90		346 50		114 00					5,593 40
	Greenwood	120 00	8,727 33		757 58	426 02						10,030 93
	Kamloops	145 00	9,400 30		831 26	2,181 34	3,906 30					16,464 20
	Kaslo	90 00	5,794 43		306 00	875 25		0 10				7,065 78
	Kelowna	65 00				425 29	514 88					1,005 17
	Moyie City	50 00			155 63							205 63
	Nakusp	20 00	4,295 32			3,583 62						7,898 94

	Nelson	*310 00*	*40,734 11*		*3,148 77*	*4,546 31*	*1,933 80*	*197 35*				*50,870 34*
	New Westminster	*172 50*			*2,180 67*	*747 95*	*1,744 65*					*4,845 77*
	Revelstoke	170 00	4,501 53		658 44	456 25						5,786 22
	Rossland	315 00	19,396 96		7,174 43	193 55	588 00	127 95				27,795 89
	Sandon	120 00	5,705 31		918 30							6,743 61
	Trail	120 00	1,040 16		1,892 32							3,052 48
D—7	Victoria	300 00			8,839 41	831 12	2,137 95			13 00		12,121 48
	Nanaimo	11,051 50	769,228 99	57 00	193,345 03	313,823 85	134,349 30	13,867 48	7,398 29	7,742 80	1,100 00	1,451,964 24

INLAND REVENUE DEPARTMENT, OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

FINANCIAL RETURNS, 1898-99

DR. **No. 1.—GENERAL REVENUES ACCOUNT, 1898-99.** CR.

Memo. of Refunds deducted below.	Amounts deposited to the credit of the Receiver General.	Balances due 30th June, 1899.	Totals.	SERVICES.	Revenues of Previous Years not collected 1st July, 1898.	Revenues accrued, 1898-99.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
118,662 83	9,677,886 23	56,260 94	9,734,147 17	Excise and Seizures, per Statement No. 3	36,228 87	9,697,918 30	9,734,147 17
.....	3,052 00	28,474 17	31,526 17	Hydraulic and Other Rents, per Statement No. 5	27,809 17	3,717 00	31,526 17
.....	1,268 00	12,947 41	14,215 41	Minor Public Works, per Statement No. 6	12,842 41	1,373 00	14,215 41
.....	11,626 63	37,795 42	49,422 05	Culling Timber, per Statement No. 7	38,797 67	10,624 38	49,422 05
.....	48,453 95	2,709 28	51,163 23	Weights and Measures, per Statements Nos. 19 (A) and 19 (B).	1,668 13	49,495 10	51,163 23
.....	18,617 00	1,196 50	19,813 50	Gas Inspection, per Statement No. 21	86 25	19,727 25	19,813 50
20 00	11,398 25	140 00	11,538 25	Electric Light Inspection, per Statement No. 23	18 75	11,519 50	11,538 25
.....	4,276 90	.....	4,276 90	Law Stamps, per Statements Nos. 10 and 18	.....	4,276 90	4,276 90
.....	.....	45 04	45 04	Bill Stamps, per Statement No. 9	45 04	.....	45 04
.....	642 10	.....	642 10	Sundry Minor Revenues, per Statement No. 11	.....	642 10	642 10
.....	25,049 06	.....	25,049 06	Methylated Spirits, net receipts.	.....	25,049 06	25,049 06
118,682 83	9,802,270 12	.....	9,941,838 88		.....	9,824,342 59	9,941,838 88
.....	118,682 83	.....	118,682 83	....LESS—Refunds as per Statement No. 16	.....	118,682 83	118,682 83
.....	9,683,587 29	139,568 76	9,823,156 05	.....Totals.....	117,496 29	9,705,659 76	9,823,156 05

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

DR. No. 2.—GENERAL EXPENDITURES

Balances due to Collectors, &c., 1st July, 1898.	Expenditures Authorized by the Department.					Balances due by Collectors, &c., 30th June, 1899.	Totals.
	Salaries.	Contingencies.	Seizures.	Cullers' Fees.	Cullers' Annuities.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
796 57	307.733 30	89,443 85	1,390 50	.....	....	413 08	399,777 30
....	5,850 00	1,951 39	.....	4,200 00	5,600 00	75 00	17,676 39
.....	.. ..	.....	8,847 56	....	.....	....	8,847 56
.....	10,350 46	18,153 56	.....	....	.....	25 81	28,529 83
....	13,975 00	5,222 63	. .. .	....	.....	16 66	49,214 29
.....	45,913 64	18,282 17	1 20	... .	.....	193 26	64,390 27
....	14,487 72	5,743 18	....	.....	.....	212 88	20,443 78
....	2,000 00	4,032 69	....	.....	.....	....	6,032 69
796 57	430,310 12	142,829 47	10,239 26	4,200 00	5,600 00	936 69	594,912 11

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

SESSIONAL PAPER No. 7

ACCOUNT, 1898–99. CR.

SERVICES.	Balances due by Collectors, &c., 1st July, 1898.	Amounts disbursed by the Receiver General on requisitions of the Departments.	DEDUCTIONS FROM SALARIES FOR			Balances due to Collectors, &c., 30th June, 1899.	Totals.
			Superannuations.	Insurance.	Retirement.		
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Excise and Seizures, per Statement No. 4.	438 08	391,852 37	5,894 49	71 76	773 35	747 25	399,777 30
Culling timber, per Statement No. 8.	75 00	17,480 67	102 00	.....	18 72	.....	17,676 39
Excise seizures distributed per Statement No. 4, Appendix B	....	8,847 56	....	....	.....	.....	8,847 56
Sundry minor expenditures, per Statement No. 12.	225 91	28,208 00	95 92	.... ..	.....	.....	28,529 83
Departmental expenditure, per Statement No. 17.	16 66	48,406 93	790 70	.....	.....	.....	49,214 29
Weights and Measures, per Statements Nos. 20 (A) and 20 (B)	208 26	63,166 57	379 20	90 04	17 50	538 70	64,390 27
Gas Inspection, per Statement No. 22.	212 88	19,838 94	187 84	.....	2 50	201 62	20,443 78
Electric Light Inspection, per Statement No. 24.	....	6,032 69	.....	.....	....	.....	6,032 69
Totals.	1,176 79	583,833 73	7,450 15	151 80	812 07	1,487 57	594,912 11

E. MIALL,
Commissioner.

63 VICTORIA, A. 1900

EXCISE,

No. 3.—COLLECTION Divisions

DR. *For Details, see*

Balances due 1st July, 1898.	AMOUNT ACCRUED DURING THE YEAR, INCLUDING LICENSE FEES.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum Inspection Fees.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
71 65	106,886 76	50 00	4,137 98	3,789 50	955 20	179 90	.....	100 00
382 11	21,662 68	150 00	10,932 68	7,232 30	20,628 66	238 70	4,759 00	150 00
.....	11,100 51	.....	.....	3,065 81	.....	153 50	.....	120 80
498 10	397,289 67	350 00	71,160 72	19,111 23	37,110 15	261 40	.....	175 00
2,261 74	205,743 63	150 00	69,353 73	332,430 66	28,756 83	1,334 30	2,202 85	228 19
88 45	38,016 45	100 00	43,007 47	21,978 42	21,603 96	1,491 30	1,375 36	.....
2,196 86	85,155 00	357 00	58,674 31	69,090 51	154,123 89	10,804 49	.....	621 90
995 55	205,558 21	150 00	2,900 85	41,034 41	743 82	1,736 20	.....	422 45
.....	19,539 53	350 00	13,876 45	34,913 46	3,249 75	305 20	.....	.....
43 50	51,822 52	.....	100 00	9,066 96	1,479 54	343 30	.....	.....
.....	19,919 10	250 00	10,294 74	192 30	806 70	170 80	.....	215 00
.....	10,684 53	50 00	216 00	1,419 00	.....	162 10	.....	.....
.....	90,762 49	150 00	25,361 09	1,140 53	4,138 20	286 93	300 00	115 00
177 00	16,992 59	100 00	13,068 17	5,735 40	9,008 25	106 30	.....	25 00
321 00	28,519 35	250 00	39,484 19	6,103 16	7,346 64	457 20	.....	300 00
							*11,610 50	
1,385 23	582,834 18	650 00	185,813 68	189,161 72	41,453 28	6,830 10	13,902 95	859 50
1,085 17	277,013 11	175 00	30,645 45	4,586 85	9,936 99	183 59	400 00	.....
430 23	.....	.....	.....	.....	.....	.....	.....	.....
							*11,610 50	
9,936 59	2,169,500 31	3,282 00	579,027 51	750,052 22	341,341 86	25,045 31	22,940 16	3,332 84
246 33	30,244 48	75 00	378 00	38,189 03	1,321 98	.....	.....	5 00
							*4,467 41	
11,138 63	1,027,737 93	500 00	80,530 11	1,723,201 05	294,235 96	7,982 30	2,844 04	1,110 64
1,203 93	320,391 43	200 00	45,951 72	95,433 12	19,222 38	110 20	2,267 66	2,312 73
844 28	138,084 23	175 00	8,134 16	134,134 23	53,070 01	107 30	4,619 44	1,871 14
.....	19,424 75	.....	.....	11 30	.....	.....	.....	.....
39 77	44,738 27	25 00	54 00	.....	135 55	.....	434 74	133 00
304 29	50,483 42	.....	.....	3,048 50	7,533 40	304 00	.....	20 00
.....	20,300 55	.....	.....	697 90	2,492 10	78 20	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
							*4,467 41	
13,777 23	1,651,405 06	975 00	135,047 99	1,994,715 13	378,011 38	8,582 00	10,165 88	5,452 51
1,472 08	109,148 03	100 00	11,693 25	112,293 94	8,741 97	4,375 88	388 37	137 50
.....	.....	.....	.....	.....	.....	.....	.....	.....
1,472 08	109,148 03	100 00	11,693 25	112,293 94	8,741 97	4,375 88	388 37	137 50
.....	.....	.....	.....	2,379 00	.....	3 75	.....	71 29
611 54	53,899 69	175 00	37,983 56	91,803 96	3,489 60	2,013 01	.....	727 23
.....	.....	.....	.....	29,115 74	.....	66 90	.....	129 15
5,860 50	.....	.....	.....	.....	.....	.....	.....	.....
6,472 04	53,899 69	175 00	37,983 56	123,298 70	3,489 60	2,083 66	.....	927 67
205 75	623 00	75 00	2,106 00	56,379 57	.....	251 30	.....	.....

*Acetic acid.

SESSIONAL PAPER No. 7

1898–99.

in Account with Revenues.

Appendix A.) CR.

Other Receipts.	Total Duties accrued.	Total Debits.	DIVISIONS.	Deposited to the credit of the Receiver General.	Balances due 30th June, 1899.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
606 00	116,705 34	116,776 99	Belleville	115,952 61	824 38	116,776 99
940 00	66,694 02	67,076 13	Brantford	66,614 44	461 69	67,076 13
105 00	14,545 62	14,545 62	Cornwall	14,545 62		14,545 62
3,327 86	528,786 03	529,284 13	Guelph	528,910 93	373 20	529,284 13
617 50	640,817 69	643,079 43	Hamilton	642,459 24	620 19	643,079 43
513 00	128,085 96	128,174 41	Kingston	128,062 11	112 30	128,174 41
281 30	379,108 40	381,305 26	London	379,712 00	1,593 26	381,305 26
415 41	252,961 35	253,956 90	Ottawa	251,672 94	2,283 96	253,956 90
180 00	72,414 39	72,414 39	Owen Sound	72,414 39		72,414 39
270 00	63,082 32	63,125 82	Perth	63,125 80	0 02	63,125 82
80 00	31,928 64	31,928 64	Peterborough	31,928 64		31,928 64
60 00	12,591 63	12,591 63	Port Arthur	12,591 63		12,591 63
168 83	122,423 07	122,423 07	Prescott	122,423 07		122,423 07
128 00	45,163 71	45,340 71	St. Catharines	45,082 97	257 74	45,340 71
80 00	82,540 54	82,861 54	Stratford	82,563 56	297 98	82,861 54
3,915 80	1,037,031 71	1,038,416 94	Toronto	1,036,815 07	1,601 87	1,038,416 94
5,320 85	328,261 84	329,347 01	Windsor	327,894 21	1,452 80	329,347 01
		430 23	Suspense Account		430 23	430 23
17,009 55	3,923,142 26	3,933,078 85	*Ontario*	3,922,769 23	10,309 62	3,933,078 85
50 00	70,263 49	70,509 82	Joliette	70,509 82		70,509 82
2,068 09	3,144,677 53	3,155,816 16	Montreal	3,141,234 76	14,581 40	3,155,816 16
961 72	486,850 96	488,054 89	Quebec	482,790 06	3,154 47	485,944 53
809 75	341,005 26	341,849 54	Sherbrooke	340,786 22	1,063 32	341,849 54
207 85	19,643 90	19,643 90	Sorel	19,643 90		19,643 90
340 00	45,860 56	45,900 33	St. Hyacinthe	45,865 24	35 09	45,900 33
61 95	61,451 27	61,755 56	Three Rivers	60,633 51	1,122 05	61,755 56
40 00	23,608 75	23,608 75	Victoriaville	23,608 75		23,608 75
			Suspense Account		2,110 36	2,110 36
4,539 36	4,193,361 72	4,207,138 95	*Quebec*	4,185,072 26	22,066 69	4,207,138 95
641 07	247,520 01	248,992 09	St. John	244,956 68	2,548 01	247,504 69
			Suspense Account		1,487 40	1,487 40
641 07	247,520 01	248,992 09	*New Brunswick*	244,956 68	4,035 41	248,992 09
20 00	2,474 04	2,474 04	Cape Breton	2,474 04		2,474 04
430 55	190,522 60	191,134 14	Halifax	190,242 24	891 90	191,134 14
50 00	29,361 79	29,361 79	Pictou	29,361 79		29,361 79
		5,860 50	Suspense Account		5,860 50	5,860 50
500 55	222,358 43	228,830 47	*Nova Scotia*	222,078 07	6,752 40	228,830 47
20 00	59,454 87	59,660 62	Charlottetown, *P.E.I.*	59,018 32	642 30	59,660 62

63 VICTORIA, A. 1900

EXCISE,

No. 3.—Collection Divisions

Dr. (*For Details, see*

Balances due 1st July, 1898.	Amount accrued during the Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum Inspection Fees.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
45 80	280,236 61	350 00	22,953 83	176,790 21	22,834 80	2,430 63	.....	421 50
....	19,015 26	200 00	6,993 96	2,512 51	....	93 43	....	.....
45 80	299,251 87	550 00	29,947 79	179,302 72	22,834 80	2,524 06	..... .	421 50
3,655 18	174,646 44	1,400 00	32,739 96	64,887 35	17,272 93	2,907 75	.....	373 60
664 20	151,145 07	250 00	20,922 28	39,238 54	9,626 70	289 85	....	67 50
4,319 38	325,791 51	1,650 00	53,662 24	104,125 89	26,899 63	3,197 60	.....	441 10
36,228 87	4,609,619 47	6,807 00	849,468 34	3,320,168 17	781,319 24	46,059 81	*16,077 91 33,494 41	10,713 12
.....	52,941 79	25 00	38,793 44	26,201 74	95 74	... .	50 00	244 65
.....	4,556,677 68	6,782 00	810,674 90	3,293,966 43	781,223 50	46,059 81	*16,077 91 33,444 41	10,468 47

Inland Revenue Department,
Ottawa, 25th September, 1899.

* Acetic acid.

SESSIONAL PAPER No. 7

1898-99.

in Account with Revenues—*Concluded.*

Appendix A.) CR.

Other Receipts.	Total Duties accrued.	Total Debits.	DIVISIONS.	Deposited to the credit of the Receiver General.	Balances due 30th June, 1899.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
660 30	506,677 88	506,723 68	..Winnipeg.....	501,051 47	5,672 21	506,723 68
120 00	28,935 16	28,935 16	..Calgary, N.W.T.....	28,935 16	.....	28,935 16
780 30	535,613 04	535,658 84	....*Manitoba and N.W.T.*.	529,986 63	5,672 21	535,658 84
580 00	294,808 03	298,463 21	..Vancouver.....	293,010 16	5,453 05	298,463 21
120 00	221,659 94	222,324 14	..Victoria.....	220,994 88	1,329 26	222,324 14
700 00	516,467 97	520,787 35	.....*British Columbia*....	514,005 04	6,782 31	520,787 35
24,190 83	9,697,918 30	9,734,147 17	.....Totals.....	9,677,886 23	56,260 94	9,734,147 17
310 47	118,662 83	.....	..LESS—Refunds as per Statement No. 16.			
23,880 36	9,579,255 47	.....	..Net Revenue.			

F. MIALL,
Commissioner.

63 VICTORIA, A. 1900

EXCISE,

No. 4.—Collection Divisions

Dr. (*For Details, see*

Balances due by Collectors, 1st July, 1898.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for			Balances due to Collectors, 30th June, 1899.	Totals.	Divisions.
		Superannuation.	Insurance.	Retirement.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
43 98	6,817 57	142 50				7,004 05	Belleville
	7,829 47	152 95	71 76			8,054 18	Brantford
	1,089 39	20 00				1,109 39	Cornwall
	17,418 27	348 17				17,766 44	Guelph
	19,280 67	377 22		47 32		19,705 21	Hamilton
	9,329 89	178 49			135 00	9,643 38	Kingston
	18,269 62	345 74		31 28	24 09	18,670 73	London
68 45	6,784 00	75 49		70 00		6,997 94	Ottawa
	5,046 21	89 25		16 32	42 69	5,194 47	Owen Sound.
	5,961 24	58 84		66 78		6,086 86	Perth
	4,564 30	87 92				4,652 22	Peterborough
	1,032 29	20 00				1,052 29	Port Arthur
	11,058 75	197 80			25 55	11,282 10	Prescott
	4,190 59	98 46			45 82	4,334 87	St. Catharines
	6,871 07	134 31			33 59	7,038 97	Stratford
	38,491 75	754 70		39 90		39,381 35	Toronto
	18,376 98	347 48		10 80	49 08	18,689 34	Windsor
	8,034 21	141 60				8,175 81	District Inspectors
112 43	190,446 27	3,570 92	71 76	282 40	355 82	194,839 60	*Ontario*
	3,468 80	40 60		40 67		3,550 07	Joliette
	39,509 59	713 59		81 53		40,304 71	Montreal
	13,790 02	235 27			141 72	14,167 01	Quebec
	8,355 16	109 49		81 50		8,546 15	Sherbrooke
	1,014 25	20 00				1,034 25	Sorel
	1,769 37	27 46		18 72	24 70	1,840 25	St. Hyacinthe
	2,045 01	39 00				2,084 01	Three Rivers
	959 51	15 00			88 94	1,063 45	Victoriaville
	4,656 15	37 98			21 13	4,715 26	District Inspectors
	75,567 86	1,238 39		222 42	276 49	77,305 16	*Quebec*
	10,023 05	182 68				10,205 73	St. John
	2,851 11	44 00				2,895 11	District Inspector
	12,874 16	226 68				13,100 84	*New Brunswick*
	252 45	3 75				256 20	Cape Breton.
	11,083 20	211 65				11,294 85	Halifax
	1,739 37	19 81		20 40		1,779 58	Pictou
	13,075 02	235 21		20 40		13,330 63	*Nova Scotia*
100 00	2,253 50	43 96				2,397 46	Charlottetown, *P.E.I.*
200 00	13,548 88	210 88		87 99		14,047 75	Winnipeg, Man
	3,925 48	42 02		25 00		3,992 50	Calgary, N.W.T
	3,480 20	50 00				3,530 20	District Inspector
200 00	20,954 56	302 90		112 99		21,570 45	*Manitoba and N.W.T.*

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in account with Expenditures.

Appendix B.) CR.

Balances due to Collectors, 1st July, 1898.	Expenditures authorized by the Department.						Balances due by Collectors, 30th June, 1899.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	6,549 18	.....	.....	.....	220 30	190 59	43 98	7,004 05
.....	6,977 52	12 45	.....	75 00	577 81	411 40	.....	8,054 18
.....	1,000 00	7 85	.....	.....	6 50	95 04	.....	1,109 39
.....	16,400 80	12 22	.....	96 00	647 35	610 07	.....	17,766 44
.....	19,210 49	.....	187 62	.....	80 25	226 85	.....	19,705 21
.....	8,930 00	.....	.....	270 00	68 85	374 53	.....	9,643 38
.....	17,434 96	43 25	124 00	80 00	585 49	403 03	.....	18,670 73
.....	6,708 36	51 20	.....	.....	82 20	87 73	68 45	6,997 94
.....	4,552 50	3 50	.....	132 20	338 50	167 77	.....	5,194 47
.....	5,569 96	.....	.....	96 00	122 28	298 62	.....	6,086 86
.....	4,400 00	23 65	.....	.....	52 61	175 96	.....	4,652 22
.....	1,000 00	.....	.....	.....	8 90	43 39	.....	1,052 29
.....	10,699 90	16 00	100 00	.....	10 55	455 65	.....	11,282 10
.....	3,695 00	7 85	239 81	48 00	230 79	113 42	.....	4,334 87
.....	6,402 50	9 75	.....	.....	338 50	288 22	.....	7,038 97
.....	37,917 50	159 26	96 10	.....	648 55	559 94	.....	39,381 35
49 08	17,798 51	.....	100 00	.....	248 40	493 35	.....	18,689 34
.....	7,083 30	.....	.....	50 00	897 68	144 83	.....	8,175 81
49 08	182,330 48	346 98	847 53	847 20	5,165 51	5,140 39	112 43	194,839 60
.....	3,113 12	.....	.....	.....	76 75	360 20	.....	3,550 07
403 98	35,884 34	137 05	2,349 62	.....	788 92	740 80	.....	40,304 71
.....	11,288 05	317 14	1,499 76	.....	547 93	514 13	.....	14,167 01
232 32	6,854 98	113 36	.....	300 00	537 55	507 94	.....	8,546 15
.....	1,000 00	11 60	.....	.....	9 40	13 25	.....	1,034 25
.....	1,750 00	13 35	.....	.....	21 30	55 60	.....	1,840 25
.....	1,950 00	13 50	.....	.....	57 80	62 71	.....	2,084 01
.....	500 00	.....	500 04	25 00	.....	38 41	.....	1,063 45
.....	4,399 96	.....	.....	.....	243 04	72 26	.....	4,715 26
636 30	66,740 45	606 00	4,349 42	325 00	2,282 69	2,365 30	.....	77,305 16
.....	9,256 25	46 05	.....	.....	520 75	382 68	.....	10,205 73
.....	2,200 00	.....	.....	.....	677 56	17 55	.....	2,895 11
.....	11,456 25	46 05	.....	.....	1,198 31	400 23	.....	13,100 84
.....	187 50	40 98	.....	.....	.....	27 72	.....	256 20
.....	10,595 00	165 97	.....	.....	139 86	394 02	.....	11,294 85
.....	1,398 06	71 31	.....	.....	191 49	118 72	.....	1,779 58
.....	12,180 56	278 26	.....	.....	331 35	540 46	.....	13,330 63
.....	2,200 00	.....	.....	30 00	.....	67 46	100 00	2,397 46
.....	11,745 04	39 71	668 00	265 00	543 60	586 40	200 00	14,047 75
.....	2,383 00	.....	62 00	110 00	1,099 07	338 43	.....	3,992 50
.....	2,500 00	.....	.....	.....	939 85	90 35	.....	3,530 20
.....	16,628 04	39 71	730 00	375 00	2,582 52	1,015 18	200 00	21,570 45

63 VICTORIA, A. 1900

EXCISE,

No. 4.—COLLECTION Divisions in

DR. *For Details, see*

Balances due by Collectors, 1st July, 1898.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for			Balances due to Collectors, 30th June, 1899.	Totals.	Divisions.
		Superannuation.	Insurance.	Retirement.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
.....	9,938 80	117 35	.....	127 64	114 94	10,298 73	. Vancouver .....
.....	5,076 87	109 08	.....	7 50	.....	5,193 45	..Victoria..... ... ...
.....	3,439 15	50 00	.....	.... ..	....	3,489 15	..District Inspector .....
.....	18,454 82	276 43	.....	135 14	114 94	18,981 33	....*British Columbia*.....
.....	182 81	....	.... .	.....	....	182 81	..Chief Inspector of Inland Revenue ....
....	186 08	.....	.....	.....	.....	186 08	..Inspector of Bonded Factories ....
....	22,495 04	.....	.....	.....	.....	22,495 04	..General Expenditure ...
.. ....	5,066 02	....	.....	.....	....	5,066 02	..Legal Expenses.. .....
.....	4,106 44	.....	.....	.....	.....	4,106 44	..Printing .....
... .	990 00	.....	.....	.....	.....	990 00	..Stationery ....
.....	283 25	.....	.....	.....	....	283 25	..Lithographing, Engraving, &c.. . .....
25 65	13,206 62	....	.....	.....	... .	13,232 27	..Preventive Service.....
... .	5,488 08	... .	.....	.....	.....	5,488 08	..Commission to Customs Officers .....
.....	90 00	.....	.....	.....	....	90 00	..Commission on sale of Stamps for Canada Twist. ....
... .	6,131 84	... .	.....	....	.....	6,131 84	.Duty-pay to officers in charge of most important establishments...
438 08	391,852 37	5,894 49	71 76	773 35	747 25	399,777 30	... *Grand Totals*..... ...

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

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account with Expenditures—*Concluded.*

Appendix B.) CR.

Balances due to Collectors, 1st July, 1898.	Expenditures authorized by the Department.						Balances due by Collectors, 30th June, 1899.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	6,820 06	63 50	1,213 75	809 00	712 80	679 62	....	10,298 73
....	4,340 00	10 00	480 00	120 00	54 40	189 05	.....	5,193 45
....	2,500 00	... .	....	.....	989 15	.... .	....	3,489 15
.. ..	13,660 06	73 50	1,693 75	929 00	1,756 35	868 67	.. . ...	18,981 33
.....	....	.. ..	. .. .	....	147 81	35 00	.....	182 81
.....	.....	.....	.....	.....	186 08	... .	.....	186 08
.....	.....	.....	.....	.....	. .. ...	22,495 04	.....	22,495 04
....	.....	.....	....	.....	.....	5,066 02	....	5,066 02
.....	.....	.....	.....	.....	.....	4,106 44	.. ..	4,106 44
.....	....	.....	.. ..	.....	.. ..	990 00	....	990 00
... ...	... ...	... ...	... ...	... ...	... ...	283 25	.....	283 25
111 19	2,537 46	.....	4,808 80	.....	2.858 47	2,915 70	0 65	13,232 27
.....	.. . .	....	.....	....	.....	5,488 08	....	5,488 08
.....	..... .	... .	.....	.....	.....	90 00	.....	90 00
.. ..	.....	....	.....	.....	.. ..	6,131 84	.....	6,131 84
796 57	307,733 30	1,390 50	12,429 50	2,506 20	16,509 09	57,999 06	413 08	399,777 80

E. MIALL,
Commissioner.

HYDRAULIC AND OTHER RENTS.

No. 5.—Summary Statement of Lessees' Accounts, 1898-99.

Dr. (*For Details, see Appendix A.*) Cr.

Balances due 1st July, 1898.	Accrued during the year ended 30th June, 1899.	Totals.	——	Deposited to the credit of the Receiver General.	Balances due 30th June, 1899.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
2,245 84	3,325 00	5,570 84	.... Chaudière Falls and Ottawa River	2,846 00	2,724 84	5,570 84
.....	27 00	27 00	.....St. Lawrence River	2 00	25 00	27 00
100 00	41 00	141 00	.....St. Maurice River	21 00	120 00	141 00
70 00	.....	70 00	.... Rivière du Lièvre	.....	70 00	70 00
345 00	324 00	669 00	.....Sundry properties	183 00	486 00	669 00
			Land Sales.			
15,573 50	.....	15,573 50	..... Principal Accounts	.....	15,573 50	15,573 50
9,474 83	.....	9,474 83	.....Interest "	.....	9,474 83	9,474 83
27,809 17	3,717 00	31,526 17	....Totals	3,052 00	28,474 17	31,526 17

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, 25th September, 1899.

DR. **No. 6.—MINOR PUBLIC WORKS, 1898-99.** CR.

Balances due 1st July, 1898.	Accrued during the year ended 30th June, 1899.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due 30th June, 1899.	Totals.
$ cts.	$ cts.	$ cts.	*Bridges.*	$ cts.	$ cts.	$ cts.
2,600 62	.....	2,600 62	Dunnville	.....	2,600 62	2,600 62
			Ferries.			
50 00	25 00	75 00	Bridgeburg and Black Rock	.....	75 00	75 00
.....	10 00	10 00	Bristol Ferry	.....	10 00	10 00
50 00	50 00	100 00	Buckingham and Cumberland	50 00	50 00	100 00
20 00	.....	20 00	Cardinal and Ogdensburg	20 00	.....	20 00
.....	10 00	10 00	Cross Point and Campbellton	10 00	.....	10 00
20 00	.....	20 00	Edmundston and Maine	.....	20 00	20 00
50 00	50 00	100 00	Fort Erie and Buffalo	100 00	.....	100 00
.....	1 00	1 00	Gould's Landing and Portage du Fort	1 00	.....	1 00
155 00	155 00	310 00	Hull (new lease)	155 00	155 00	310 00
1,736 79	.....	1,736 79	Hull (old lease)	.....	1,736 79	1,736 79
.....	30 00	30 00	La Passe and Gower Point	30 00	.....	30 00
.....	6 00	6 00	Montebello and Alfred	6 00	.....	6 00
50 00	50 00	100 00	Niagara and Youngstown	.....	100 00	100 00
.....	2 00	2 00	Ottawa and Kettle Island Ferry	2 00	.....	2 00
.....	1 00	1 00	Ouellette Street, Detroit	1 00	.....	1 00
.....	202 00	202 00	Pembroke and Allumette Island (new lease)	202 00	.....	202 00
1 00	.....	1 00	Pembroke and Allumette Island (old lease)	.....	1 00	1 00
.....	200 00	200 00	Prescott and Ogdensburg	200 00	.....	200 00
.....	10 00	10 00	Queenston	.....	10 00	10 00
.....	60 00	60 00	Queenston and Lewiston	60 00	.....	60 00
79 00	159 00	238 00	Quyon	79 00	159 00	238 00
.....	50 00	50 00	Rockliffe and Gatineau	50 00	.....	50 00
.....	100 00	100 00	Sault Ste. Marie	100 00	.....	100 00
30 00	.....	30 00	St. Leonard and Van Buren	.....	30 00	30 00
			Sundries.			
8,000 00	.....	8,000 00	Dundas and Waterloo Road	.....	8,000 00	8,000 00
.....	2 00	2 00	Government Telegraph Lines	2 00	.....	2 00

Dr. No. 6.—MINOR PUBLIC WORKS, 1898-99—*Concluded.* Cr.

Balances due 1st July, 1898.	Accrued during the year ended 30th June, 1899.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due 30th June 1899.	Totals.
$ cts.	$ cts.	$ cts.	*Sundries*—Concluded.	$ cts.	$ cts.	$ cts.
.....	175 00	175 00	.....Part of building, Portland, N.B....	175 00	.....	175 00
.....	25 00	25 00	.....Wiarton Docks.....	25 00	... .	25 00
12,842 41	1,373 00	14,215 41	.... Totals.....	1,268 00	12,947 41	14,215 41

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

No. 7.—CULLERS' REVENUE, 1898-99.

DR. *(For Details, see Appendix A.)* CR.

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Balances due 1st July, 1898.	Amounts accrued for measuring and culling timber during the year ended 30th June, 1899.	Totals.	——	Deposited to the credit of the Receiver General.	Balances due 30th June, 1899.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
38,507 90	10,624 38	49,132 28	.... Quebec.....	11,626 63	37,505 65	49,132 28
289 77	... .	289 77	..... Plamondon, M. A.....	.....	289 77	289 77
38,797 67	10,624 38	49,422 05	.. .. Totals	11,626 63	37,795 42	49,422 05

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

No. 8.—CULLERS' EXPENDITURES, 1898–99.

DR. (*For Details, see Appendix B.*) CR.

Balances due 1st July, 1898.	Received from Department to meet expenditure.	Deductions from Salaries for		Totals.	——	Authorized Expenditures.				Balances due 30th June, 1899.	Totals.
		Superannuation.	Retirement.			Salaries.	Contingencies.	Cullers' Fees.	Annuities.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
75 00	7,641 25	102 00	18 72	7,836 97	....Quebec	5,850 00	1,911 97	.....	.....	75 00	7,836 97
.....	9,800 00	.....	.....	9,800 00	....Superannuated Cullers and Cullers' Fees.	.....	.....	4,200 00	5,600 00	.....	9,800 00
.....	2 26	.....	.....	2 26	....Printing	.....	2 26	.....	.....	.....	2 26
.....	37 16	.....	.....	37 16	....Stationery	.....	37 16	.....	.....	.....	37 16
75 00	17,480 67	102 00	18 72	17,676 39	.....Totals.....	5,850 00	1,951 39	4,200 00	5,600 00	75 00	17,676 39

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

BILL STAMPS, 1898-99.

DR. **No. 9.—BILL STAMP Distributors in account with the Inland Revenue Department.** CR.

BALANCES, 1ST JULY, 1898.		Totals.		BALANCES, 30TH JUNE, 1899.		Totals.
Stamps on hand.	Cash on hand.			Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.		$ cts	$ cts.	$ cts.
1,372 77	.....	1,372 77	....Post Office Department	1,372 77	.....	1,372 77
.....	11 54	11 54	....Belleville, ex-Collector E. R. Benjamin	.....	11 54	11 54
.....	33 50	33 50	....Three Rivers, ex-Collector B. Lassalle	.....	33 50	33 50
160 00	.....	160 00	....McLeod, Colonel J. F., Fort McLeod	160 00	.....	160 00
1,532 77	45 04	1,577 81	.....Totals.....	1,532 77	45 04	1,577 81

LAW STAMPS, 1898-99.

DR. **No. 10.—LAW STAMP Distributors in account with the Inland Revenue Department.** CR.

Stamps received from Department.	Totals.		Commission of 5 per cent allowed by Department on Stamps sold.	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
2,000 00	2,000 00	....Cameron, R., Registrar, Supreme Court	100 00	1,900 00	2,000 00
2,502 00	2,502 00	....Audette, L. A., Registrar, Exchequer Court	125 10	2,376 90	2,502 00
4,502 00	4,502 00	.....Totals.....	225 10	4,276 90	4,502 00

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

DR. No. 11.—SUNDRY MINOR REVENUES, 1898-99. CR.

Accrued during the year ended 30th June, 1899.	Totals.	——	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
482 00	482 00	.. .Fertilizers Inspection Fees.....	482 00	482 00
104 00	104 00	....Adulteration of Food Fees.....	104 00	104 00
56 10	56 10	....Casual Revenue..	56 10	56 10
642 10	642 10	....Totals.....	642 10	642 10

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

No. 12.—SUNDRY MINOR EXPENDITURES, 1898-99.

DR. *(For Details, see Appendix B.)* CR.

Balances due 1st July, 1898.	Amounts received from Department to meet Expenditure	Deductions from Salaries for Superannuation.	Totals.	——	Salaries.	Contingencies.	Printing.	Stationery	Balance due 30th June, 1899.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
25 91	23,029 34	95 92	23,151 17	....Adulteration of Food..	8,850 46	13,877 44	223 29	174 17	25 81	23,151 17
200 00	5,100 00	.....	5,300 00	....Inspection of Staples	1,500 00	3,767 49	32 51	.....	.....	5,300 00
.....	78 66	....	78 66	....Minor Public Works.....	.....	73 51	5 15	.....	.....	78 66
225 91	28,208 00	95 92	28,529 83	..... Totals	10,350 46	17,718 44	260 95	174 17	25 81	28,529 83

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

No. 13.—STATEMENT showing the quantities of the several articles subject to 1897, 1898 and 1899, and

ARTICLES SUBJECT TO EXCISE DUTY.	1897.			
	QUANTITIES.			Duty.
	Ex-Manufactory.	Ex-Warehouse.	Totals.	
	Gallons.	Gallons.	Gallons.	$ cts.
Spirits	2,568	2,779,946	2,782,514	4,732,506 19
	Imported.	*125,378	125,378	37,613 38
	2,568	2,905,324	2,907,892	4,770,119 57
Malt Liquor, the duty being paid on malt	17,888,239		17,888,239	479 70
	Lbs.	Lbs.	Lbs.	
Malt	57,720	68,385,633	68,443,353	1,026,652 13
	No.	No.	No.	
Cigars	67,469,160	45,806,945	113,276,105	678,029 67
Cigarettes	92,134,000	1,664,000	93,798,000	156,257 85
	Lbs.	Lbs.	Lbs.	
Tobacco from Foreign Leaf	929,077	8,071,528	9,000,605	2,250,151 57
" Canadian Leaf	537,463	188,618	726,081	36,304 25
" Combination Leaf				
Snuff	237,020		237,020	43,041 95
Canadian Twist		78,371	78,371	3,918 53
Raw Leaf Tobacco, Foreign		648,688	648,688	65,027 20
	1,703,560	8,987,205	10,690,765	2,398,443 50
Inspection Fees on Petroleum				42,017 61
Vinegar and Acetic Acid				35,787 31
Licenses, Spirits				2,250 00
" Malt Liquor				6,325 00
" Malt				6,075 00
" Cigars				12,250 00
" Tobacco				2,310 00
" Vinegar and Acetic Acid				1,450 00
Totals				9,138,447 34

* Spirits imported for use in the manufacture of crude fulminate on which duty, at the rate of 30

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

Excise Duty taken for Consumption, during the years ended 30th June, the Duty accrued thereon.

1898.				1899.			
Quantities.			Duty.	Quantities.			Duty.
Ex-Manufactory.	Ex-Warehouse.	Totals.		Ex-Manufactory.	Ex-Warehouse.	Totals.	
Gallons.	Gallons.	Gallons.	$ cts.	Gallons.	Gallons.	Gallons.	$ cts.
3,866	1,874,479	1,878,345	3,563,575 92	5,571	2,404,599	2,410,170	4,566,147 06
Imported.	*94,681	94,681	28,404 39	Imported.	*137,825	137,825	41,347 41
3,866	1,969,160	1,973,026	3,591,980 31	5,571	2,542,424	2,547,995	4,607,494 47
19,871,738	.....	19,871,738	101 00	21,101,873	.....	21,101,873	57 00
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
1,934,547	37,020,168	38,954,715	584.321 14	19,121	46,193,701	46,212,822	843,193 34
No.	No.	No.		No.	No.	No.	
68,320,283	44,811,940	113,132,223	676,577 34	72,965,468	55,953,630	128,919,098	768,496 74
79,457,817	1,105,000	80,562,817	240,343 70	100,609,828	533,500	101,143,328	302,841 24
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
821,324	5,827,009	6,648,333	1,662,070 10	719,987	6,385,800	7,105,787	1,776,457 27
1,630,737	257,222	1,887,959	94,398 03	1,564,167	622,260	2,186,427	109,321 37
.....	.....	.....	.....	263,906	88,299	352,205	17,610 28
223,175	.....	223,175	40,610 37	218,225	.....	218,225	39,700 85
.....	55,379	55,379	2,768 96	.....	84,115	84,115	4,205 76
.....	8,506,199	8,506,199	851,786 25	.....	10,239,863	10,239,863	1,067,656 40
2,675,236	14,645,809	17,321,045	2,651,633 71	2,766,285	17,420,337	20,186,622	3,014,951 93
.....	.....	.....	44,648 15	.....	.....	.....	46,059 81
.....	.....	.....	35,176 96	.....	.....	.....	47,572 32
.....	.....	.....	2,000 00	.....	.....	.....	2,125 00
.....	.....	.....	6,750 00	.....	.....	.....	6,750 00
.....	.....	.....	5,575 00	.....	.....	.....	6,275 00
.....	.....	.....	12,220 00	.....	.....	.....	12,822 50
.....	.....	.....	2,308 00	.....	.....	.....	2,375 00
.....	.....	.....	1,800 00	.....	.....	.....	2,000 00
.....	.....	.....	7,855,435 31	.....	.....	.....	9,663,014 35

cents per gallon, was collected and afterwards refunded, on the exportation of the fulminate.

E. MIALL,
Commissioner.

No. 14.—Amounts deposited monthly to the credit of the Honourable the Receiver General on account of Inland Revenues, during the Fiscal Year ended 30th June, 1899.

——	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North-west Territories.	British Columbia.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July:—								
Excise	267,522 08	282,243 41	18,790 49	15,441 35	2,763 30	35,073 96	39,564 01	661,398 60
" Seizures	194 40	176 65		50 00				421 05
Culling Timber		1,254 05						1,254 05
Hydraulic Rents	1 00	1 00					25 00	27 00
Weights and Measures	1,297 47	935 01	52 15		19 85		6 70	2,311 18
Gas Inspection	70 25	628 00		86 25				784 50
Electric Light Inspection		89 00		18 75			17 50	125 25
Other Revenues	1,570 00	175 00	155 00	25 00	25 00	60 00	90 00	2,100 00
Totals	270,655 20	285,502 12	18,997 64	15,621 35	2,808 15	35,133 96	39,703 21	668,421 63
August:—								
Excise	309,396 84	340,958 50	20,097 65	15,902 22	4,892 80	41,587 32	39,523 42	772,358 75
" Seizures	60 00	433 80		131 82			150 00	775 62
Culling Timber		1,789 04						1,789 04
Hydraulic Rents	200 00	20 00					50 00	270 00
Minor Public Works	201 00		43 75					244 75
Weights and Measures	1,897 25	1,852 55	93 00	47 45	43 28	697 88	23 85	4,655 26
" " Seizures		10 00						10 00
Gas Inspection	685 00	24 50	14 75	45 75	6 75	29 75	35 75	842 25
Electric Light Inspection	121 25	63 00		19 50			28 25	232 00
Other Revenues	955 50	395 00	10 00	180 00	38 00	140 00	75 00	1,793 50
Totals	313,516 84	345,546 39	20,259 15	16,326 74	4,980 83	42,454 95	39,886 27	782,971 17
September:—								
Excise	324,683 93	358,144 41	20,426 96	18,053 89	4,756 68	46,459 15	53,121 38	825,646 40
" Seizures	20 00	450 10		80 25			125 00	675 35
Culling Timber		671 67						671 67
Hydraulic Rents	250 00						11 00	261 00
Weights and Measures	1,423 03	1,759 70	111 15	490 76	49 80	378 90	59 90	4,273 24
" " Seizures		5 00						5 00
Gas Inspection	758 50	495 25	28 50	47 25			179 75	1,509 25
Electric Light Inspection	190 75	293 75	32 75	10 25			34 75	562 25
Other Revenues	682 75	74 00	13 00	60 00			10 00	839 75
Totals	328,008 96	361,893 88	20,612 36	18,742 40	4,806 48	46,838 05	53,541 78	834,443 91

OCTOBER :—								
Excise	365,970 18	381,572 74	23,757 30	23,539 40	5,554 05	48,837 71	39,918 79	889,150 17
" Seizures	75 00	371 37					43 60	489 97
Culling Timber		736 59						736 59
Hydraulic Rents	50 00						13 00	63 00
Weights and Measures	2,974 73	1,325 76	254 79	244 65	29 69	167 51	10 50	5,007 63
Gas Inspection	889 75	575 00	71 75	79 00		57 00	55 00	1,727 50
Electric Light Inspection	290 50	84 25	26 25	9 50			48 50	459 00
Other Revenues	299 25						35 00	334 25
Totals	370,549 41	384,665 71	24,110 09	23,872 55	5,583 74	49,062 22	40,124 39	897,968 11
NOVEMBER :—								
Excise	344,870 54	361,538 14	20,755 84	19,524 91	5,371 74	51,760 69	38,692 54	842,514 40
" Seizures	276 00	484 96		75 00				835 96
Culling Timber		992 10						992 10
Hydraulic Rents	105 00	1 00					5 00	111 00
Minor Public Works	51 00		43 75					94 75
Weights and Measures	1,288 30	947 02	126 10	218 03	65 94	541 90	54 40	3,241 69
" " Seizures		10 00						10 00
Gas Inspection	855 25	612 00	28 75	41 00	3 50	14 25	117 50	1,672 25
Electric Light Inspection	303 50	199 75	3 50	34 75		8 25	38 75	588 50
Other Revenues	385 00	47 50		55 00	1 00			488 50
Totals	348,134 59	364,832 47	20,957 94	19,948 69	5,442 18	52,325 09	38,908 19	850,549 15
DECEMBER :—								
Excise	365,832 92	423,512 71	22,474 51	23,879 35	5,553 56	44,768 33	46,247 97	932,269 35
" Seizures	237 00	117 30				100 00		454 30
Culling Timber		1,528 05						1,528 05
Hydraulic Rents	300 00	1 00						301 00
Minor Public Works							1 00	1 00
Weights and Measures	1,553 82	486 05	72 75	174 20	34 55	207 80	8 00	2,537 17
" " Seizures	5 00	30 40						35 40
Gas Inspection	702 00	584 75	20 00	47 75	1 50	33 50	57 50	1,447 00
Electric Light Inspection	217 75	351 75	13 50	27 25			130 25	740 50
Other Revenues	719 50	10 00				9 00		738 50
Totals	369,567 99	426,622 01	22,580 76	24,128 55	5,589 61	45,118 63	46,444 72	940,052 27
JANUARY :—								
Excise	318,239 23	280,489 42	16,989 66	18,114 65	4,079 10	50,167 01	38,323 81	726,402 88
" Seizures	5 00	126 18						131 18
Hydraulic Rents	250 00							250 00
Minor Public Works	26 00							26 00
Weights and Measures	2,737 65	482 40	86 25	41 40	7 50	146 85	53 70	3,555 75
Gas Inspection	899 50	527 75	112 50	91 50	18 00	25 00	89 75	1,764 00
Electric Light Inspection	360 00	260 25	24 00	49 25		44 75	42 00	780 25
Other Revenues	565 15	21 00	23 00	7 00				616 15
Totals	323,082 53	281,907 00	17,235 41	18,303 80	4,104 60	50,383 61	38,509 26	733,526 21

No. 14.—Amounts deposited monthly to the credit of the Honourable the Receiver General, &c.—*Concluded.*

——	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North-west Territories.	British Columbia.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
February :—								
Excise	308,538 26	321,752 76	17,874 72	14,824 24	3,653 94	32,486 94	33,827 50	732,958 36
" Seizures	242 45	725 91	5 00	10 00	.....	21 50	.....	1,004 86
Culling Timber	.....	315 19	.....	.....	.....	.....	.....	315 19
Hydraulic Rents	701 00	.....	.....	16 00	.....	.....	1 00	718 00
Minor Public Works	.....	50 00	43 75	.....	.....	.....	.....	93 75
Weights and Measures	1,428 64	734 20	36 10	63 95	13 75	167 90	54 15	2,498 69
Gas Inspection	790 00	503 00	14 75	13 50	2 25	.....	47 00	1,370 50
Electric Light Inspection	196 25	164 50	5 25	28 75	.....	.....	49 25	444 00
Other Revenues	314 50	25 00	.....	18 00	1 00	.....	.....	358 50
Totals	312,211 10	324,270 56	17,979 57	14,974 44	3,670 94	32,676 34	33,978 90	739,761 85
March :—								
Excise	316,522 85	332,676 66	17,956 74	18,811 75	4,984 05	39,745 53	40,882 16	771,579 74
" Seizures	403 40	303 84	7 50	.....	.....	.....	17 50	732 24
Hydraulic Rents	485 00	1 00	.....	.....	.....	.....	.....	486 00
Minor Public Works	1 00	79 00	.....	.....	.....	.....	.....	80 00
Weights and Measures	2,234 07	902 34	33 38	25 35	14 75	161 45	21 50	3,392 84
Gas Inspection	800 25	572 75	11 50	.....	0 75	.....	.....	1,385 25
Electric Light Inspection	156 25	425 50	.....	10 50	.....	139 25	141 75	873 25
Other Revenues	356 85	10 00	.....	12 00	3 00	.....	.....	381 85
Totals	320,959 67	334,971 09	18,009 12	18,859 60	5,002 55	40,046 23	41,062 91	778,911 17
April :—								
Excise	344,699 47	362,932 19	17,367 29	16,445 99	6,199 05	40,978 28	39,047 44	827,669 71
" Seizures	116 35	439 28	.....	10 00	.....	200 00	.....	765 63
Hydraulic Rents	.....	51 00	.....	.....	.....	.....	.....	51 00
Minor Public Works	.....	6 00	.....	.....	.....	.....	.....	6 00
Weights and Measures	3,042 39	1,545 70	77 82	45 15	26 45	360 95	87 55	5,186 01
Gas Inspection	950 25	78 00	67 50	57 50	11 00	63 00	37 50	1,264 75
Electric Light Inspection	200 50	45 50	76 00	45 25	.....	118 00	52 50	537 75
Other Revenues	372 50	10 00	.....	5 00	.....	.....	.....	387 50
Totals	349,381 46	365,107 67	17,588 61	16,608 89	6,236 50	41,720 23	39,224 99	835,868 35

MAY:—								
Excise	349,225 28	369,031 54	25,411 90	17,971 78	7,416 25	43,910 03	46,089 67	859,056 45
" Seizures	919 50	600 50	75 00	320 60		100 00		2,015 60
Culling Timber		266 93						266 93
Hydraulic Rents	2 00						1 00	3 00
Minor Public Works	412 00	31 00	43 75					486 75
Weights and Measures	2,104 03	2,020 16	74 10	85 95	8 85	140 15	62 15	4,495 39
Gas Inspection	942 25	585 50	50 75	25 00	2 00	29 00	22 75	1,657 25
Electric Light Inspection	257 75	213 50	31 50	9 75		59 75	60 00	632 25
Other Revenues	453 25		1 00		3 00		24 00	481 25
JUNE:—								
Totals	354,316 06	372,749 13	25,688 00	18,413 08	7,430 10	44,238 93	46,259 57	869,094 87
Excise	303,939 81	364,767 27	22,916 12	18,640 87	3,793 80	53,790 18	58,325 25	826,173 30
" Seizures	778 74	1,222 62	50 00	250 00			105 00	2,406 36
Culling Timber		4,073 01						4,073 01
Hydraulic Rents	460 00				1 00		50 00	511 00
Minor Public Works	235 00							235 00
Weights and Measures	3,989 43	2,028 89	257 15	558 03	82 65	290 15	32 40	7,238 70
Gas Inspection	1,333 50	1,355 50	123 25	13 75	28 25	57 50	280 75	3,192 50
Electric Light Inspection	361 00	557 25	105 50	54 50		38 50	136 50	1,253 25
Other Revenues	555 25	13 00	1 00					569 25
Totals	311,652 73	374,017 54	23,453 02	19,517 15	3,905 70	54,176 33	58,929 90	845,652 37
Grand Totals	3,972,036 54	4,222,085 57	247,471 67	225,317 24	59,561 38	534,174 57	516,574 09	9,777,221 06
Methylated Spirits								92,467 60
Total, agreeing with Statement No. 1, page 3								9,869,688 66

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

EXCISE

No. 15.—COMPARATIVE Monthly

——	July.	August.	September.	October.	November.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Spirits. 1897-98	95,915 60	166,594 89	240,033 02	295,682 48	328,295 80
Spirits. 1898-99	317,872 76	368,708 45	388,014 13	438,321 34	435,554 71
Increase, 1898-99	221,957 16	202,113 56	147,981 11	142,638 86	107,258 91
Decrease, 1898-99					
Malt Liquor. 1897-98	6,050 00	150 00	179 80	271 20	50 00
Malt Liquor. 1898-99	6,200 00	100 00	100 00	50 00	
Increase, 1898-99	150 00				
Decrease, 1898-99		50 00	79 80	221 20	50 00
Malt. 1897-98	13,309 68	11,602 98	11,474 30	23,084 54	53,051 29
Malt. 1898-99	46,419 74	54,754 28	65,639 29	67,458 20	77,966 51
Increase, 1898-99	33,110 06	43,151 30	54,164 99	44,373 66	24,915 22
Decrease, 1898-99					
Tobacco. 1897-98	160,044 74	247,381 67	265,830 60	258,037 99	260,509 90
Tobacco. 1898-99	260,941 98	293,499 82	283,377 23	296,713 48	289,356 12
Increase, 1898-99	100,897 24	46,118 15	17,546 63	38,675 49	28,846 22
Decrease, 1898-99					
Cigars. 1897-98	60,050 69	49,900 17	55,019 75	57,284 97	56,525 12
Cigars. 1898-99	74,880 40	68,775 47	66,915 06	69,627 74	62,732 64
Increase, 1898-99	14,829 71	18,875 30	11,895 31	12,342 77	6,207 52
Decrease, 1898-99					
Petroleum. 1897-98	1,842 09	3,377 86	4,989 76	5,965 95	5,774 38
Petroleum. 1898-99	2,178 55	3,397 35	5,293 47	6,223 86	5,942 77
Increase, 1898-99	336 46	19 49	303 71	257 91	168 39
Decrease, 1898-99					
Manufactures in bond. 1897-98	2,677 47	2,917 13	3,389 65	3,523 55	2,668 42
Manufactures in bond. 1898-99	3,656 14	2,399 83	2,959 35	4,063 17	3,036 95
Increase, 1898-99	978 67			539 62	368 53
Decrease, 1898-99		517 30	430 30		
Seizures. 1897-98	221 70	519 57	613 80	443 51	519 55
Seizures. 1898-99	571 05	750 62	723 94	316 38	835 96
Increase, 1898-99	349 35	231 05	110 14		316 41
Decrease, 1898-99				127 13	
Other Receipts. 1897-98	5,237 17	1,538 07	1,464 98	1,507 03	1,253 00
Other Receipts. 1898-99	6,999 17	9,919 52	5,379 70	2,189 35	1,525 13
Increase, 1898-99	1,762 00	8,381 45	3,914 72	682 32	272 13
Decrease, 1898-99					
Total Increase, 1898-99	374,370 65	318,323 00	235,406 51	239,162 30	168,303 33
Total Decrease, 1898-99					
Total Revenue, 1897-98	345,349 14	483,982 34	582,995 66	645,801 22	708,647 46
" 1898-99	719,719 79	802,305 34	818,402 17	884,963 52	876,950 79

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

SESSIONAL PAPER No. 7

REVENUE.

Statement, 1897–98 and 1898–99.

December.	January.	February.	March.	April.	May.	June.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
484,848 89	285,214 10	307,737 93	325,851 92	348,496 39	338,541 16	376,768 13	3,593,980 31
527,502 89	362,923 27	347,630 41	332,929 47	382,527 17	361,841 23	345,793 64	4,609,619 47
42,654 00	77,709 17	39,892 48	7,077 55	34,030 78	23,300 07	.....	1,015,639 16
.....	.....	.....	.....	.....	.....	30,974 49	.....
.....	50 00	.....	25 00	50 00	.....	25 00	6,851 00
100 00	75 00	107 00	75 00	.....	.....	.....	6,807 00
100 00	25 00	107 00	50 00	.....	.....	.....	.....
.....	.....	.....	.....	50 00	.....	25 00	44 00
55,459 90	67,936 96	64,298 35	91,333 84	92,322 90	55,704 80	50,316 60	589,896 14
65,623 13	61,962 47	64,701 56	77,740 16	119,956 65	87,647 29	59,599 06	849,468 34
10,163 23	.....	403 21	.....	27,633 75	31,942 49	9,282 46	259,572 20
.....	5,974 49	.....	13,593 68	.....	.....	.....	.....
213,561 59	233,801 50	236,376 69	285,088 50	259,066 47	252,097 30	222,488 46	2,894,285 41
241,662 22	231,032 27	258,127 09	274,472 91	280,675 61	327,620 64	282,688 80	3,320,168 17
28,100 63	.....	21,750 40	.....	21,609 14	75,523 34	60,200 34	425,882 76
.....	2,769 23	.....	10,615 59	.....	.....	.....	.....
56,827 14	45,543 97	46,544 21	60,526 38	61,626 33	69,238 86	69,709 75	688,797 34
63,336 57	50,997 71	56,703 42	59,428 92	62,804 34	71,852 41	73,264 56	781,319 24
6,509 43	5,453 74	10,159 21	.....	1,178 01	2,613 55	3,554 81	92,521 90
.....	.....	.....	1,097 46	.....	.....	.....	.....
5,179 13	4,137 43	3,426 70	3,087 37	2,057 48	2,511 77	2,298 23	44,648 15
5,098 02	4,074 17	3,299 01	3,309 71	2,399 69	2,428 46	2,414 75	46,059 81
.....	.....	.....	222 34	342 21	.....	116 52	1,411 66
81 11	63 26	127 69	.....	.....	83 31	.....	.....
1,816 07	1,668 81	1,770 73	2,159 66	3,040 50	2,989 39	3,976 31	32,597 69
2,350 84	1,837 14	2,038 22	2,754 01	2,230 72	3,324 15	2,843 89	33,494 41
534 77	168 33	267 49	594 35	.....	334 76	.....	896 72
.....	.....	.....	.....	809 78	.....	1,132 42	.....
560 37	943 95	856 82	1,343 93	709 97	123 28	516 93	7,373 38
454 30	206 18	947 36	731 12	1,202 75	1,743 90	2,229 56	10,713 12
.....	.....	90 54	.....	492 78	1,620 62	1,712 63	3,339 74
106 07	737 77	.....	612 81	.....	.....	.....	.....
1,462 48	1,114 22	668 68	1,910 70	1,268 68	2,048 45	1,689 33	21,162 79
1,479 42	1,249 40	1,547 84	3,087 49	859 49	3,353 49	2,078 74	40,268 74
16 94	135 18	879 16	1,176 79	.....	1,905 04	389 41	19,105 95
.....	.....	.....	.....	409 19	.....	.....	.....
87,891 82	73,946 67	73,421 80	.....	84,017 70	137,156 56	43,124 26	1,818,326 09
.....	.....	.....	16,798 51	.....	.....	.....	.....
819,715 57	640,410 94	661,680 11	771,327 30	758,638 72	723,255 01	727,788 74	7,879,592 21
907,607 39	714,357 61	735,101 91	754,528 79	852,656 42	860,411 57	770,913 00	9,697,918 30

E. MIALL,
Commissioner.

No. 16.—Refunds of Revenue during the Fiscal Year ended 30th June, 1899.

EXCISE.

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1898.			$ cts.	$ cts
Spirits	Eastern Townships Bank	Aug 2	Sherbrooke	Refunded under Revised Statutes, cap. 34, sec. 238	9,597 86	
	Heney, J. J	Oct. 25	Prescott	" " 34 " 238	8,163 35	
	Turner, Jas., & Co	" 26	Hamilton	" " 29 " 78	54 76	
	Bolmer, J. E	Dec. 7	Windsor	" " 34 " 238	1,243 16	
		1899.				
	Heney, J. J	April 19	Prescott	" " 34 " 238	7,720 38	
	"	" 27	"	" " 34 " 238	7,496 00	
	"	May 4	"	" " 34 " 238	5,642 32	
	Swift, E G	" 12	Windsor	" " 34 " 238	160 25	
	"	" 12	"	" " 34 " 238	5 98	
	"	" 12	"	" " 34 " 238	26 09	
	"	" 18	"	" " 34 " 238	107 00	
	"	" 18	"	" " 34 " 238	86 53	
	"	" 18	"	" " 34 " 238	121 07	
	"	" 18	"	" " 34 " 238	123 86	
	"	" 22	"	" " 34 " 238	100 42	
	"	June 6	"	" " 34 " 238	147 95	
	Eastern Townships Bank	" 13	Sherbrooke	" " 34 " 238	11,082 20	
	Swift, E. G	" 13	Windsor	" " 34 " 238	370 08	
	"	" 20	"	" " 34 " 238	169 65	
	"	" 26	"	" " 34 " 338	293 21	
	"	July 21	"	" " 34 " 238	229 67	
						52,941 79
		1899.				
Malt Liquor	Shoenith, Geo	April 22	Windsor	" " 29 " 78	25 00	
						25 00
		1898.				
Malt	Wilson, Wm	July 12	Toronto	" " 29 " 78	170 99	
	Labatt, John	" 18	London	" " 29 " 78	531 25	
	Carling, T. H.	" 18	"	" " 29 " 78	747 78	
	Roy, Jas. A	" 25	Belleville	" " 29 " 78	207 21	
	Sleeman, Geo	" 25	Guelph	" " 29 " 78	1,085 86	

Huether, C. N.	"	*25*	"	"	"	*29*	"	*78*	*200*	*12*
Bauer, Aloyes	"	*25*	"	"	"	*29*	"	*78*	*473*	*80*
Bernhardt, P.	"	*25*	"	"	"	*29*	"	*78*	143	63
Holliday, Thos.	"	*25*	"	"	"	*29*	"	*78*	45	35
Lutz, W. H.	"	25	"	"	"	29	"	78	43	17
Rau, Mary	"	25	"	"	"	29	"	78	179	14
Wilson, M. S.	"	25	Hamilton	"	"	29	"	78	1,365	72
Steele, Jas. J	"	25	"	"	"	29	"	78	658	39
Lottridge, Jas. M.	"	25	"	"	"	29	"	78	574	41
Clarke, L. H.	"	25	Kingston	"	"	29	"	78	1,561	13
Fisher, John	"	25	"	"	"	29	"	78	82	21
Stevenson, Thos	"	25	"	"	"	29	"	78	82	91
Ottawa Brewing and Malting Co	"	25	Ottawa	"	"	29	"	78	137	73
Anderson, A.	"	25	"	"	"	29	"	78	70	65
Bowie, R.	"	25	Prescott	"	"	29	"	78	107	56
Prescott Brewing and Malting Co	"	25	"	"	"	29	"	78	107	02
Wiser, J. P.	"	25	"	"	"	29	"	78	118	13
McCarthy, D. J.	"	25	"	"	"	29	"	78	426	62
Watson, Jno.	"	25	Stratford	"	"	29	"	78	97	88
Devlin, Felix	"	25	"	"	"	29	"	78	55	08
Clarke, L. H.	"	25	"	"	"	29	"	78	744	50
"	"	25	"	"	"	29	"	78	1,444	37
Reinhardt, L.	"	25	Toronto	"	"	29	"	78	706	20
Brain, Ed	"	25	"	"	"	29	"	78	108	53
Davies, Robt.	"	25	"	"	"	29	"	78	1,650	20
Cosgrove, L. J	"	25	"	"	"	29	"	78	474	16
Toronto Brewing and Malting Co	"	25	"	"	"	29	"	78	359	36
O'Keefe, Eug.	"	25	"	"	"	29	"	78	909	95
Thomas, W. J	"	25	"	"	"	29	"	78	200	83
Simpson, T. W.	"	25	"	"	"	29	"	78	102	26
Clarke, J. A. P.	"	25	"	"	"	29	"	78	54	42
Anderton, J. W.	"	25	"	"	"	29	"	78	97	82
Hiram Walker & Sons	"	25	Windsor	"	"	29	"	78	1,033	80
Boswell & Bros	"	25	Quebec	"	"	29	"	78	858	28
Drewry, Ed. L.	"	25	Winnipeg	"	"	29	"	78	528	99
Shea, Patrick	"	25	"	"	"	29	"	78	141	91
O'Dwyer, Patrick	"	27	London	"	"	29	"	78	136	38
Schwartz, J. S.	"	27	Owen Sound	"	"	29	"	78	2	25
Eaton, C.	"	27	"	"	"	29	"	78	159	50
Huether, Wm.	"	27	"	"	"	29	"	78	96	01
Farquharson & Grainger	"	27	Windsor	"	"	29	"	78	93	15
Cronmiller & White.	"	27	St. Catharines	"	"	29	"	78	177	07
Martini, Joseph.	"	27	Stratford	"	"	29	"	78	44	32
Kuntz, Jacob.	"	27	"	"	"	29	"	78	63	23
Roy, Joseph	"	27	Joliette.	"	"	29	"	78	30	44
Dawes, A. J.	"	27	Montreal	"	"	29	"	78	1,223	78

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1898.			$ cts.	$ cts.
Malt—*Continued*...	Reinhardt, C. S.....	July 27..	Montreal.....	Refunded under Revised Statutes, cap. 29, sec. 78....	335 24	
	Scott, J. P.....	" 27..	"	" " 29 " 78....	2,184 74	
	LaCourt, P. H. de.....	" 27..	"	" " 29 " 78 ...	29 25	
	Molson, J. T.....	" 27..	"	" " 29 " 78. ..	4 51	
	Clouthier, D.....	" 27..	"	" " 29 " 78....	10 53	
	Ready, Jas.....	" 27..	St. John, N.B....	" " 29 " 78....	357 33	
	Oland, J. C.....	" 27..	Halifax.....	" " 29 " 78...	397 25	
	Wickwire, W. N.....	" 27..	"	" " 29 " 78....	503 96	
	May, John P.....	" 27..	"	" " 29 " 78....	54 00	
	Kingdon, A	" 27..	Winnipeg.....	" " 29 " 78...	29 12	
	Cross, A. E	" 27..	Calgary...	" " 29 " 78 ...	147 34	
	Kelly & Omand.....	" 27..	"	" " 29 " 78...	23 97	
	Ochsner, Robert	" 27..	"	" " 29 " 78....	25 65	
	Cairns, Mary.....	" 27..	"	" " 29 " 78...	1 50	
	Proteau & Carignan.....	" 30..	Quebec	" " 29 " 78....	203 63	
	Blackwood, Wm.....	" 30..	Winnipeg.....	" " 29 " 78....	162 87	
	Bernhardt, P.....	Aug. 2..	Guelph.....	" " 29 " 78....	5 00	
	Bixel, A.....	" 13..	Brantford	" " 29 " 78....	206 44	
	Luke, C.....	" 13..	"	" " 29 " 78....	60 69	
	Calcutt, H	" 13..	Peterborough....	" " 29 " 78 ...	186 44	
	Woodhouse, J. A	" 13..	"	" " 29 " 78....	75 90	
	Healey, Owen.....	" 13..	"	" " 29 " 78....	12 63	
	Taylor, H. J.	" 13..	St. Catharines ..	" " 29 " 78....	428 90	
	Nutter, S. C...	" 13..	Sherbrooke..	" " 29 " 78....	495 21	
	Wittemann, K.....	" 13..	Winnipeg.....	" " 29 " 78....	39 81	
	Woodman, C	" 13..	"	" " 29 " 78....	12 04	
	Union Brewing Co.....	" 13..	Victoria	" " 29 " 78..	60 00	
	Victoria Phœnix B. Co....	" 13..	"	" " 29 " 78...	60 00	
	Benoit, R. J.....	" 31..	Sherbrooke..	" " 29 " 78 ..	22 50	
	Amyot & Gauvin.....	Sept. 14..	Quebec.....	" " 29 " 78....	81 00	
	Sleeman, Geo.....	" 29..	Guelph.....	" " 29 " 78....	456 71	
	Carling, T. H.....	" 29..	London.....	" " 29 " 78....	62 96	
	Prescott B. & M. Co	" 29..	Prescott.....	" " 29 " 78 ...	76 59	
	Witteman, K	" 29..	Winnipeg.....	" " 29 " 78....	43 84	
	Victoria Phœnix B. Co....	Oct. 5..	Victoria.....	" " 34 " 178...	259 19	
	Wickwire, W. N	" 5..	Halifax.....	" " 34 " 178....	1,587 42	

	Oland, J. C	"	5..	"	"	"	34	"	178....	52 23	
	Walkerville B. Co	"	5..	*Windsor*	"	"	34	"	178....	17 37	
	Labatt, John	"	5..	*London*	"	"	34	"	178....	21 93	
	Prescott B. & M. Co	"	26..	*Prescott*	"	"	29	"	78....	298 12	
	Hamilton, Jos	"	26..	*London*	"	"	29	"	78....	18 36	
	Otterbein, C	Dec.	3..	Brantford	"	"	29	"	78....	87 33	
	Winfindale, A. H	"	6..	Ottawa	"	"	29	"	78....	169 26	
	Prescott B. & M. Co	"	27..	Prescott	"	"	29	"	78....	392 27	
			1899.								
	Prescott B & M. Co	Jan.	5..	Prescott	"	"	29	"	78....	384 03	
	Sleeman, Geo	"	5..	Guelph	"	"	29	"	78....	1,151 48	
	Wilson, Wm	"	16..	Toronto	"	"	29	"	78....	139 74	
	McCready, Jno. T	"	16..	St. John, N.B.	"	"	29	"	78....	114 00	
	Oland, Jno. C	"	17..	Halifax	"	"	34	"	178....	98 67	
	Walkerville B. Co	"	17..	Windsor	"	"	34	"	238....	14 67	
	Wickwire, W. N	"	17..	Halifax	"	"	34	"	178....	1,695 53	
	Victoria Phœnix B. Co	"	17..	Victoria	"	"	34	"	178....	356 82	
	Wickwire, W. N	Feb.	16..	Halifax	"	"	34	"	238....	147 25	
	Doering & Marstrand	"	23..	Vancouver	"	"	29	"	78....	45 00	
	Carling, T. H	Mar.	23..	London	"	"	29	"	78....	141 02	
	Walkerville B. Co	April	7..	Windsor	"	"	34	"	238....	17 85	
	Oland, Jno. C	"	7..	Halifax	"	"	34	"	238....	144 33	
	Wickwire, W. N	"	7..	"	"	"	34	"	238....	1,078 07	
	Victoria Phœnix B. Co	"	7..	Victoria	"	"	34	"	238....	290 43	
	Star Brewing Co	"	22..	Montreal	"	"	29	"	78....	139 59	
	Amyot & Gauvin	"	22..	Quebec	"	"	29	"	78....	452 39	
	Schoenith, Geo	"	24..	Windsor	"	"	29	"	78....	24 74	
	Brain, E	July	3..	Toronto	"	"	29	"	78....	58 07	
	Prescott B. & M. Co	"	3..	Prescott	"	"	29	"	78....	131 88	
	Walkerville B. Co	"	5..	Windsor	"	"	34	"	178....	20 61	
	Oland, J. C	"	5..	Halifax	"	"	34	"	178...	44 40	
	Wickwire, W. N	"	5..	"	"	"	34	"	178...	1,326 84	
	Fairall, H	"	5..	Victoria	"	"	34	"	178....	32 07	
	Victoria Phœnix B. Co	"	5..	"	"	"	34	"	178....	267 48	
											38,793 44
			1898.								
Tobacco	Empire Tobacco Co	July	11..	Sherbrooke	"	"	34	"	238....	1,141 50	
	Lemesurier, J	"	11..	Quebec	"	"	34	"	259....	5 97	
	Henry, Jas	"	11..	Montreal	"	"	34	"	270....	0 97	
	The American Tobacco Co.	"	11..	"	"	"	34	"	270....	19 50	
	Tuckett, Geo. T	"	11..	Hamilton	"	"	34	"	259....	42 41	
	"	"	11..	"	"	"	29	"	78....	33 15	
	McAlpin, E. A	"	11..	Toronto	"	"	29	"	78...	52 24	
	"	"	11..	"	"	"	34	"	259....	20 16	
	McDonald, R. D	"	11..	London	"	"	34	"	238....	7 50	
	Isaacs, A	"	11..	St. John, N.B.	"	"	34	"	259....	29 27	

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1898.			$ cts.	$ cts.
Tobacco—*Con.*	Fraser, Jas	July 11	Halifax	Refunded under Revised Statutes, cap. 34, sec, 238	124 80	
	Tobin, Jno. & Co	" 11	"	" " 34 " 238	22 44	
	Hobricker, A	" 11	"	" " 34 " 238	53 64	
	Smith, L. M	" 11	"	" " 34 " 238	6 88	
	McKenna, A	" 18	Pictou	" " 34 " 238	583 60	
	Houde, B. & Co	" 18	Quebec	" " 34 " 259	34 99	
	Henry, Jas	" 18	Montreal	" " 34 " 259	5 17	
	The American Tobacco Co.	" 18	"	" " 34 " 270	60 26	
	"	" 18	"	" " 34 " 259	589 57	
	Fortier, J. M	" 18	"	" " 34 " 259	16 90	
	Hobrecker, A	" 21	Halifax	" " 34 " 238	21 00	
	Smith, L. M	" 25	"	" " 34 " 238	6 72	
	Fortier, J. M	" 27	Montreal	" " 34 " 270	13 20	
	Hobrecker. A	" 27	Halifax	" " 34 " 238	12 25	
	Bauld, Gibson & Co	" 29	"	" " 34 " 238	3 36	
	Isaacs, A	Aug. 4	St. John, N.B	" " 34 " 238	35 00	
	Henry, Jas	" 4	Montreal	" " 34 " 259	3 99	
	The American Tobacco Co.	" 4	"	" " 34 " 259	522 58	
	Fortier, J. M	" 8	"	" " 34 " 259	13 90	
	Tuckett, G. T	" 8	Hamilton	" " 34 " 259	41 59	
	Lemesurier, J	" 18	Quebec	" " 34 " 259	3 19	
	Houde, B. & Co	" 18	"	" " 34 " 259	31 68	
	Isaacs, A	" 18	St. John, N.B	" " 34 " 259	20 99	
	"	" 30	"	" " 34 " 238	82 50	
	Henry, Jas	Sept. 3	Montreal	" " 34 " 270	13 06	
	Tuckett, Geo. T	" 8	Hamilton	" " 34 " 259	41 00	
	Lemesurier, J	" 8	Quebec	" " 34 " 259	4 71	
	Houde, B., & Co	" 8	"	" " 34 " 259	40 85	
	The Empire Tobacco Co	" 15	Sherbrooke	" " 34 " 238	2,185 61	
	Henry, Jas	" 15	Montreal	" " 34 " 259	7 83	
	The American Tobacco Co.	" 15	"	" " 34 " 259	642 77	
	Fortier, J. M	" 17	"	" " 34 " 259	12 46	
	Isaacs, A	" 19	St. John, N.B	" " 34 " 259	25 18	
	Smith, L. M	" 23	Halifax	" " 34 " 238	13 28	
	Lemesurier, J	Oct. 5	Quebec	" " 34 " 259	5 34	
	McAlpin, E. A	" 7	Toronto	" " 34 " 259	18 00	

"	"	7..	"	"	"	29	"	78....	53 24
Tuckett, Geo. T.	"	7..	Hamilton	"	"	34	"	259....	41 16
"	"	7..	"	"	"	29	"	78....	44 13
McKenna, A.	"	7..	Pictou, N.S.	"	"	34	"	259....	0 15
"	"	7..	"	"	"	29	"	78....	2 20
Tuckett, Geo. T.	"	10..	Hamilton	"	"	29	"	78....	76 19
Isaacs, A.	"	11..	St. John, N.B.	"	"	34	"	259....	27 92
Fortier, J. M.	"	11..	Montreal	"	"	34	"	259....	30 70
Henry, Jas.	"	11..	"	"	"	34	"	259....	5 07
The American Tobacco Co.	"	11..	"	"	"	34	"	238....	536 28
"	"	17..	"	"	"	34	"	259....	707 18
Houde, B., & Co.	"	17.	Quebec	"	"	34	"	259....	37 10
Isaacs, A.	"	26..	St. John, N.B.	"	"	34	"	238....	237 37
McDonald, W. C.	"	26..	Montreal	"	"	29	"	78....	10 00
Tuckett, Geo. T.	"	26..	Hamilton	"	"	29	"	78....	126 92
"	"	26..	"	"	"	29	"	78....	43 70
"	Nov.	7..	"	"	"	34	"	259....	61 82
Isaacs, A.	"	9..	St. John, N.B.	"	"	34	"	259....	18 81
Houde, B., & Co.	"	10..	Quebec	"	"	34	"	259....	41 77
Lemesurier, J.	"	10..	"	"	"	34	"	259....	3 80
Fortier, J. M.	"	16..	Montreal	"	"	34	"	259....	13 83
Henry, Jas.	"	16..	"	"	"	34	"	259....	11 13
The American Tobacco Co.	"	16..	"	"	"	34	"	259....	686 06
"	"	25..	"	"	"	34	"	270....	137 40
Caron, D.	"	25..	"	"	"	34	"	270....	2 60
Fortier, J. M.	"	28..	"	"	"	29	"	78....	3 00
McDonald, R. D.	"	29..	London	"	"	34	"	238....	14 37
Tuckett, Geo. T.	"	29..	Hamilton	"	"	34	"	238....	1,196 83
"	Dec.	7..	"	"	"	34	"	259....	51 90
The American Tobacco Co.	"	9..	Montreal	"	"	34	"	259....	540 37
Henry, Jas.	"	9..	"	"	"	34	"	259....	8 86
Lemesurier, J.	"	9..	Quebec	"	"	34	"	259....	4 54
Houde, B. & Co.	"	9..	"	"	"	34	"	259....	33 40
Fortier, J. M.	"	12..	Montreal	"	"	34	"	259....	14 80
The American Tobacco Co,	"	12..	"	"	"	34	"	259....	24 87
Isaacs, A.	"	12..	St. John, N.B.	"	"	34	"	259....	20 75
Bauld, Gibson & Co.	"	17..	Halifax	"	"	34	"	238....	7 48
Isaacs, A.	"	17..	St. John, N.B.	"	"	34	"	238....	82 90
Tuckett, Geo. T.	"	17 .	Hamilton	"	"	34	"	270....	2 80
McKenna, Bros	"	27..	Pictou	"	"	34	"	238....	11 60
	1899.								
National Cigar Co.	Jan.	5..	Toronto	"	"	29	"	78....	3 10
McAlpin, E. A.	"	9..	"	"	"	34	"	259....	28 38
"	"	9..	"	"	"	29	"	78....	74 74
Henry, Jas.	"	11..	Montreal	"	"	34	"	259....	7 63
Fortier, J. M.	"	11..	"	"	"	34	"	259....	10 75
The American Tobacco Co.	"	11..	"	"	"	34	"	259....	531 77

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded,	Amounts.	Totals.
		1899.			$ cts.	$ cts.
Tobacco—*Cont.*	Houde, B. & Co.	Jan. 11.	Quebec	Refunded under Revised Statutes, cap. 34 sec. 259	39 78	
	Lemesurier, J.	" 11.	"	" " 34 " 259	1 66	
	Rithet, R. P., & Co., Ltd.	" 12.	Victoria	" " 34 " 238	16 48	
	Tuckett, Geo. T.	" 12.	Hamilton	" " 29 " 78	34 95	
	"	" 12.	"	" " 34 " 259	36 16	
	Isaacs, A.	" 12.	St. John, N.B.	" " 34 " 259	12 27	
	The American Tobacco Co.	" 13.	Montreal	" " 34 " 270	29 39	
	Empire Tobacco Co.	" 20.	"	" " 29 " 78	7 35	
	Bauld, Gibson & Co.	" 27.	Halifax	" " 34 " 238	10 77	
	McKenna, A.	Feb. 2.	Pictou	" " 34 " 238	2,920 20	
	McDonald, W. C.	" 7.	Montreal	" " 29 " 78	286 70	
	Tuckett, Geo. T.	" 7.	Hamilton	" " 29 " 78	85 71	
	"	" 7.	"	" " 34 " 259	16 53	
	Lemesurier, J.	" 7.	Quebec	" " 34 " 259	7 20	
	Tremain, S.	" 7.	Halifax	" " 34 " 238	24 56	
	McKenna, A.	" 9.	Pictou	" " 34 " 238	76 00	
	Bantly, M.	" 11.	Victoria	" " 34 " 238	19 00	
	McKenna, A.	" 13.	Pictou	" " 34 " 238	376 50	
	Houde, B., & Co.	" 13.	Quebec	" " 34 " 259	27 40	
	Isaacs, A.	" 13.	St. John, N.B.	" " 34 " 259	8 22	
	Houde, B., & Co.	" 14.	Quebec	" " 34 " 270	24 87	
	Henry, Jas.	" 14.	Montreal	" " 34 " 259	5 57	
	Fortier, J. M.	" 14.	"	" " 34 " 259	1 96	
	The American Tobacco Co.	" 14.	"	" " 34 " 259	503 61	
	"	" 16.	"	" " 34 " 270	32 48	
	Grothé, L. O.	" 16.	"	" " 34 " 238	33 62	
	McKenna, A.	" 16.	Pictou	" " 34 " 238	108 13	
	Tobin, John, & Co.	" 21.	Halifax	" " 34 " 238	34 48	
	Smith, L. M.	" 28.	"	" " 34 " 238	73 08	
	Tuckett, Geo. T.	Mar. 6.	Hamilton	" " 34 " 259	45 62	
	Isaacs, A.	" 7.	St. John, N.B.	" " 34 " 238	131 25	
	The American Tobacco Co.	" 8.	Montreal	" " 34 " 270	20 67	
	McKenna, A.	" 8.	Pictou	" " 34 " 259	0 05	

"	"	8..	"	"	"	29	"	78....	4	25
Lemesurier, J.	"	8 ..	Quebec	"	"	34	"	259....	1	81
Isaacs, A	"	8..	St. John, N.B.	"	"	34	"	259....	13	48
McKenna, A	"	13..	Pictou	"	"	34	"	238....	42	12
The American Tobacco Co.	"	14..	Montreal	"	"	34	"	270....	16	32
Henry, Jas	"	14..	"	"	"	34	"	270....	5	90
"	"	14..	"	"	"	34	"	259...	5	37
Fortier, J. M	"	14..	"	"	"	34	"	259....	6	20
The American Tobacco Co.	"	14..	"	"	"	34	"	259....	441	17
McDonald, Sir W. C	"	21..	"	"	"	29	"	78....	148	10
The American Tobacco Co.	"	29..	"	"	"	34	"	238 ...	510	10
Tuckett, Geo. T	April	8..	Hamilton	"	"	34	"	259....	41	89
"	"	8..	"	"	"	29	"	78....	19	15
McAlpin, E. A	"	8 ..	Toronto	"	"	34	"	259 ...	16	00
"	"	8..	"	"	"	29	"	78....	86	89
Houde, B., & Co	"	8..	Quebec	"	"	34	"	259....	36	30
Smith, L. M	"	10..	Halifax	"	"	34	"	238....	199	86
Fortier, J. M	"	13..	Montreal	"	"	34	"	270....	4	48
The American Tobacco Co.	"	13..	"	"	"	34	"	270...	9	62
"	"	13..	"	"	"	34	"	259....	583	89
Isaacs, A	"	13..	St. John, N.B.	"	"	34	"	259....	17	69
Henry, Jas	"	13..	Montreal	"	"	34	"	259....	6	27
Houde, B., & Co	"	13..	Quebec	"	"	34	"	259....	28	21
McKenna, A	"	13..	Pictou	"	"	34	"	238....	1,323	76
Fortier, J. M	"	15..	Montreal	"	"	34	"	259....	8	13
Lemesurier, Jas	"	17..	Quebec	"	"	34	"	259....	4	07
Isaacs, A	"	24..	St. John, N.B.	"	"	34	"	238....	114	99
The American Tobacco Co.	"	25..	Montreal	"	"	34	"	270....	24	17
Fortier, J. M	"	28.	"	"	"	34	"	238 ...	159	56
Tuckett, Geo. T	May	12..	Hamilton	"	"	34	"	259....	14	45
Tobin, John, & Co	"	12..	Halifax	"	"	34	"	238....	3	96
Henry, Jas	"	15..	Montreal	"	"	34	"	259....	7	25
Fortier, J. M	"	15..	"	"	"	34	"	259....	14	03
Isaacs, A	"	15..	St. John, N.B.	"	"	34	"	259....	27	40
The American Tobacco Co.	"	15..	Montreal	"	"	34	"	259....	559	17
Smith, L. M	"	16..	Halifax	"	"	34	"	238....	23	52
"	"	16..	"	"	"	34	"	238....	9	90
"	"	16..	"	"	"	34	"	238....	85	80
Lemesurier, J	"	16..	Quebec	"	"	34	"	259 ...	4	70
Houde, B., & Co	"	16..	"	"	"	34	"	259....	26	42
Tuckett, Geo. T	"	27..	Hamilton	"	"	34	"	238 ...	973	33
Tobin, John, & Co	"	29 ..	Halifax	"	"	34	"	238....	50	86
McDonald, Sir W. C	June	8..	Montreal	"	"	34	"	238 . .	106	30
Houde, B., & Co	"	10..	Quebec	"	"	34	"	259....	38	34
Tuckett, Geo. T	"	10..	Hamilton	"	"	34	"	259....	79	00
Isaacs, A	"	12..	St. John, N.B.	"	"	34	"	238....	3	75
"	"	12..	"	"	"	34	"	238....	117	50
Smith, L. M	"	13..	Halifax	"	"	34	"	238....	90	08
"	"	13..	"	"	"	34	"	238....	120	43

EXCISE—*Concluded.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1899.			$ cts.	$ cts.
Tobacco—*Conc.*	McKenna, A.	June 13..	Pictou	Refunded under Revised Statutes, cap. 34, sec. 238	451 60	
	Lemesurier, J.	" 14..	Quebec	" " 34 " 259	4 54	
	Henry, Jas.	" 14..	Montreal	" " 34 " 259	7 18	
	Fortier, J. M.	" 14..	"	" " 34 " 259	9 87	
	The American Tobacco Co.	" 14..	"	" " 34 " 259	734 93	
	Isaacs, A.	" 14..	St. John, N.B.	" " 34 " 259	33 61	
	Bauld, Gibson & Co.	" 27..	Halifax	" " 34 " 238	5 31	
	Tremain, Stuart	" 27..	"	" " 34 " 238	21 44	
	Smith, L. M.	" 27..	"	" " 34 " 238	206 80	
	Fortier, J. M.	" 27..	Montreal	" " 34 " 270	10 54	
	McDonald, Sir W. C.	July 3..	"	" " 34 " 238	88 00	
	McKenna, A.	" 7..	Pictou	" " 34 " 238	38 16	
	Tuckett, Geo. T.	" 8..	Hamilton	" " 34 " 259	59 82	
	"	" 8..	"	" " 29 " 78	20 90	
	The American Tobacco Co.	" 12..	Montreal	" " 34 " 270	96 15	
	"	" 13..	"	" " 29 " 78	63 70	
	Henry, Jas	" 17..	"	" " 34 " 259	7 56	
	Fortier, J. M	" 17..	"	" " 34 " 259	6 77	
	The American Tobacco Co.	" 17..	"	" " 34 " 259	633 89	
	McLenaghan, N.	" 17..	Perth	" " 29 " 78	10 00	
	McAlpin, E. A.	" 21..	Toronto	" " 34 " 259	31 18	
	"	" 21..	"	" " 29 " 78	67 25	
						26,201 74
		1898.				
Cigars	Fortier, J. M.	Sept. 12..	Montreal	" " 34 " 270	8 93	
	Edwards, Geo.	Oct. 26..	Toronto	" " 29 " 78	75 00	
	Milligan, Geo.	Dec. 27..	"	" " 34 " 270	11 81	
						95 74
Malt Vinegar Brewers	Wilson, Wm.	Oct. 13..	"	" " 29 " 78	208 18	

		1899.								
	"	April 20..	"	"	"	29	"	78....	102 29	
										310 47
		1898.								
Bonded Warehouse.	Lefebvre, M	Sept. 29..	St. Johns, Que....	"	"	29	"	78....	50 00	
										50 00
Seizures	Ballard, E	Oct. 27..	Sherbrooke	"	"	29	"	78....	50 00	
	Senez, C	" 27..	"	"	"	29	"	78....	50 00	
	Dutcher, J. S	" 27..	Toronto	"	"	29	"	78....	50 00	
		1899.								
	Thérien, F. X	Feb. 3..	Quebec	"	"	29	"	78....	4 65	
	Lafrance, F	April 21..	Cornwall	"	"	29	"	78....	40 00	
	Plourde, N	July 3..	Quebec	"	"	29	"	78....	50 00	
										244 65
		1898.								
Electric Light Registration Fees	Powell, J. B	July 15..	Guelph	"	"	29	"	78...	5 00	
	Ingersoll Electric Power & Light Co	Aug. 5..	Brantford	"	"	29	"	78....	15 00	
										20 00
				Grand total						118,682 83

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

DR. No. 17.—DEPARTMENTAL EXPENDITURES, 1898-99. CR.

Due by sundry persons, 1st July, 1898.	Disbursed by the Receiver General.	Deductions for Superannuation.	Totals.	——	Salaries.	Contingencies.	Due by sundry persons, 30th June, 1899.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
.....	7,000 00	.....	7,000 00	....Minister of Inland Revenue	7,000 00	.....	.....	7,000 00
.....	36,184 30	790 70	36,975 00	....Departmental Officers.....	36,975 00	.....	.....	36,975 00
.....	308 62	.....	308 62	....Subscriptions to Newspapers.....	.....	308 62	.....	308 62
.....	1,675 00	.....	1,675 00	....Extra Clerks.	.....	1,675 00	.....	1,675 00
.....	489 51	.....	489 51	....Telegraph Companies and Telephone.....	.....	489 51	.....	489 51
.....	818 35	.....	818 35	....Stationery.....	.....	818 35	.....	818 35
.....	206 34	.....	206 34	.. Books and Maps.....	.....	206 34	.....	206 34
.....	1,170 98	.....	1,170 98	....Printing and Lithographing.....	.....	1,170 98	.....	1,170 98
.....	25 43	.....	25 43	.. Postage.....	.....	25 43	.....	25 43
16 66	528 40	.....	545 06	....Sundry persons	.....	528 40	16 66	545 06
16 66	48,406 93	790 70	49,214 29	..... Totals	43,975 00	5,222 63	16 66	49,214 29

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

WEIGHTS AND MEASURES, GAS, ELECTRIC LIGHT AND LAW STAMPS.

DR. — No. 18.—STATEMENT showing amount of Revenue accrued during Year ended 30th June, 1899. — CR.

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps.		Totals.
				Supreme Court.	Exchequer Court.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
To amount of stamps destroyed or returned by distributors..	170 52	1,076 50	3 50	.....	....	1,250 52
To commission allowed	.....	... .	.....	100 00	125 10	225 10
To amount of stamps remaining in hands of distributors, 30th June, 1899.....	39,818 70	31,145 30	31,532 25	.....	.....	102,496 25
To balance, being the revenue accrued during 1898-99.....	49,314 70	19,720 25	7,349 50	1,900 00	2,376 90	80,661 35
Totals.....	89,303 92	51,942 05	38,885 25	2,000 00	2,502 00	184,633 22

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps.		Totals.
				Supreme Court.	Exchequer Court.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
By amount of stamps in the hands of distributors on 1st July, 1898.....	34,401 42	27,592 05	32,660 25	... ..	... ..	94,653 72
By stamps issued by Inland Revenue Department during the year.	54,902 50	24,350 00	6,225 00	2,000 00	2,502 00	89,979 50
Totals.....	89,303 92	51,942 05	38,885 25	2,000 00	2,502 00	184,633 22

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

DR. No. 19 (A).—Inspection Divisions in Account with Revenue. CR.

Balances due by Inspectors, 1st July, 1898.		Stamps issued to Inspect'rs.	Seizures and Penalties.	Other Receipts.	Totals.	Divisions.	Stamps returned or destroyed.	Deposited to the credit of the Receiver General.	Balances due by Inspectors, 30th June, 1899.		Totals.
Stamps on hand.	Cash on hand.								Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
2,224 81	.....	5,040 00	5 00	.....	7,269 81	Belleville	19 56	3,431 85	3,455 35	363 05	7,269 81
3,063 40	.....	10,537 50	.....	.....	13,600 90	Hamilton	9 69	10,044 36	3,546 85	.....	13,600 90
1,648 85	.....	2,725 00	.....	.....	4,373 85	Ottawa	13 18	2,186 12	2,059 95	114 60	4,373 85
3,223 36	588 25	5,855 00	.....	.....	9,666 61	Toronto	17 69	4,860 82	4,074 25	713 85	9,666 61
2,753 29	.....	4,665 00	.....	.....	7,418 29	Windsor	8 33	5,452 66	1,957 30	.....	7,418 29
12,913 71	588 25	28,822 50	5 00	.....	42,329 46	*Ontario*	68 45	25,975 81	15,093 70	1,191 50	42,329 46
7,427 61	873 26	15,775 00	54 40	120 00	24,250 27	Montreal	26 10	11,437 06	11,760 00	1,027 11	24,250 27
4,169 79	61 75	1,375 00	1 00	.....	5,607 54	Quebec	17 80	2,963 59	2,262 10	364 05	5,607 54
2,600 30	.....	.....	.....	.....	2,600 30	Three Rivers	15 92	674 53	1,909 85	.....	2,600 30
14,197 70	935 01	17,150 00	55 40	120 00	32,458 11	*Quebec*	59 82	15,075 18	15,931 95	1,391 16	32,458 11
1,987 78	52 15	1,245 00	.....	.....	3,284 93	*St. John, N.B.*	10 89	1,274 74	1,999 30	.....	3,284 93
.....	.....	695 00	.....	.....	695 00	Cape Breton	.....	210 95	484 05	.....	695 00
253 02	.....	1,240 00	.....	.....	1,493 02	Halifax	0 60	814 07	678 35	.....	1,493 02
1,074 38	.....	1,315 00	.....	.....	2,389 38	Pictou	6 93	969 90	1,378 65	33 90	2,389 38
1,327 40	.....	3,250 00	.....	.....	4,577 40	*Nova Scotia*	7 53	1,994 92	2,541 05	33 90	4,577 40
688 35	.....	265 00	.....	.....	953 35	*Charlottetown, P.E.I.*	1 54	397 06	554 75	.....	953 35
2,136 23	.....	3,800 00	.....	.....	5,936 23	*Winnipeg, Man.*	12 40	2,951 28	2,972 55	.....	5,936 23

624 66	.....	.....	.....	.....	624 66	*Calgary, N.W.T.*	4 15	310 16	310 35	.....	624 66
525 59	.....	370 00	.....	.....	895 59	*Victoria, B.C.*	5 74	474 80	415 05	.....	895 59
34,401 42	1,575 41	54,902 50	60 40	120 00	91,059 73	..... Grand Totals	170 52	48,453 95	39,818 70	2,616 56	91,059 73

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

WEIGHTS AND MEASURES, 1898-99.

No. 19 (B).—Deputy Inspectors of the Old Divisions in Account with Revenue.

DR. CR.

Balances due 1st July, 1898. — Cash on hand.	Totals.	Divisions.	Balances due 30th June, 1899. — Cash on hand.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
87 10	87 10	Essex	87 10	87 10
87 10	87 10	*Ontario*	87 10	87 10
5 62	5 62	Hull	5 62	5 62
5 62	5 62	*Quebec*	5 62	5 62
92 72	92 72	Totals	92 72	92 72

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

WEIGHTS AND MEASURES, 1898–99.

No. 20 (A).—INSPECTION DIVISIONS in Account with Expenditures.

DR. (*For Details, see Appendix B.*) CR.

Balances due by Inspectors, 1st July, 1898.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for: Superannuation.	Insurance.	Retirement.	Balances due to Inspectors, 30th June, 1899.	Totals.	Divisions.	Expenditures authorized by the Department: Salaries.	Seizures.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	5,150 85	51 92	.. .	....	206 58	5,409 35	..Belleville.	3,399 92	.....	458 26	230 00	903 53	417 64	5,409 35
.....	6,930 55	32 08	.....	.....	.....	6,962 63	..Hamilton.....	5,599 72	.....	....	.....	1,245 03	117 88	6,962 63
.....	4,695 37	7 04	41 76	.....	15 62	4,759 79	..Ottawa.....	3,484 94	.....	....	250 00	826 10	198 75	4,759 79
.....	4,539 41	40 96	.....	.....	179 75	4,760 12	..Toronto...	3,616 02	.....	.....	.....	1,017 67	126 43	4,760 12
....	4,580 68	24 00	.....	.....	.....	4,604 68	..Windsor.....	3,449 76	.	....	.....	993 86	161 06	4,604 68
.....	25,896 86	156 00	41 76	.....	401 95	26,496 57	.....*Ontario*.....	19,550 36	...	458 26	480 00	4,986 19	1,021 76	26,496 57
.....	9,014 32	64 04	.....	. ...	.....	9,078 36	..Montreal	7,199 72	1 20	.....	.....	1,537 13	340 31	9,078 36
.....	5,660 91	48 28	38 28	.....	100 00	5,847 47	..Quebec.....	4,399 96	.....	... .	200 00	1,196 44	51 07	5,847 47
.....	1,742 47	6 96	... ..	17 50	.. ..	1,766 93	..Three Rivers.....	1,499 92	.....	....	.....	249 75	17 26	1,766 93
.....	16,417 70	119 28	38 28	17 50	100 00	16,692 76	.....*Quebec*	13,099 60	1 20	.... .	200 00	2,983 32	408 64	16,692 76
.....	2,776 42	49 96	.....	.....	.....	2,826 38	..St. John.....	2,500 00	....	.. . .	.....	307 74	18 64	2,826 38
.....	2,776 42	49 96	.....	.....	.....	2,826 38	.....*New Brunswick*	2,500 00	. ..	....	.....	307 74	18 64	2,826 38
.....	795 74	.. ....	.....	.....	33 95	829 69	..Cape Breton.....	531 06	..	. .....	.....	229 06	69 57	829 69
.....	2,205 83	.....	.....	.....	.....	2,205 83	..Halifax.....	1,599 96	...	....	300 00	99 74	206 13	2,205 83
15 00	2,128 43	19 96	... .	.....	.....	2,163 39	..Pictou.....	1,600 00	.....	....	.....	459 00	104 39	2,163 39
15 00	5,130 00	19 96	.....	. . ..	33 95	5,198 91	.....*Nova Scotia*... ...	3,731 02	...	.....	300 00	787 80	380 09	5,198 91

WEIGHTS AND MEASURES, 1898-99—*Concluded.*

No. 20 (A).—INSPECTION DIVISIONS in Account with Expenditures.

DR. (*For Details, see Appendix B.*) CR.

Balances due by Inspectors, 1st July, 1898.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for			Balances due to Inspectors, 30th June, 1899.	Totals.	Divisions.	Expenditures authorized by the Department.						Totals.
		Superannuation.	Insurance.	Retirement.				Salaries.	Seizure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	1,694 95	.....	.....	.....	2 80	1,697 75	..Charlottetown, P.E.I...	1,500 00	.....	.....	.....	160 69	37 06	1,697 75
.....	4,538 01	4 04	.....	.....	.....	4,542 05	..Winnipeg, Man	2,774 80	...	700 08	108 00	866 87	92 30	4,542 05
.....	939 41	13 96	....	.....	.....	953 37	..Calgary.....	808 02	..	.....	.....	141 35	4 00	953 37
.....	5,477 42	18 00	.. ..	... .	... .	5,495 42	.....*Manitoba*	3,582 82	.....	700 08	108 00	1,008 22	96 30	5,495 42
.....	2,157 44	....	.....	.....	.....	2,157 44	..Victoria, B.C.....	1,149 84	.....	.... . .	125 00	812 60	70 00	2,157 44
.....	784 00	16 00	...	.....	.....	800 00	..Commissioner of Standards.....	800 00	.. ..	.....	.....	.....	.....	800 00
.....	122 42	.....	.....	.....	.....	122 42	..O. Higman.....	....	....	..... .	.. ..	112 08	10 34	122 42
.....	1,763 87	.....	.....	.. ..	.....	1,763 87	. General Contingencies..	.....	....	.....	.....	.....	1,763 87	1,763 87
.....	381 21	.... ..	.....	.....	.....	381 21	..Printing.....	.....	.....	.....	.....	.....	381 21	381 21
.....	557 56	... .	.....	.. ...	.....	557 56	..Stationery.....	....	.....	.....	.....	.....	557 56	557 56
.....	6 72	.....	.. ..	.....	.....	6 72	..Lithographing.....	... .	.....	.....	.....	.....	6 72	6 72
15 00	63,166 57	379 20	80 04	17 50	538 70	64,197 01	..... Grand Totals.....	45,913 64	1 20	1,158 34	1,213 00	11,158 64	4,752 19	64,197 01

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

WEIGHTS AND MEASURES, 1898-99.

No. 20 (B).—Inspection Divisions in Account with Expenditures.

DR. (Old Divisions.) CR.

Balances due by sundry persons, 1st July, 1898.	Totals.	Divisions.	Balances due by sundry persons, 30th June, 1899.	Totals.
$ cts.	$ cts.		$ cts.	cts.
39 56	39 56	Essex	39 56	39 56
33 53	33 53	Waterloo	33 53	33 53
73 09	73 09	*Ontario*	73 09	73 09
0 33	0 33	Drummond	0 33	0 33
41 45	41 45	Laval	41 45	41 45
26 88	26 88	Montmorency	26 88	26 88
27 51	27 51	Richelieu	27 51	27 51
96 17	96 17	*Quebec*	96 17	96 17
24 00	24 00	Lunenburg, Nova Scotia	24 00	24 00
193 26	193 26	Totals	193 26	193 26

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

GAS INSPECTION AND LAW STAMPS, 1898-99.

DR. No. 21.—STAMP DISTRIBUTORS in Account with Inland Revenue Department. CR.

BALANCES DUE BY INSPECTORS, 1ST JULY, 1898.		Stamps issued to Inspectors and others.	Other Receipts.	Totals.	DISTRICTS.	Damaged Stamps.	Commission allowed to Distributors of Stamps.	Deposited to the credit of the Receiver General.	BALANCES DUE BY INSPECTORS, 30TH JUNE, 1899.		Totals.
Stamps on hand.	Cash on hand.								Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
877 50				877 50	Barrie			63 00	814 50		877 50
384 00		525 00		909 00	Belleville			170 25	738 75		909 00
453 25		87 50		540 75	Berlin			119 25	421 50		540 75
313 00		425 00		738 00	Brockville			226 00	512 00		738 00
248 75		200 00		448 75	Cobourg			130 00	318 75		448 75
131 50		300 00		431 50	Cornwall			45 00	386 50		431 50
560 75		75 00		635 75	Guelph			126 75	509 00		635 75
1,941 25		1,200 00		3,141 25	Hamilton	37 50		1,063 50	1,861 75	178 50	3,141 25
1,224 75		137 50		1,362 25	Kingston			197 00	1,165 25		1,362 25
223 50				223 50	Listowel			55 75	167 75		223 50
651 00		2,000 00		2,651 00	London			1,662 25	766 25	222 50	2,651 00
278 00		37 50		315 50	Napanee			63 75	233 75	18 00	315 50
615 75		3,275 00		3,890 75	Ottawa			582 75	3,308 00		3,890 75
423 00				423 00	Owen Sound			61 75	361 25		423 00
693 50				693 50	Peterborough			36 00	622 50	35 00	693 50
208 50		100 00		308 50	Sarnia			81 00	227 50		308 50
741 00		200 00		941 00	Stratford			66 75	874 25		941 00
6,558 80		5,000 00		11,558 80	Toronto			4,925 75	6,062 80	570 25	11,558 80
16,527 80		13,562 50		30,090 30	*Ontario*	37 50		9,676 50	19,352 05	1,024 25	30,090 30
1,477 75		6,850 00	7 00	8,334 75	Montreal			6,240 75	2,094 00		8,334 75
830 00		300 00		1,130 00	Quebec			258 75	833 25	38 00	1,130 00
561 00				561 00	Sherbrooke			42 50	518 50		561 00
2,868 75		7,150 00	7 00	10,025 75	*Quebec*			6,542 00	3,445 75	38 00	10,025 75
1,034 50				1,034 50	Fredericton			69 50	965 00		1,034 50
1,055 75		650 00		1,705 75	St. John			474 50	1,231 25		1,705 75
2,090 25		650 00		2,740 25	*New Brunswick*			544 00	2,196 25		2,740 25

820 75	86 25	975 00	.....	1,882 00	*Halifax, N.S.*	.....	.....	548 25	1,227 00	106 75	1,882 00
956 00	.....	.....	.....	956 00	*Charlottetown, P.E.I.*	.....	.....	74 00	882 00	.....	956 00
715 75	.....	150 00	.....	865 75	*Winnipeg, Man.*	.....	.....	309 00	556 75	.....	865 75
898 75	.....	125 00	.....	1,023 75	Nanaimo	.....	.....	137 50	886 25	.....	1,023 75
1,097 00	.....	.....	.....	1,097 00	New Westminster	1,039 00	.....	58 00	.....	.....	1,097 00
1,041 75	.....	875 00	.....	1,916 75	Vancouver	.....	.....	270 75	1,618 50	27 50	1,916 75
575 25	.....	862 50	.....	1,437 75	Victoria	.....	.....	457 00	980 75	.....	1,437 75
3,612 75	.....	1,862 50	.....	5,475 25	*British Columbia*	1,039 00	.....	923 25	3,485 50	27 50	5,475 25
27,592 05	86 25	24,350 00	7 00	52,035 30	Grand Totals	1,076 50	.....	18,617 00	31,145 30	1,196 50	52,035 30
.....	.....	4,502 00	.....	4,502 00	Law stamps	.....	225 10	4,276 90	.....	.....	4,502 00

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

GAS INSPECTION.

No. 22.—Inspection Districts in Account with Expenditures, 1898-99.

(*For Details, see Appendix B.*)

Dr. Cr.

Balance due by Inspectors, 1st July, 1898.	Amounts received from Department to meet expenditure.	Deduction from salaries for		Balance due to Inspectors, 30th June, 1899.	Totals.	Districts.	Expenditures authorized by the Department.					Balance due by Inspectors, 1st July, 1899.	Totals.
		Superannuation.	Retirement.				Salaries.	Special assistance.	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	99 85	2 00	.....	.....	101 85	Barrie	100 00	.....	.....	.....	1 85	.....	101 85
.....	492 65	4 96	.....	.....	497 61	Belleville	288 08	.....	107 50	34 70	67 33	.....	497 61
.....	125 62	2 00	.....	.....	127 62	Berlin	100 00	.....	.....	17 90	9 72	.....	127 62
.....	97 65	.....	.....	13 89	111 54	Brockville	.....	99 96	.....	.....	11 58	.....	111 54
.....	140 10	2 00	.....	15 65	157 75	Cobourg	100 00	.....	.....	27 65	30 10	.....	157 75
.....	138 50	2 00	.....	9 50	150 00	Cornwall	100 00	.....	.....	.....	50 00	.....	150 00
.....	107 61	2 00	.....	13 24	122 85	Guelph	100 00	.....	.....	6 90	15 95	.....	122 85
.....	1,836 50	31 96	.....	.....	1,868 46	Hamilton	1,699 96	.....	36 00	93 00	39 50	.....	1,868 46
.....	483 31	.....	.....	13 94	497 25	Kingston	399 96	.....	22 50	.....	74 79	.....	497 25
.....	172 47	.....	.....	18 00	190 47	Listowel	99 96	.....	75 00	.....	15 51	.....	190 47
.....	1,388 80	20 00	.....	23 25	1,432 05	London	1,000 00	.....	110 00	241 95	80 10	.....	1,432 05
.....	10 45	.....	.....	.....	10 45	Napanee	.....	.....	.....	10 45	.....	.....	10 45
.....	1,438 50	.....	.....	18 90	1,457 40	Ottawa	900 00	180 00	300 00	.....	77 40	.....	1,457 40
.....	321 00	4 00	.....	.....	325 00	Owen Sound	200 00	.....	125 00	.....	.....	.....	325 00
.....	206 55	4 00	.....	.....	210 55	Peterborough	200 00	.....	.....	.....	10 55	.....	210 55
.....	15 75	.....	.....	5 25	21 00	Sarnia	.....	.....	20 00	.....	1 00	.....	21 00
.....	204 50	4 00	.....	6 00	214 50	Stratford	200 00	.....	.....	.....	14 50	.....	214 50
.....	2,220 27	28 04	.....	.....	2,248 31	Toronto	2,199 92	7 50	.....	.....	40 89	.....	2,248 31
.....	9,506 08	106 96	.....	137 62	9,744 66	*Ontario*	7,687 88	287 46	796 00	432 55	540 77	.....	9,744 66
.....	3,036 34	.....	.....	14 25	3,050 59	Montreal	2,199 84	450 00	240 00	18 95	141 80	.....	3,050 59
.....	1,446 80	25 96	.....	.....	1,472 76	Quebec	1,300 00	.....	150 00	.....	22 76	.....	1,472 76
.....	98 00	2 00	.....	.....	100 00	Sherbrooke	100 00	.....	.....	.....	.....	.....	100 00
.....	4,581 14	27 96	.....	14 25	4,623 35	*Quebec*	3,599 84	450 00	390 00	18 95	164 56	.....	4,623 35

.....	200 00	.....	.....	.....	200 00	..Fredericton	200 00	.....	.....	.....	.....	.....	200 00
.....	1,149 17	20 00	.....	.....	1,169 17	..St. John.....	1,000 00	.....	.....	132 14	37 03	.....	1,169 17
.....	1,349 17	20 00	.....	.....	1,369 17	... . *New Brunswick*	1,200 00	.....	.....	132 14	37 03	.....	1,369 17
.....	2,051 59	25 96	.....	.....	2,077 55	..Halifax	1,300 00	.....	309 35	355 10	113 10	.....	2,077 55
12 88	.....	.....	.....	.....	12 88	..Pictou	.....	.....	.....	.....	.....	12 88	12 88
12 88	2,051 59	25 96	.....	.....	2,090 43	.....*Nova Scotia*.	1,300 00	.....	309 35	355 10	113 10	12 88	2,090 43
.....	225 00	.....	.....	5 40	230 40	...*Charlottetown, P.E.I.* ...	200 00	.....	.....	.....	30 40	.. ....	230 40
.....	110 48	.....	.....	35 35	145 83	. .. *Winnipeg, Man*.. ..	.....	.....	108 00	.....	37 83	... ...	145 83
.....	100 00	.....	.....	.....	100 00	..Nanaimo	100 00	.....	.....	.....	.....	.....	100 00
.....	96 54	0 96	2 50	.....	100 00	..New Westminster	100 00	.....	.....	.....	.....	.....	100 00
.....	157 95	2 00	.....	9 00	168 95	..Vancouver	100 00	.....	.....	8 00	60 95	.....	168 95
... .	508 88	4 00	.. ....	.....	512 88	..Victoria	200 00	.....	125 00	.... ..	187 88	.....	512 88
... .	863 37	6 96	2 50	9 00	881 83	..... *British Columbia*...	500 00	.....	125 00	8 00	248 83	.....	881 83
00	580 33	.....	.. ..	... .	780 33	..General.....	.. ....	.....	. .....	56 10	524 23	200 00	780 33
.....	331 40	.....	... ...	.. . .	331 40	..General expenses.....	.....	.....	.....	.....	331 40	.....	331 40
.....	132 71	.....	... ..	.... ..	132 71	..Printing	.....	.....	.....	.....	132 71	.....	132 71
.... ..	113 67	.....	.....	.....	113 67	..Stationery	.....	.....	.....	.....	113 67	.....	113 67
212 88	19,838 94	187 84	2 50	201 62	20,443 78	..... Grand Totals.....	14,487 72	737 46	1,728 35	1,002 84	2,274 53	212 88	20,443 78

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

ELECTRIC LIGHT STAMPS, 1898-99.

DR. No. 23.—STAMP DISTRIBUTORS in Account with Inland Revenue Department. CR.

BALANCES, 1ST JULY, 1898.		Stamps issued to Inspectors.	Registration Fees Accrued.	Totals.	DISTRICTS.	Returned Damaged Stamps.	DEPOSITED TO THE CREDIT OF THE RECEIVER GENERAL.		BALANCES, 30TH JUNE, 1899		Totals.
Stamps on hand.	Cash. on hand.						Registration Fees.	*Inspection Fees.	Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
666 00	.....	200 00	425 00	1,291 00	....Belleville.....	.....	425 00	153 25	712 75	.....	1,291 00
2,000 75	.....	375 00	340 00	2,715 75	....Hamilton.....	.....	340 00	327 00	2,017 25	31 50	2,715 75
2,090 00	.....	150 00	560 00	2,800 00	....London.....	.....	560 00	195 25	2,036 25	8 50	2,800 00
6,190 25	.....	1,250 00	350 00	7,790 25	....Ottawa.....	.....	350 00	1,032 75	6,407 50	.....	7,790 25
6,895 75	.....	.....	795 00	7,690 75	....Toronto.....	3 50	795 00	947 25	5,872 00	73 00	7,690 75
17,842 75	.....	1,975 00	2,470 00	22,287 75	..... *Ontario*.....	3 50	2,470 00	2,655 50	17,045 75	113 00	22,287 75
5,223 25	.....	1,800 00	280 00	7,303 25	....Montreal.....	.....	280 00	2,233 50	4,789 75	.....	7,303 25
2,457 75	.....	250 00	45 00	2,752 75	....Quebec.....	.....	45 00	281 50	2,426 25	.....	2,752 75
218 75	.....	200 00	325 00	743 75	....Sherbrooke.....	.....	325 00	233 00	185 75	.....	743 75
7,899 75	.....	2,250 00	650 00	10,799 75	..... *Quebec*.....	.....	650 00	2,748 00	7,401 75	.....	10,799 75
1,958 50	.....	200 00	175 00	2,333 50	..... *St. John, N.B*.....	.....	175 00	318 25	1,840 25	.....	2,333 50
1,731 75	18 75	500 00	380 00	2,630 50	..... *Halifax, N.S*.....	.....	380 00	318 00	1,919 75	12 75	2,630 50
929 75	.....	425 00	285 00	1,639 75	..... *Winnipeg, Man*.....	.....	285 00	408 50	946 25	.....	1,639 75
1,206 25	.....	375 00	150 00	1,731 25	..... Vancouver.....	.....	150 00	415 50	1,151 50	14 25	1,731 25
1,091 50	.....	500 00	60 00	1,651 50	....Victoria.....	.....	60 00	364 50	1,227 00	.....	1,651 50
2,297 75	.....	875 00	210 00	3,382 75	..... *British Columbia*.....	.....	210 00	780 00	2,378 50	14 25	3,382 75
32,660 25	18 75	6,225 00	4,170 00	43,074 00	.....Grand Totals.....	3 50	4,170 00	7,228 25	31,532 25	140 00	43,074 00
.....	.....	.....	20 00	20 00	Less Refunds as per Statement No. 16.....	.....	20 00	.....	.....	.....	20 00
32,660 25	18 75	6,225 00	4,150 00	43,054 00	...Net Revenue.....	3 50	4,150 00	7,228 25	31,532 25	140 00	43,054 00

*These fees were collected by Collectors of Inland Revenue.

INLAND REVENUE DEPARTMENT, OTTAWA, 25th September, 1899. E. MIALL, *Commissioner.*

ELECTRIC LIGHT INSPECTION.

No. 21.—INSPECTION Districts in Account with Expenditures, 1898 99.

DR. (*For Details, see Appendix B.*) CR.

Amounts received from Department to meet Expenditures.	Totals.	——	Expenditure Authorized by the Department.				Totals.
			Salaries.	Special Assistance.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
2,278 04	2,278 04	Chief electrical engineer	2,000 00		135 55	142 49	2,278 04
94 36	94 36	Belleville			52 85	41 51	94 36
20 40	20 40	Hamilton			19 10	1 30	20 40
23 65	23 65	London			17 00	6 65	23 65
204 30	204 30	Toronto			197 10	7 20	204 30
309 22	309 22	Montreal		282 00	11 00	16 22	309 22
12 25	12 25	Quebec				12 25	12 25
72 84	72 84	Sherbrooke			63 45	9 39	72 84
141 64	141 64	St. John			112 64	29 00	141 64
66 76	66 76	Halifax			65 76	1 00	66 76
43 96	43 96	Vancouver				43 96	43 96
99 37	99 37	Victoria			20 35	79 02	99 37
2,625 67	2,625 67	General				2,625 67	2,625 67
34 26	34 26	Printing				34 26	34 26
5 97	5 97	Stationery				5 97	5 97
6,032 69	6,032 69	Totals	2,000 00	282 00	694 80	3,055 89	6,032 69

INLAND REVENUE DEPATRMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

DR. No. 25—STATEMENT showing the Transactions in connection with the Manufacture of Methylated Spirits, 1898-99. CR.

——	Amounts.	Totals.	——	Amounts.	Totals.
	$ cts.	$ cts.		$ cts.	$ cts.
To Stock on hand, 1st July 1898		9,096 79	By receipts during the year, for:—		92,467 60
Wood naphtha, 2366·59 Std. Gall. at $1.20	2,839 91		Methylated spirits	83,279 58	
Methylated spirits, 2,996·68 Std. Gall.	3,808 44		Drums (347 at $10)	3,470 00	
Alcohol, 1,719·81 Proof Gall. at 30c.	515 94		Barrels (2,266 at $2.50)	5,665 00	
Drums, 164 at $10, and barrels, 117 at $2.50	1,932 50		Tin cans (5 at $1.50, 1 at $1.25)	8 75	
			Wood naphtha	37 80	
Disbursements during the year, for:—		60,057 21	Cartage, $1. Refund of freight, $5.47	6 47	
Alcohol	27,338 60				
Wood naphtha	23,710 42		Stock on hand, 30th June, 1899		7,144 96
Drums (333 at $10, less freight)	3,272 95		Wood naphtha, 823·08 Std. Gall. at $1.40	1,152 31	
Barrels (2,315 at $2.50, less freight)	5,712 74		Methylated spirits { 1,538·18 Std. Gall. at $1.10	1,692 00	
Tin cans (15 at $1.50)	22 50		Methylated spirits { 1,146·51 " $1.50	1,719 76	
			Alcohol, 3,061·32 Proof Galls. at 30c.	918 39	
Other expenses, as follows		7,361 33	Drums, 123 at $10	1,230 00	
Freight	1,946 99		Barrels, 167 at $2 50	417 50	
Rent of warehouse	800 00		Tin cans, 10 at $1.50	15 00	
" motor power	156 25				
Heating	115 50				
Lighting	27 82				
Salaries	3,818 24				
Stationery	7 57				
Printing	11 77				
Lithographing	20 00				
Sundries	457 19				
Balance, being net profit over expenditure		23,097 23			
Total		99,612 56	Total		99,612 56

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

No. 26.—STATEMENT showing the amounts voted and the Expenditure authorized for each service for the year ended 30th June, 1899.

Services.	Grants.	Expenditures.	Over Expenditures.	Under Expenditures.
	$ cts.	$ cts.	$ cts.	$ cts.
Minister's salary	7,000 00	7,000 00		
Departmental salaries	37,425 00	36,975 00		450 00
" contingencies	7,075 00	5,222 63		1,852 37
Excise salaries	305,076 25	305,200 28	124 03	
" contingencies	48,000 00	47,954 92		45 08
" " on account of stamps	19,000 00	19,028 52	28 52	
Commission to Customs officers	5,500 00	5,488 08		11 92
Duty pay	6,000 00	5,573 51		426 49
" other than special surveys	1,000 00	558 33		441 67
Cullers' salaries	5,850 00	5,850 00		
" contingencies	3,000 00	1,951 39		1,048 61
" fees	4,900 00	4,200 00		700 00
" annuities	5,600 00	5,600 00		
Preventive service	13,000 00	13,206 62	206 62	
Minor revenues	200 00	78 66		121 34
Tobacco stamp commission	100 00	90 00		10 00
Weights and measures salaries	46,035 00	45,913 64		121 36
" " contingencies	17,000 00	17,478 47	478 47	
Gas inspection salaries	14,850 00	14,487 72		362 28
" contingencies	4,367 31	5,541 56	1,174 25	
Electric light inspection	6,032 69	6,032 69		
Inspection of staples	5,100 00	5,100 00		
Adulteration of food	25,000 00	23,125 36		1,874 64
Methylated spirits	55,000 00	67,418 54	12,418 54	
Metric system supplies	250 00	250 00		
L. A. Fréchette translation	100 00	99 40		0 60
	642,461 25	649,425 32	14,430 43	7,466 36

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A

STATISTICS

APPENDIX A—SPIRITS.

No. 1.—RETURN of Manufactures for

DIVISIONS.	LICENSES.		GRAIN USED FOR DISTILLATION.				
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.	Wheat.
		$	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Belleville, Ont.	1	250	162,600	3,154,440	942,220	32,520	860
Guelph "	1	250	150,260	2,619,700	475,340	39,100	.....
Hamilton "	1	250	121,424	2,389,980	483,340	37,940	2,646
Perth "	2	500	193,095	.....	.....	.....	.....
Prescott "	1	250	180,945	3,599,400	681,115	45,110	.....
Toronto "	1	250	1,095,105	19,731,840	4,101,625	263,900	119,900
Windsor "	1	250	2,408,174	12,402,500	2,286,310	154,950	102,000
Joliette, Que	1	125	220,407	161,504	212,307	.....	.....
Totals	9	2,125	4,532,010	44,059,364	9,182,257	573,520	225,406

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

the Year ended 30th June, 1899.

Barley.	Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
.....	4,292,640	256,627·38	.....	.....	250 00
.....	3,284,400	194,381·15	97·33	184 93	434 93
.....	3,035,330	173,687·08	157·94	300 09	550 09
.....	193,095	9,755·90	50·75	97 44	597 44
.....	4,506,570	259,761·75	.....	.....	250 00
57,385	25,369,755	1,507,121·45	4,624·42	8,786 40	9,036 40
.....	17,353,934	1,013,050·02	540·62	3,002 31	3,252 31
.....	594,218	29,579·95	100·03	192 06	317 06
57,385	58,629,942	3,443,964·68	5,571 09	12,563 23	14,688 23

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

No. 2.—Comparative Statement of manufactures

Provinces.	Licenses.		Grain used for Distillation.			
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.
1898.		$	Lbs.	Lbs.	Lbs.	Lbs.
Ontario	8	2,000	1,748,898	23,316,210	4,932,991	290,303
1899.						
Ontario	8	2,000	4,311,603	43,897,860	8,969,950	573,520
Quebec	1	125	220,407	161,504	212,307	
Totals	9	2,125	4,532,010	44,059,364	9,182,257	573,520

Inland Revenue Department,
Ottawa, 25th September, 1899.

for the Years ended 30th June, 1898 and 1899.

Wheat.	Barley.	Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
Lbs.	Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
13,920	....	30,302,322	1,753,186·35	3,865·52	6,851 39	8,851 39
225,406	57,385	58,035,724	3,414,384·73	5,471·06	12,371 17	14,371 17
.....	.....	594,218	29,579·95	100 03	192 06	317 06
225,406	57,385	58,629,942	3,443,964·68	5,571·09	12,563 23	14,688 23

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

No. 3.—STATEMENT showing the transactions in the Distilleries in the

DIVISIONS.	Spirits in process, including deficiencies brought forward.	Spirits. manufactured during the year including surpluses.	SPIRITS RETURNED TO DISTILLERY FOR REDISTILLATION.	
			Duty Paid.	In Bond.
	Galls.	Galls.	Galls.	Galls.
Belleville, Ont	2,228·04	256,627·38		374·77
Guelph, Ont	15,793·58	194,381·15		12,053·35
Hamilton, Ont	535·62	173,687·08	251·20	44,820·42
Perth, Ont	3,210·39	9,755·90		
Prescott, Ont	20,044·14	259,761·75		
Toronto, Ont	10,937·85	1,507,121·45	763·71	400,140·29
Windsor, Ont	65,877·02	1,013,050·02		17,617·76
Joliette, Qué		29,579·95		
Totals	118,626 64	3,443,964·68	1,014·91	475,006·59

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

Dominion of Canada during the Fiscal Year ended 30th June, 1899.

Spirits received from other sources, duty paid.	Totals.	Spirits warehoused during the year.	Fusel oil written off.	Deficiencies on which duty was collected.	Spirits in process, including deficiencies carried forward.	Totals.
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
415·16	259,645·35	256,051·16	2,189·76	....	1,404·43	259,645·35
570·53	222,798·61	214,991·58	1,336·97	97·33	6,372·73	222,798·61
151·65	219,445·97	218,267·88	240·94	157·94	779·21	219,445·97
.....	12,966·29	12,835·65	....	50·75	79·89	12,966·29
760·10	280,565·99	260,950·30	.....	.. ..	19,615·69	280,565·99
852·77	1,919,816·07	1,907,129·90	. . ..	4,624·42	8,061·75	1,919,816·07
37·68	1,096,582·48	1,022,814·36	1,581·71	540·62	71,645·79	1,096,582·48
..... .	29,579·95	21,052·85	. . ..	... .	8,527·10	29,579·95
2,787·89	4,041,400·71	3,914,093·68	5,349·38	5,471·06	116,486·59	4,041,400·71

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 4.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Placed in Warehouse.	Imported	Received from other Divisions.	Totals.	DIVISIONS.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.		Galls.	$ cts.
666,008·84	256,051·16	.. ..	12,292·80	934,352·80	Belleville Ont.	56,124·76	106,636 76
4,874·96	....	.....	27,545·11	32,420·07	Brantford „ .	11,397·01	21,662 68
545·37	....	.....	6,148·11	6,693 48	Cornwall „ .	5,842·36	11,100 51
936,517·66	214,991·58	.....	90,690·14	1,242,199·38	Guelph „ .	208,869·46	396,854 74
519,767·37	218,267·88	.....	77,904·98	815,940·23	Hamilton „ .	107,996·64	205,193 54
2,039 31	.....	.....	26,392·50	28,431·81	Kingston „ .	20,008·70	38,016 45
10,406·32	....	.....	44,965·81	55,372·13	London „ .	44,817·71	85,155 00
14,260·97	.....	.....	112,387·16	126,648·13	Ottawa „ .	108,187·13	205,558 21
1,719·81	.....	.....	87,559·18	89,278·99	„ Gvt. Wse. „	.....	.....
.....	....	.....	59·32	59·32	„ Dep. Lab. „	.....	.....
1,047·84	.....	.....	10,806·12	11,853·96	Owen S'nd. „ .	10,283·91	19,539 53
53,723·07	12,835·65	.....	21,393·58	87,952·30	Perth „ .	26,877·60	51,225 08
2,050·57	....	.....	10,237·01	12,287·58	Peterboro' „ .	10,483·52	19,919 10
1,046·82	.....	.....	6,448·58	7,495·40	Port Arthur„ .	5,623·41	10,684 53
772,169·92	260,950·30	99,846·95	49,454·48	1,182,421·65	Prescott „ .	31,873·06	90,512 49
1,704 17	....	.....	8,645·95	10,350·12	St. Cath'nes„ .	8,943 48	16,992 59
1,598 52	.....	.....	15,745·12	17,343·64	Stratford „	15,008·60	28,519 35
3,940,168·18	1,907,129·90	.....	98,072·28	5,945,370·36	Toronto „ .	304,647·26	573,797 78
4,085,960·68	1,022,814·36	4,143·87	34,369·62	5,147,288·53	Windsor „ .	144,174·00	273,760 80
11,015,610·38	3,893,040·83	103,990·82	741,117·85	15,753,759·88	.....Totals....	1,121,158·61	2,155,129 14
2,127·98	21,052·85	.....	17,611·85	40,792·68	Joliette, Que.	15,751·23	29,927 42
66,741·17	.....	*116·78 4,757·18	600,548·38	672,163·51	Montreal „ .	545,904·88	1,027,737 93
27,393·08	.....	.....	185,663·45	213,056·53	Quebec „ .	168,757·61	320,391 43
4,376·81	....	.....	25,201·66	29,578·47	St. Hy'nthe „ .	23,545·90	44,738 27
10,523·16	....	36,940·65	83,434·91	130,898·72	Sherbrooke „ .	66,843·40	138,084 23
579·68	....	.....	11,205·10	11,784·78	Sorel „ .	10,223·53	19,424 75
5,674·40	....	.....	22,719·00	28,393·40	ThreeRivers„ .	26,622·57	50,483 42
4,525·93	....	.....	8,514·67	13,040·60	Victoriaville„ .	10,681·54	20,300 55
121,942·21	21,052·85	*116·78 41,697·83	954,899·02	1,139,708·69	.....Totals....	868,333·66	1,651,088 00
6,030·08	.....	.....	59,330·45	65,360·53	St. John, N.B.	57,446·41	109,148 03
7,566·34	....	.....	29,116·35	36,682·69	Halifax, N.S..	28,368·29	53,899 69
65·40	....	..... .	663·23	728·63	Charlotn, P.E.I.	328·04	623 00
26,304·94	.....	.....	157,045·21	183,350·15	Winnipeg, Man	147,492·51	280,236 61
2,209·18	. ...	.....	12,810·20	15,019·38	Calgary, NWT	10,008·01	19,015 26
41,110 27	....	.....	84,738·57	125,848·84	Vanc'ver, B.C.	91,913·18	174,646 44
30,584·82	... .	.....	72,617·68	103,202·50	Victoria „ .	79,550·14	151,145 07
71,695·09	.....	.....	157,356·25	229,051·34	.....Totals....	171,463·32	325,791 51
8,612·54	....	.....	.....	8,612·54	Sundries	.. . .	..... .
11,260,036·16	3,914,093·68	*116·78 145,688·65	2,112,338·56	17,432,273·83	.Grand Totals..	2,404,598·85	†4,594,931 24

* Seizure. † This amount includes $41,347.41 collected on imported Spirits used in Bonded Factories at 30c. per gallon.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Year ended 30th June, 1899. CR.

Removed in Bond.		Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
205,074·40	374·77	7,590·67	435·13	1,108·08	.....	663,644·99	934,352·80
.....	.....	.....	.....	.....	13,947·51	7,075·55	32,420·07
.....	.....	.....	.....	.....	.....	851·12	6,693·48
79,232·60	12,053·35	23,446·30	467·49	4,535·13	.....	913,595·05	1,242,199·38
128,779·53	44,820·42	9,807·92	590·94	350·76	7,837·75	515,756·27	815,940·23
175·30	.....	.....	.....	6·53	6,471·98	1,769·30	28,431·81
363·39	.....	.....	.....	119·37	.....	10,071·66	55,372·13
1,075·91	.....	.....	128·70	.....	.....	17,256·39	126,648·13
.....	.....	.....	.....	.....	*86,217·67	3,061·32	89,278·99
.....	.....	.....	59·32	.....	.....	.....	59·32
.....	.....	.....	.....	.....	.....	1,570·05	11,853·96
648·66	.....	899·27	.....	1·60	.....	59,525·17	87,952·30
.....	.....	.....	.....	.....	.....	1,804·06	12,287·58
.....	.....	.....	.....	.....	.....	1,871·99	7,495·40
263,492·69	.....	3,350·74	502·96	1,261·66	99,846·95	782,093·59	1,182,421·65
.....	.....	.....	.....	123·81	.....	1,282·83	10,350·12
.....	.....	.....	.....	.....	.....	2,335·04	17,343·64
749,629·40	400,140·29	28,408·61	2,002·05	5,995·16	55,269·27	4,399,278·32	5,945,370·36
640,109·93	17,617·76	59,850·86	363·46	104,791·59	4,143·87	4,176,237·06	5,147,288·53
2,068,581·81	475,006·59	133,354·37	4,550·05	118,293·69	*86,217·67 187,517·33	11,559,079·76	15,753,759·88
.....	.....	.....	.....	.....	.....	25,041·45	40,792·68
38,345·05	.....	.....	.....	147·26	16,502·00	71,264·32	672,163·51
331·81	.....	.....	396·08	.....	12,990·43	30,580·60	213,056·53
.....	.....	.....	.....	13·15	1,757·90	4,261·52	29,578·47
.....	.....	.....	.....	.....	54,273·87	9,781·45	130,898·72
.....	.....	.....	.....	.....	.....	1,561·25	11,784·78
.....	.....	.....	.....	.....	.....	1,770·83	28,393·40
.....	.....	.....	.....	.....	.....	2,356·06	13,040·60
38,676·86	.....	.....	396·08	160·41	85,524·20	146,617·48	1,139,708·69
.....	.....	.....	.....	23·60	1,616·93	6,273 59	65,360·53
.....	.....	.....	.....	289·31	.....	8,025·09	36,682·69
.....	.....	.....	.....	.....	.....	400·59	728·63
4,057·04	.....	.....	.....	115·80	.....	31,684·80	183,350·15
.....	.....	.....	.....	.....	.....	5,011·37	15,019·38
583·53	.....	.....	.....	333·95	.....	33,018·18	125,848·84
439·32	.....	.....	.....	944·61	.....	22,268·43	103,202·50
1,022·85	.....	.....	.....	1,278·56	.....	55,286·61	229,051·34
.....	.....	.....	.....	.....	.....	8,612·54	8,612·54
2,112,338·56	475,006·59	133,354·37	4,946·13	120,161·37	*86,217·67 274,658·46	11,820,991·83	17,432,273·83

* Used in manufacture of Methylated Spirits at the Government Warehouse, Ottawa.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 5.—COMPARATIVE STATEMENT of Warehouse

Remaining in Warehouse from last year.	Placed in Warehouse	Imported.	Received from other Divisions.	Totals.	PROVINCES.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.	1898.	Galls.	$ cts.
11,756,095·22	1,766,030·06	62,688·47	613,426·69	14,198,240·44	Ontario.....	810,377·70	1,553,198 67
68,209·95	.....	*116·73 31,992·87	840,374·78	940,694·33	Quebec.....	705,477·09	1,350,501 08
3,773·32	.....	.....	52,068·00	55,841·32	N. Brunswick..	49,544·09	94,134 02
4,322·59	.....	.....	27,736·69	32,059·28	Nova Scotia ...	24,316·30	46,204 19
.....	.....	.....	662·62	662·62	P. E. Island...	597·22	1,135 02
17,506·03	.....	.....	147,391·78	164,897·81	Manitoba.....	130,254·57	247,483 46
1,395·42	.....	.....	9,680·00	11,075·42	N. W. Territ..	8,866·24	16,845 77
26,199·23	.....	.....	196,726·32	222,925·55	B. Columbia...	145,046·12	275,626 71
8,612·54	.....	.....	.....	8,612·54	Sundries.....	.....	.....
11,886,114·30	1,766,030·06	*116·73 94,681·34	1,888,066·88	15,635,009·31	....Totals....	1,874,479·33	3,585,128 92
					1899.		
11,015,610·38	3,893,040·83	103,990·82	741,117·85	15,753,759·88	Ontario.....	1,121,158·61	2,155,129 14
121,942·21	21,052·85	*116·78 41,697·83	954,899·02	1,139,708·69	Quebec.....	868,333·66	1,651,088 00
6,030·08	.....	.....	59,330·45	65,360·53	N. Brunswick..	57,446·41	109,148 03
7,566·34	.....	.....	29,116·35	36,682·69	Nova Scotia ...	28,368·29	53,899 69
65·40	.....	.....	663·23	728·63	P. E. Island...	328·04	623 00
26,304·94	.....	.....	157,045·21	183,350·15	Manitoba.....	147,492·51	280,236 61
2,209·18	.....	.....	12,810·20	15,019·38	N. W. Territ..	10,008·01	19,015 26
71,695·09	.....	.....	157,356·25	229,051·34	B. Columbia...	171,463·32	325,791 51
8,612·54	.....	.....	.....	8,612·54	Sundries.....	.....	.....
11,268,036·16	3,914,093·68	*116·78 145,688·65	2,112,338·56	17,432,273·83	....Totals.....	2,404,598·85	4,594,931 24

*Seized.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

Returns for the Years ended 30th June, 1898 and 1899. CR.

REMOVED IN BOND.		FREE.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
1,833,756·28	68,122·88	125,284·78	9,353·63	84,519·47	*98,706·87 152,508·45	11,015,610·38	14,198,240·44
43,027·41	.....	.....	.....	160·32	70,087·30	121,942·21	940,694·33
18·34	.....	.....	.....	36·58	212·23	6,030·08	55,841·32
.....	.....	.....	.....	176·64	.....	7,566·34	32,059·28
.....	.....	.....	.....	.....	.....	65·40	662·62
7,678·70	.....	.....	608·91	50·69	.....	26,304·94	164,897·81
.....	.....	.....	.....	.....	.....	2,209·18	11,075·42
3,586·15	.....	.....	70·78	2,527·41	.....	71,695 09	222,925·55
.....	.....	.....	.....	.....	.....	8,612·54	8,612·54
1,888,066·88	68,122·88	125,284·78	10,033·32	87,471·11	*98,706·87 222,807·98	11,260,036·16	15,635,009·31
2,068,581·81	475,006·59	133,354·37	4,550·05	118,293·69	*86,217·67 187,517·33	11,559,079·76	15,753,759·88
38,676·86	.....	.....	396·08	160·41	85,524·20	146,617·48	1,139,708·69
.....	.....	.....	.....	23·60	1,616·93	6,273·59	65,360·53
.....	.....	.....	.....	289·31	.....	8,025·09	36,682·69
.....	.....	.....	.....	.....	.....	400·59	728·63
4,057·04	.....	.....	.....	115·80	.....	31,684·80	183,350·15
.....	.....	.....	.....	.....	.....	5,011·37	15,019·38
1,022·85	.....	.....	.....	1,278·56	.....	55,286·61	229,051·34
.....	.....	.....	.....	.....	.....	8,612·54	8,612·54
2,112,338·56	475,006·59	133,354·37	4,946·13	120,161·37	274,658·46 86,217·67	11,820,991·83	17,432,273·83

*Used in the manufacture of Methylated Spirits at the Government Warehouse, Ottawa.

	1898.	1899.
Total duty collected ex-manufactory and ex-warehouse	$3,591,980 31	$4,607,494 47
" " on Licenses	2,000 00	2,125 00
Totals	$3,593,980 31	$4,609,619 47

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MALT.

No. 6.—RETURN of Manufactures for the Year ended 30th June, 1899.

DIVISIONS.	LICENSES. No.	LICENSES. Fees.	Grain placed in Steep.	Malt manufactured at 1½ cents per lb.	Paid Duty Ex-manufactory.	Warehoused.	Total Duty collected Ex-manufactory, including License Fees.
		$	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
Belleville, Ont.	1	50	392,968	313,790	.....	313,790	50 00
Brantford "	2	100	730,822	591,784	.....	591,784	100 00
Guelph "	8	725	7,689,305	6,178,124	.....	6,178,124	725 00
Hamilton "	3	500	6,289,747	5,093,002	.....	5,093,002	500 00
Kingston "	2	250	6,021,845	5,193,936	.....	5,193,936	250 00
London "	3	450	6,440,590	5,176,296	.....	5,176,296	450 00
Owen Sound "	1	150	1,348,336	1,053,080	.....	1,053,080	150 00
Perth "	2	100	224,346	189,168	.....	189,168	100 00
Peterborough, Ont.	2	250	1,955,348	1,572,130	.....	1,572,130	250 00
Prescott "	4	350	2,050,820	1,640,162	.....	1,640,162	350 00
St. Catharines "	2	100	1,044,784	839,972	.....	839,972	100 00
Stratford "	1	200	5,838,000	4,796,620	.....	4,796,620	200 00
Toronto "	10	1,400	17,521,354	13,911,939	.....	13,911,939	1,400 00
Windsor "	1	200	2,793,988	2,275,955	.....	2,275,955	200 00
Totals	42	4,825	60,342,253	48,825,958	.....	48,825,958	4,825 00
Montreal, Que.	3	600	10,480,819	8,494,462	.....	8,494,462	600 00
Quebec "	1	150	1,420,654	1,138,157	.....	1,138,157	150 00
Totals	4	750	11,901,473	9,632,619	.....	9,632,619	750 00
Halifax, N.S.	1	100	619,773	500,008	.....	500,008	100 00
Winnipeg, Man.	4	300	1,790,738	1,377,888	14,548	1,363,340	518 22
Calgary, N.W.T.	4	250	858,103	675,627	4,573	671,054	318 60
Vancouver, B.C.	1	50	11,737	8,739	.....	8,739	50 00
Grand Totals	56	6,275	75,524,077	61,020,839	19,121	61,001,718	6,561 82

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

SESSIONAL PAPER No. 7

APPENDIX A—*Continued*—MALT.

No. 7.—COMPARATIVE STATEMENT of Manufactures for the Years ended 30th June, 1898 and 1899.

PROVINCES.	LICENSES. No.	LICENSES. Fees.	Grain placed in Steep.	Malt manufactured at 1½ cents per lb.	Paid Duty Ex-manufactory.	Warehoused.	Total Duty collected Ex-manufactory, including License Fees.
1898		$	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
Ontario	41	4,425	47,661,365	37,822,867	1,925,820	35,897,047	33,312 30
Quebec	3	550	6,178,382	5,124,394	.....	5,124,394	550 00
Nova Scotia	2	150	864,014	697,577	.....	697,577	150 00
Manitoba	4	275	1,581,576	1,269,194	7,420	1,261,774	386 30
N. W. Territories	3	175	696,252	564,497	1,307	563,190	194 61
Totals	53	5,575	56,981,589	45,478,529	1,934,547	43,543,982	34,593 21
1899.							
Ontario	42	4,825	60,342,253	48,825,958	.....	48,825,958	4,825 00
Quebec	4	750	11,901,473	9,632,619	.....	9,632,619	750 00
Nova Scotia	1	100	619,773	500,008	.....	500,008	100 00
Manitoba	4	300	1,790,738	1,377,888	14,548	1,363,340	518 22
N. W. Territories	4	250	858,103	675,627	4,573	671,054	318 60
British Columbia	1	50	11,737	8,739	.....	8,739	50 00
Totals	56	6,275	75,524,077	61,020,839	19,121	61,001,718	6,561 82

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—MALT.

DR. No. 8.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Placed in Warehouse.	Increases.	Received from other Divisions.	Imported.	Totals.	Divisions.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
39,738	313,790	656	.....	.....	354,184	..Belleville, Ont....
186,566	591,784	8,251	182,400	.....	969,001	..Brantford " ....
1,918,315	6,178,124	96,109	540,000	.....	8,732,548	..Guelph " ....
1,362,499	5,093,002	65,854	.....	.....	6,521,355	..Hamilton " ....
1,117,352	5,193,936	25,384	66,752	.....	6,403,424	..Kingston " ....
2,051,513	5,176,296	80,490	30,000	.....	7,338,299	..London " ....
6,952	.....	351	206,120	.....	213,423	..Ottawa " ....
291,418	1,053,080	7,932	492,500	.....	1,844,930	..Owen Sound " ....
7,305	189,168	504	9,200	.....	206,177	..Perth " ....
437,414	1,572,130	34,992	87,613	.....	2,132,149	..Peterborough " ....
.....	.....	.....	14,400	.....	14,400	..Port Arthur " ....
911,410	1,640,162	30,105	.....	.....	2,581,677	..Prescott " ....
145,608	839,972	7,903	106,200	.....	1,099,683	..St. Catharines " ....
1,033,638	4,796,620	14,984	367,984	.....	6,213,226	..Stratford " ....
3,379,578	13,911,939	80,197	721,840	.....	18,093,554	..Toronto " ....
1,947,856	2,275,955	14,243	479,000	61,750	4,778,804	..Windsor " ....
14,837,162	48,825,958	467,955	3,304,009	61,750	67,496,834	.... Totals.....
.....	.....	.....	281,482	.....	281,482	..Joliette, Que .....
965,228	8,494,462	65,984	688,000	12,442	10,226,116	..Montreal " .....
100,500	1,138,157	.....	1,832,000	.....	3,070,657	..Quebec " .....
14,392	.....	3,007	555,600	.....	572,999	..Sherbrooke " ....
.....	.....	.....	3,600	.....	3,600	. St. Hyacinthe " .....
1,080,120	9,632,619	68,991	3,360,682	12,442	14,154,854	.....Totals.....
31,550	.....	.....	778,000	.....	809,550	..St. John, N.B.....
54,266	500,008	2,491	2,074,000	.....	2,627,765	..Halifax, N.S.....
.....	.....	.....	144,000	.....	144,000	..Charlottetown, P.E.I..
381,127	1,363,340	11,462	270,000	.....	2,025,929	..Winnipeg, Man.....
112,552	671,054	1,464	.....	.....	785,070	..Calgary, N.W.T.....
43,769	8,739	.....	472,000	1,884,767	2,409,275	..Vancouver, B.C.....
36,000	.....	.....	1,010,000	428,823	1,474,823	..Victoria " .....
79,769	8,739	.....	1,482,000	2,313,590	3,884,098	.... Totals.....
16,576,546	61,001,718	552,363	11,409,691	2,387,782	91,928,100	.....Grand Totals....

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Year ended 30th June, 1899. CR.

Entered for Consumption at 1½ cents per lb.		Removed to other Divisions.	Exported.	Free, and Written off by Authority.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
272,532	4,087 98	....	....	.....	81,652	354,184
722,179	10,832 68	.....	.....	28,628	218,194	969,001
4,695,715	70,435 72	1,606,524	229,774	602	2,199,933	8,732,548
4,590,249	68,853 73	1,144,900	.....	....	786,206	6,521,355
2,850,498	42,757 47	1,238,920	.. ..	.....	2,314,006	6,403,424
3,881,571	58,224 31	980,000	....	... .	2,476,728	7,338,299
193,390	2,900 85	16,120	.....	....	3,913	213,423
915,096	13,726 45	546,400	.. ..	... .	383,434	1,844,930
.....	.....	.....	.....	197,642	8,535	206,177
669,649	10,044 74	622,800	36,000	.....	803,700	2,132,149
14,400	216 00	.....	....	.....	.....	14,400
1,667,402	25,011 09	50,632	.....	89,384	774,259	2,581,677
864,545	12,968 17	.....	....	. ...	235,138	1,099,683
2,618,946	39,284 19	3,001,500	.....	.....	592,780	6,213,226
12,294,244	184,413 68	988,813	36,000	.....	4,774,497	18,093,554
2,029,695	30,445 45	36,000	. .....	1,704,084	1,009,025	4,778,804
38,230,111	574,202 51	10,232,609	301,774	2,020,340	16,662,000	67,496,834
25,200	378 00	.....	.....	220,407	35,875	281,482
5,328,674	79,930 11	939,082	....	. .....	3,958,360	10,226,116
3,053,457	45,801 72	.....	.....	.....	17,200	3,070,657
542,276	8,134 16	....	....	.....	30,723	572,999
3,600	54 00	....	.....	.....	.....	3,600
8,953,207	134,297 99	939,082	....	220,407	4,042,158	14,154,854
779,550	11,693 25	.....	....	.....	30,000	809,550
2,525,570	37,883 56	.....	.....	.....	102,195	2,627,765
140,400	2,106 00	.. ..	... .	. ...	3,600	144,000
1,495,706	22,435 61	132,000	. .. .	... .	398,223	2,025,929
445,022	6,675 36	106,000	.....	....	234,048	785,070
2,179,312	32,689 96	.....	.....	.....	229,963	2,409,275
1,394,823	20,922 28	.....	....	.....	80,000	1,474,823
3,574,135	53,612 24	....	.....	. . ..	309,963	3,884,098
56,193,701	842,906 52	11,409,691	301,774	2,240,747	21,782,187	91,928,100

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MALT.

DR. No. 9.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from last year.	Placed in Warehouse.	Increases.	Received from other Divisions.	Imported.	Totals.	PROVINCES.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	1898.
6,504,142	35,897,047	578,495	1,518,189	102,991	44,600,864	..Ontario.....
813,233	5,124,394	77,478	2,438,979	4,190	8,458,274	..Quebec.....
.....	.....	.....	511,600	.....	511,600	..New Brunswick.
50,622	697,577	4,238	575,450	.....	1,327,887	..Nova Scotia.....
.....	.....	.....	36,000	.....	36,000	..Prince Edward Island.
118,294	1,261,774	11,516	276,000	.....	1,667,584	..Manitoba.....
20,971	563,190	7,011	.....	.....	591,172	..N. W. Territories.....
159,380	.....	.....	582,000	2,389,953	3,131,333	..British Columbia.....
7,666,642	43,543,982	678,738	5,938,218	2,497,134	60,324,714	.....Totals.....
						1899.
14,837,162	48,825,958	467,955	3,304,009	61,750	67,496,834	..Ontario.....
1,080,120	9,632,619	68,991	3,360,682	12,442	14,154,854	..Quebec.....
31,550	.....	.....	778,000	.....	809,550	..New Brunswick.....
54,266	500,008	2,491	2,071,000	.....	2,627,765	..Nova Scotia .....
.....	.....	.....	144,000	.....	144,000	..Prince Edward Island.
381,127	1,363,340	11,462	270,000	.....	2,025,929	..Manitoba.....
112,552	671,054	1,464	.....	.....	785,070	..N. W. Territories.....
79,769	8,739	.....	1,482,000	2,313,590	3,884,098	..British Columbia.....
16,576,546	61,001,718	552,363	11,409,691	2,387,782	91,928,100	.....Totals.....

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Years ended 30th June, 1898 and 1899. CR.

Entered for Consumption at 1½ cents per lb.		Removed to other Divisions.	Exported.	Free, and Written off by Authority.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
23,352,487	350,287 65	5,624,218	228,000	558,997	14,837,162	44,600,864
7,378,154	110,672 27	.....	.....	.....	1,080,120	8,458,274
480,050	7,200 75	.....	.....	.....	31,550	511,600
1,273,621	19,104 34	.....	.....	.....	54,266	1,327,887
36,000	540 00	.....	.....	.....	.....	36,000
1,219,672	18,295 07	64,000	.....	2,785	381,127	1,667,584
264,620	3,969 31	214,000	.....	.....	112,552	591,172
3,015,564	45,233 54	36,000	.....	.....	79,769	3,131,333
37,020,168	555,302 93	5,938,218	228,000	561,782	16,576,546	60,324,714
38,280,111	574,202 51	10,232,609	301,774	2,020,340	16,662,000	67,496,834
8,953,207	134,297 99	939,082	.....	220,407	4,042,158	14,154,854
779,550	11,693 25	.....	.....	.....	30,000	809,550
2,525,570	37,883 56	.....	.....	.....	102,195	2,627,765
140,400	2,106 00	.....	.....	.....	3,600	144,000
1,495,706	22,435 61	132,000	.....	.....	398,223	2,025,929
445,022	6,675 36	106,000	.....	.....	234,048	785,070
3,574,135	53,612 24	.....	.....	.....	309,963	3,884,098
56,193,701	842,906 52	11,409,691	301,774	2,240,747	21,782,187	91,928,100

	1898	1899
Total duty collected ex-manufactory and ex-warehouse.....	$584,321 14	$843,193 34
" " on licenses.....	5,575 00	6,275 00
Totals.....	$589,896 14	$849,468 34

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MALT LIQUOR.

No. 10.—RETURN of Manufactures for the Year ended 30th June, 1899.

DIVISIONS.	LICENSES. No.	LICENSES. Fees.	Total quantity of Malt used for Brewing.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported, and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
		$	Lbs.	Lbs.	Galls.	Galls.	$ cts.
Belleville, Ont.	1	50	105,139	.....	40,995	.....	50 00
Brantford "	3	150	741,194	.....	275,445	.....	150 00
Guelph "	7	350	4,734,301	.....	1,718,887	.....	350 00
Hamilton "	3	150	2,396,002	.....	1,054,602	.....	150 00
Kingston "	2	100	402,504	.....	129,300	.....	100 00
London "	6	300	4,150,031	850	1,617,200	599	357 00
Ottawa "	3	150	447,264	.....	164,157	.....	150 00
Owen Sound "	7	350	942,609	.....	378,305	.....	350 00
Peterborough "	5	250	752,218	.....	266,647	.....	250 00
Port Arthur "	1	50	33,700	.....	15,888	.....	50 00
Prescott "	3	150	1,460,848	.....	493,354	.....	150 00
St. Catharines "	2	100	865,640	.....	320,200	.....	100 00
Stratford "	5	250	419,030	.....	195,700	.....	250 00
Toronto "	13	650	11,316,041	.....	4,663,123	.....	650 00
Windsor "	4	175	1,404,573	.....	665,259	1,353	175 00
Totals	65	3,225	30,171,094	850	11,999,062	2,452	3,282 00
Joliette, Que.	2	75	27,550	.....	8,255	.....	75 00
Montreal "	10	500	11,364,549	.....	4,240,820	.....	500 00
Quebec "	4	200	3,172,862	.....	1,181,800	.....	200 00
Sherbrooke "	4	175	621,410	.....	239,315	.....	175 00
St. Hyacinthe "	1	25	21,460	.....	7,301	.....	25 00
Totals	21	975	15,207,831	.....	5,677,491	.....	975 00
St. John, N.B.	2	100	1,226,014	.....	455,755	.....	100 00
Halifax, N.S.	4	175	2,437,171	.....	850,398	177,977	175 00
Charlottetown, P.E.I.	2	75	147,500	.....	45,045	.....	75 00
Winnipeg, Man.	7	350	1,491,428	.....	520,837	.....	350 00
Calgary, N.W.T.	4	200	398,408	.....	144,525	.....	200 00
Vancouver, B.C	29	1,400	2,190,828	.....	889,353	.....	1,400 00
Victoria "	5	250	1,501,895	.....	519,407	35,731	250 00
Totals	34	1,650	3,692,723	.....	1,408,760	35,731	1,650 00
Grand Totals	139	6,750	54,772,169	850	21,101,873	216,160	6,807 00

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

SESSIONAL PAPER No. 7

APPENDIX A—*Continued*—MALT LIQUOR.

No. 11.—COMPARATIVE STATEMENT of Manufactures for the Years ended 30th June, 1898 and 1899.

PROVINCES.	LICENSES. No.	LICENSES. Fees.	Total quantity of Malt used for Brewing.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported, and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
1898.		$	Lbs.	Lbs.	Galls.	Galls.	$ cts.
Ontario	66	3,300	28,976,860	582	11,440,057	2,570	3,329 80
Quebec	21	1,025	14,749,590	.....	5,368,325	.....	1,025 00
New Brunswick	2	100	1,167,906	.....	423,387	.....	100 00
Nova Scotia	4	175	2,333,731	.....	822,614	178,232	175 00
Prince Edward Island	1	50	76,000	.....	22,800	.....	50 00
Manitoba	8	375	1,679,579	.....	547,158	.....	375 00
N. W. Territories	4	175	357,356	.....	125,525	.....	175 00
British Columbia	32	1,550	3,071,480	2,000	1,121,872	30,211	1,621 20
Totals	138	6,750	52,412,502	2,582	19,871,738	211,013	6,851 00
1899.							
Ontario	65	3,225	30,171,094	850	11,999,062	2,452	3,282 00
Quebec	21	975	15,207,831	.....	5,677,491	.....	975 00
New Brunswick	2	100	1,226,014	.....	455,755	.....	100 00
Nova Scotia	4	175	2,437,171	.....	850,398	177,977	175 00
Prince Edward Island	2	75	147,500	.....	45,045	.....	75 00
Manitoba	7	350	1,491,428	.....	520,837	.....	350 00
N. W. Territories	4	200	398,408	.....	144,525	.....	200 00
British Columbia	34	1,650	3,692,723	.....	1,408,760	35,731	1,650 00
Totals	139	6,750	54,772,169	850	21,101,873	216,160	6,807 00

1898	Exported	5,118	gallons.
	Used by H. M. Army and Navy	205,895	"
	Total	211,013	"
1899	Exported	6,854	"
	Used by H. M. Army and Navy	209,306	"
	Total	216,160	"

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—TOBACCO.

No. 12.—RETURN of Manufactures for

DIVISIONS.	LICENSES.		Total weight of raw Leaf and all other material actually used.	TOBACCO MANUFACTURED.			CIGARETTES MANUFAC-	
	No.	Fees.		At 25 cents per lb.	Paid Duty.	Ware-housed.	At $3 per M.	Paid Duty.
		$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	No.	No.
Hamilton, Ont.....	1	75 00	880,776	871,626½	124,949	746,677½	212,128	210,128
Toronto "	1	75 00	107,229	106,745½	34,022½	72,723	....	.....
Totals.....	2	150 00	988,005	978,372	158,971½	819,400½	212,128	210,128
Joliette, Que.....	2	82 50	589,211	.....	.....	.....	.....	.....
Montreal, Que.....	16	907 50	6,206,556	5,846,963½	337,857	5,509,106½	98,513,100	96,602,600
Quebec "	5	325 00	528,650	127,769½	114,911	12,858½	204,000	204,000
Sherbrooke "	2	115 00	1,162,342	.....	.....	.....	.....	.....
Three Rivers, Que...	1	50 00	20,862	.....	.....	... ..	... .	.....
Totals.....	26	1,480 00	8,507,621	5,974,733	452,768	5,521,965	98,717,100	96,806,600
St. John, N.B.....	1	75 00	25,029	8,468	8,343	125	6,430,600	3,593,100
Cape Breton, N.S...	1	75 00	*	4,183	512	3,671	.....	.....
Halifax " ...	1	75 00	9,799	9,994	2,286	7,708	.....	.....
Pictou " ...	1	75 00	99,446	98,172½	16,229½	81,943	.....	....
Totals..... ..	3	225 00	109,245	112,349½	19,027½	93,322	....	.....
Charlottetown, P.E.I	3	175 00	172,272	174,252	80,877	93,375	.....	..... .
Grand Totals..	35	2,105 00	9,802,172	7,248,174½	719,987	6,528,187½	105,359,828	100,609,828

* Cape Breton amalgamated with Pictou, 1st November, 1898.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

the Year ended 30th June, 1899.

TURED.	CANADIAN TOBACCO MANUFACTURED.			COMBINATION TOBACCO MANUFACTURED.			SNUFF MANUFACTURED.				Total Duty collected Ex-Manufactory, including License Fees.
Warehoused.	At 5 cents per lb.	Paid Duty.	Warehoused.	At 5 cents per lb.	Paid Duty.	Warehoused.	At 25 cents per lb.	Paid Duty.	At 18 cents per lb.	Paid Duty.	
No.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
2,000											31,942 66
											8,580 63
2,000											40,523 29
	535,675½	241,287½	294,388	55,175½	24,813	30,362½					13,387 58
1,910,500	332,989½	312,737	20,252½	23,850	23,199½	650½	4,940	4,940	112,715	112,715	413,500 20
	357,888	345,672	12,216				1,065	1,065	99,505	99,505	65,125 30
	941,913	640,813	301,100	303,066½	215,893½	87,173					42,950 36
	22,057	22,057									1,152 85
1,910,500	2,190,523	1,562,566½	627,956½	382,092	263,906	118,186	6,005	6,005	212,220	212,220	536,116 29
2,837,500											12,940 05
											203 00
											646 50
											4,132 38
											4,981 88
	3,340	1,600	1,740								20,474 25
4,750,000	2,193,863	1,564,166½	629,696½	382,092	263,906	118,186	6,005	6,005	212,220	212,220	615,035 76

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—TOBACCO.

No. 13.—COMPARATIVE STATEMENT of Manufactures

PROVINCES.	LICENSES.		Total weight of Raw Leaf Tobacco and all other materials actually used.	TOBACCO MANUFACTURED.			CIGARETTES MANUFAC	
	No.	Fees.		At 25 cents per lb.	Paid Duty.	Warehoused.	At $1.50 and $3 per M.	Paid Duty
1898.		$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	No.	No.
Ontario.....	2	150 00	1,290,053½	1,287,355	175,636	1,111,719	227,947	222,247
Quebec.....	25	1,475 00	8,655,591¼	6,454,031	494,813½	5,959,217½	75,900,550 *1,289,000	74,446,550 411,000
N. Brunswick..	1	75 00	36,249	7,412	7,312	100	10,528,070	4,378,020
Nova Scotia...	4	300 00	158,328	161,619	12,090½	149,528½	.....	.....
P. E. Island...	2	150 00	164,132	172,633	131,472	41,161	.....	.....
Totals	34	2,150 00	10,304,353¾	8,083,050	821,324	7,261,726	86,656,567 *1,289,000	79,046,817 411,000
1899.								
Ontario.. ..	2	150 00	988,005	978,372	158,971½	819,400½	212,128	210,128
Quebec..	26	1,480 00	8,507,621	5,974,733	452,768	5,521,965	98,717,100	96,806,600
N. Brunswick..	1	75 00	25,029	8,468	8,343	125	6,430,600	3,593,100
Nova Scotia...	3	225 00	109,245	112,349½	19,027½	93,322	.....	.....
P. E. Island...	3	175 00	172,272	174,252	80,877	93,375	.....	.....
Totals	35	2,105 00	9,802,172	7,248,174½	719,987	6,528,187½	105,359,828	100,609,828

* Canadian cigarettes at $1.50 per M.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Years ended 30th June, 1898 and 1899.

TURED.	CANADIAN TOBACCO MANUFACTURED.			COMBINATION TOBACCO MANUFACTURED.			SNUFF MANUFACTURED.				Total Duty collected ex-Manufactory, including License Fees.
Warehoused.	At 5 cents per lb.	Paid Duty.	Warehoused.	At 5 cents per lb.	Paid Duty.	Warehoused.	At 25 cents per lb.	Paid Duty	At 18 cents per lb.	Paid Duty.	
No.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
5,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44,725 76
1,454,000	1,949,429	1,630,737½	318,691½	.....	.....	.....	6,075	6,075	217,100	217,100	471,268 20
878,000											
6,150,050	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,037 06
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,322 63
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33,018 00
7,609,750	1,949,429	1,630,737½	318,691½	.....	.....	.....	6,075	6,075	217,100	217.100	567,371 65
878,000											
2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40,523 29
1,910,500	2,190,523	1,562,566½	627,956½	382,092	263,906	118,186	6,005	6,005	212,220	212,220	536,116 29
2,837,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12,940 05
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,981 88
.....	3,340	1,600	1,740	.....	.....	.....	.....	.....	.....	.....	20,474 25
4,750,000	2,193,863	1,564,166½	629,696½	382,092	263,906	118,186	6,005	6,005	212,220	212,220	615,035 76

E. MIALL,
Commissioner.

DR. No. 14.—WAREHOUSE RETURN for the Year ended 30th June, 1899. CR.

Remaining in Warehouse.				Placed in Warehouse.				Received from other Divisions.		Total to be Accounted for.					Divisions.	Entered for Consumption.						Removed in bond to other Divisions.		Exported.			Army and Navy and Ships' Stores.		Written off by Authority.	Taken for Re-Working.			Remaining in Warehouse.				Total Accounted for.				
Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Tobacco.	Cigarettes.	Canadian Tobacco.	Combination Tobacco.	Tobacco.	Cigarettes.	Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.		Tobacco at 25c. per lb.	Cigarettes at $3 per M.	Canadian Tobacco at 5 per lb.	Canadian Cigarettes at $1.50 per M.	Combination Tobacco at 5c. per lb.	Duty.	Tobacco.	Cigarettes.	Tobacco.	Cigarettes.	Canadian Tobacco.	Tobacco.	Cigarettes.		Tobacco.	Canadian Tobacco.	Combination Tobacco.	Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.	Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.
Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	Lbs.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.		Lbs.	No.	Lbs.	No.	Lbs.	$ cts.	Lbs.	No.	Lbs.	No.	Lbs.	Lbs.	No.		Lbs.	Lbs.	Lbs.	Lbs.	No.	Lbs.	Lbs.	Lbs.	No.	Lbs.
1,311								13,457		14,768					Belleville, Ont.	13,898					3,474 50											870					14,768				
1,824½								11,544		13,368½					Cornwall "	11,747					2,936 76											1,621½					13,368½				
1,415								35,152		36,567					Guelph "	36,220½					9,055 13											346½					36,567				
284,829				746,677½	2,000			533,484½		1,564,991	2,000				Hamilton "	769,795½					192,448 90	465,206		32,580	2,000						124½	7,134			290,151					1,564,991	2,000			
2,237½								60,817		63,054½					Kingston "	59,911½					14,977 88														3,143					63,054½				
14,646½								86,514		101,160½					London "	93,959½					23,490 01	239													6,962					101,160½				
8,900								167,150½		176,050½					Ottawa "	161,3-9					40,347 26														14,661½					176,050½				
6,681								135,827		142,508					Owen Sound "	133,629					33,907 26														6,879					142,508				
1,266								35,802		37,068					Perth "	34,669					8,677 25														2,399					37,068				
3,260								3,936		7,196					Port Arthur "	5,676					1,419 00														1,520					7,196				
705								13,141		13,846					St. Catharines "	12,558					3,139 50														1,288					13,846				
523								13,428		13,951					Stratford "	13,849					3,462 26														102					13,951				
49,876½				72,723				593,225		715,824½					Toronto "	636,514½					159,128 62	10,325½										2,323			66,661½					715,824½				
								8,305		8,305					Windsor "	7,253					1,813 25														1,052					8,305				
377,475				819,400½	2,000			1,711,783		2,908,658½	2,000				Totals	1,993,069½					498,277 58	475,770½		32,580	2,000						124½	9,457			397,657					2,908,658½	2,000			
		16,059				294,388	30,362½					310,447		30,362½	Joliette, Que			268,316		10,230	13,927 30															310,447			30,362½
769,640			392,500	5,509,106½	1,910,500	20,252½	650½	8,757½	146,000	6,287,504	1,910,500	20,252½	392,500	650½	Montreal "	2,376,121		5,636	392,500		594,900 93	3,092,943	91,000	14,808½	1,794,500	19					2,216	1,359		803 146½	25,000	13,238½	650½		6,287,504	1,910,500	20,252½	392,500	650½
10,242½		2,732		12,858½		12,216		37,739½		60,840	146,000	14,948			Quebec "	48,749½	120,000	10,478			13,071 25							21,000			485	973½		12,046½	5,000	3,496½			60,840	146,000	14,948		
2,505½		50,447				301,100	87,173	29,699½		23,205		331,547		87,173	Sherbrooke "	20,961		337,330		78,069	26,910 26										44	1,586	1,508	2,244		12,631	7,596		23,205		351,547		87,173
357								1,064		1,421					Three Rivers "	777					194 25														644					1,421				
782,835		69,238	392,500	5,521,965	1,910,500	627,956½	118,186	68,170	146,000	6,372,970	2,056,500	697,194½	392,500	118,186	Totals	2,446,608½	120,000	621,760	392,500	88,299	648,103 99	3,092,943	91,000	14,808½	1,794,500	19		21,000			529	6,134½	1,508	818,081	30,000	69,281	28,379		6,372,970	2,056,500	697,194½	392,500	118,186
30,318½	578,900			125	2,837,500			379,861		410,304½	3,416,400				St. John, N.B.	379,150	21,000				94,850 49		125,000	125	2,635,000		668							30,361½	635,400				410,304½	3,416,400			
4,514				3,671				5,000		13,185					Cape Breton, N.S.	7,912					1,978 00	5,128					145												13,185				
86,479½				7,708				332,895	70,000	447,073½	70,000				Halifax "	358,923					89,730 77	544½		11,123½			2,416½	70,000						74,967					447,073½	70,000			
18,644				81,943				53,660		154,247					Pictou "	60,934					15,233 46	5,020		64,492			37							23,764					154,247				
109,637½				93,322				411,546	70,000	614,505½	70,000				Totals	426,868					106,717 23	10,692½		75,615½			2,598½	70,000						98,731					614,505½	70,000			
11,573				93,375		1,740		544½		105,492½		1,740			Charlottetown, P.E.I	76,904½		500			19,251 12	3,349									3,608			21,631		1,240			105,492½		1,740		
84,620								657,913		742,533					Winnipeg, Man.	675,117					168,779 31	336												67,080					742,533				
4,190								10,300		14,490					Calgary, N.W.T	10,050					2,512 51													4,440					14,490				
60,727½								216,839½		277,567					Vancouver, B.C	234,303½					58,575 90	4,803					413½							38,047					277,567				
39,994								131,609		171,603					Victoria "	143,728½					35,932 12	672					652½							26,550					171,603				
100,721½								348,448½		449,170					Totals	378,032					94,508 02	5,475					1,066							64,597					449,170				
19,719½										19,719½					Sundries																	19,719½					19,719½				
1,521,090	578,900	69,238	392,500	6,528,187½	4,750,000	629,696½	118,186	3,588,566	216,000	11,637,843½	5,544,900	698,934½	392,500	118,186	Grand Totals	6,385,799½	141,000	622,260	392,500	88,299	1,633,000 25	3,588,566	216,000	123,129	4,431,500	19	4,332½	91,000	124½	13,594	6,134½	1,508	1,522,298	665,400	70,521	28,379		11,637,843½	5,544,900	698,934½	392,500	118,186

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

DR. CR.

No. 15.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended 30th June, 1898 and 1899.

REMAINING IN WAREHOUSE.				PLACED IN WAREHOUSE.							RECEIVED FROM OTHER DIVISIONS.		TOTAL TO BE ACCOUNTED FOR.					PROVINCES.	ENTERED FOR CONSUMPTION.						REMOVED IN BOND TO OTHER DIVISIONS.		EXPORTED.			ARMY AND NAVY AND SHIPS' STORES.		WRITTEN OFF BY AUTHORITY.	TAKEN FOR RE-WORKING.				REMAINING IN WAREHOUSE.					TOTAL ACCOUNTED FOR.				
					Re-Warehoused.																																								
Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Tobacco.	Tobacco.	Cigarettes.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.	Tobacco.	Cigarettes.	Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.		Tobacco at 25c. per lb.	Cigarettes at $3 per M.	Canadian Tobacco at 5c. per lb.	Canadian Cigarettes at $1.50 per M.	Combination Tobacco at 5c. per lb.	Duty.	Tobacco.	Cigarettes.	Tobacco.	Cigarettes.	Canadian Tobacco.	Tobacco.	Cigarettes.	Tobacco.	Tobacco.	Cigarettes.	Canadian Tobacco.	Combination Tobacco.	Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.	Tobacco.	Cigarettes.	Canadian Tobacco.	Canadian Cigarettes.	Combination Tobacco.
Lbs.	No.	Lbs.	No.	Lbs.	Lbs.	No.	No.	Lbs.	No.	Lbs.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	1898.	Lbs.	No.	Lbs.	No.	Lbs.	$ cts.	Lbs.	No.	Lbs.	No.	Lbs.	Lbs.	No.	Lbs.	Lbs.	No.	Lbs.	Lbs.	No.	Lbs.	No.	Lbs.	Lbs.	No.	Lbs.	No.	Lbs.
146,949½				1,111,719			5,700				1,631,097		2,889,765½	5,700				Ontario	1,932,530					48,132 52	536,251		23,334½	5,700				8,447½	11,727½				377,475					2,889,765½	5,700			
22,914	522,500	9,838		5,959,217½	400	50,000	1,454,000	318,691½	878,000		68,021½		6,050,553	2,026,500	328,529½	878,000		Quebec	2,272,141½	522,500	257,222	485,500		583,192 40	2,933,003		58,997½	1,454,000				385	3,191	50,000	2,069½		782,835		69,238	392,500		6,050,553	2,026,500	328,529½	878,000	
6,182	670,000			100			6,150,050				335,238		341,520	6,820,050				New Brunswick	310,318½	97,000				77,870 65			269	6,144,150		614	578,900						30,318½	578,900				341,520	6,820,050			
42,301½				149,528½							358,039		549,869					Nova Scotia	338,308½					89,577 18	7,827		68,932			2,983			2,181								549,869				
5,343				41,161									46,504					P. E. Island	33,672					8,268 00	785								1,074								46,504				
3,733											719,951		723,684					Manitoba	637,237					159,309 27	1,827																723,684				
											4,190		4,190					N. W. Territories																						4,190				
22,462											364,444½		386,906½					British Columbia	283,402					70,850 53	1,288		250			1,245							100,721½					386,906½				
19,719½													19,719½					Sundries																			19,719½					19,719½				
269,604½	1,192,500	9,838		7,261,726	400	50,000	7,609,750	318,691½	878,000		3,480,981		11,012,711½	8,852,250	328,529½	878,000		Totals	5,827,009½	619,500	257,222	485,500		1,472,200 55	3,480,981		151,783	7,603,850		4,842		8,832½	18,173½	50,000	2,069½		1,521,090	578,900	69,238	392,500		11,012,711½	8,852,250	328,529½	878,000	
																		1892.																											
377,475				819,400½			2,000				1,711,783		2,908,658½	2,000				Ontario	1,993,069½					498,277 58	475,770½		32,580	2,000				124½	9,457				397,657					2,908,658½	2,000			
782,835		69,238	392,500	5,521,965			1,910,500	627,956½		118,186	68,170	146,000	6,372,970	2,056,500	697,194½	392,500	118,186	Quebec	2,446,669½	129,000	621,760	392,500	88,299	648,103 99	3,092,943	91,000	14,808½	1,794,500	19		21,000		529		6,134½	1,508	818,081	30,000	69,281		28,379	6,372,970	2,056,500	697,194½	392,500	118,186
30,318½	578,900			125			2,837,500				379,861		410,304½	3,416,400				New Brunswick	359,150	21,000				94,850 49		125,000	125	2,635,000		668							30,361½	635,400				410,304½	3,416,400			
109,637½				93,322							411,546	70,000	614,505½	70,000				Nova Scotia	426,868					106,717 23	10,692½		75,615½			2,598½	70,000						98,731					614,505½	70,000			
11,573				93,375				1.740			544½		105,492½		1,740			P. E. Island	76,904½		500			19,251 12	3,349								3,608					21,631		1,740			105,492½		1,740		
84,620											657,913		742,533					Manitoba	675,117					168,779 31	336													67,080					742,533				
4,190											10,300		14,490					N. W. Territories	10,050					2,512 51														4,440					14,490				
100,721½											348,448½		449,170					British Columbia	378,032					94,508 02	5,475					1,066								64,597					449,170				
19,719½													19,719½					Sundries																				19,719½					19,719½				
1,521,090	578,900	69,238	392,500	6,528,187½			4,750,000	629,696½		118,186	3,588,566	216,000	11,637,843½	5,544,900	698,934½	392,500	118,186	Totals	6,385,799½	141,000	622,260	392,500	88,299	1,633,000 25	3,588,566	216,000	123,129	4,431,500	19	4,332½	91,000	124½	13,594		6,134½	1,508	1,522,298	665,400	70,521		28,379	11,637,843½	5,544,900	698,934½	392,500	118,186

	1898.	1899.
Total duty collected ex-manufactory and ex-warehouse on tobacco, including Canada Twist, and Raw Leaf	$2,891,977 41	$3,317,793 17
Total duty collected on licenses	2,308 00	2,375 00
Totals	$2,894,285 41	$3,320,168 17

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—RAW LEAF TOBACCO, INCLUDING STEMS, SCRAPS AND CUTTINGS.

DR. **No. 16.—WAREHOUSE RETURN for the Year ended 30th June, 1899.** CR.

Remaining in Warehouse from last Year.	Placed in Warehouse.	Received from other Divisions.	Totals.	Divisions.	Entered for Duty.		Removed to other Divisions.	Exported.	Free and Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture. Free.	Remaining in Warehouse.	Totals.
					Quantity.	Duty.							
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.		Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
241	3,170	880	4,291	Belleville, Ont..	3,045	304 50	.....	.....	.....	200	446	600	4,291
5,518	104,662	1,632	111,812	Brantford " ..	72,323	7,232 30	1,925	9,063	.....	37	118	28,346	111,812
5,315	129,632	6,846	141,793	Guelph " ..	100,561	10,056 10	1,057	7,525	28	2,711	.....	29,911	141,793
164,285	1,804,846	434	1,969,565	Hamilton " ..	1,080,391	108,039 10	2,185	132,898	251	372	4	753,464	1,969,565
55,680	93,932	2,544	152,156	Kingston " ..	69,867	7,000 54	4,124	3,198	.....	.....	2,116	72,851	152,156
99,181	591,663	4,801	695,645	London " ..	448,449	45,600 50	13,200	45,956	.....	.....	4,928	183,112	695,645
.....	2,175	6,076	8,251	Ottawa " ..	2,423	242 30	.....	.....	.....	3,710	434	1,684	8,251
139	11,388	463	11,990	Owen S'd " ..	10,062	1,006 20	270	459	.....	.....	241	958	11,990
214	2,104	3,638¼	5,956¼	Perth " ..	3,897	389 71	1,252	.....	.....	.....	3¼	804	5,956¼
99	1,810	1,280	3,189	Peterboro' " ..	1,923	192 30	.....	.....	.....	1,006	.....	260	3,189
2,186	12,369½	5,535¾	20,091¼	Prescott " ..	11,155¼	1,115 53	.....	3,755	.....	.....	.....	5,181	20,091¼
9,647	49,991	1,868	61,506	St. Cath'rines " ..	25,959	2,595 90	2,952	5,895	38	.....	368	26,294	61,506
1,424	42,097	.....	43,521	Stratford, Ont..	26,409	2,640 90	.....	5,038	.....	.....	.....	12,074	43,521
46,987	309,368½	67,288½	423,644	Toronto " ..	214,493½	21,451 69	3,550	20,200½	82	71,465	462	113,391	423,644
2,110	35,331	1,555	38,996	Windsor " ..	27,494	2,749 40	777	.....	.....	.....	.....	10,725	38,996
393,026	3,194,539	104,841½	3,692,406½	.....Totals.....	2,098,451¾	210,616 97	31,292	233,987½	399	79,501	9,120¼	1,239,655	3,692,406½
1,256	63,027	4,260¼	68,543¼	Joliette, Que..	33,085½	9,516 12	3,455	.....	.....	.....	910¾	31,092	68,543¼
2,076,293½	9,934,531	25,676¼	12,036,500¾	Montreal " ..	7,087,561½	712,327 87	118,022¼	233,197½	259,510	3,011	73,350¼	4,261,848¼	12,036,500¾
40,390	201,519½	32,301	274,210½	Quebec " ..	171,860½	17,236 57	3,142	.....	.....	.....	41,923	57,285	274,210½
147,170	357,537½	8,190	512,897½	Sherbrooke " ..	324,894½	65,173 61	26,985	11,243	.....	.....	.....	149,775	512,897½
2,912	13,575	9,772	26,259	Three Riv. " ..	17,014	1,701 40	1,128	828	.....	.....	495	6,794	26,259
955	6,954	884	8,793	Victoriaville " ..	6,979	697 90	.....	.....	.....	.....	774	1,040	8,793
2,268,976½	10,577,144	81,083½	12,927,204	.....Totals.....	7,641,395	806,653 47	152,732¼	245,268½	259,510	3,011	117,453	4,507,834¼	12,927,204

7,305	*70,210*	*396*	*77,911*	*St. John, N. B.*	*45,034*	*4,503 40*	*787*	*1,645*	*8*	*8,544*	.....	*21,893*	*77,911*
4,373	....	....	4,373	Cape Breton, N.S	1,980	198 00	2,142	.....	251	.....	.....	.....	4,373
2,649	22,256	1,459	26,364	Halifax, N.S....	16,474½	1,651 69	196	325	.....	.....	981	8,387½	26,364
2,674	159,841	2,142	164,657	Pictou, N.S.....	97,499	9,749 90	.....	.....	262	.....	.....	66,896	164,657
9,696	182,097	3,601	195,394	.....Totals.	115,953½	11,599 59	2,338	325	513	.... .	981	75,283½	195,394
9,019	241,322	.....	250,341	Charlottetown, P.E.I.	165,754	16,654 20	.. ..	.....	.....	.....	.....	84,587	250,341
5,269	123,744	700	129,713	Winnipeg, Man.	80,031	8,010 90	5,934	9,937	758	117	... .	32,936	129,713
10,194	90,442	2,079	102,715	Vancouver, B.C.	60,179½	6,311 45	168	440½	9,497	... ..	5	32,425	102,715
151	35,818	550¼	36,519¼	Victoria, B.C...	33,064¼	3,306 42	.....	190	.....	.... .	8	3,257	36,519¼
10,345	126,260	2,629¼	139,234¼	.....Totals.....	93,243¾	9,617 87	168	630½	9,497	.... .	13	35,682	139,234¼
2,703,636½	14,515,316	193,251¼	17,412,203¾	..Grand Totals..	10,239,863	1,067,656 40	193,251¼	491,793½	270,685	91,173	127,567¼	5,997,870¾	17,412,203¾

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—RAW LEAF TOBACCO, INCLUDING STEMS, SCRAPS AND CUTTINGS

DR. No. 17—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended 30th June, 1898 and 1899. CR.

Remaining in Warehouse from last year.	Placed in Warehouse.	Received from other Divisions.	Totals.	PROVINCES.	Entered for Duty.		Removed to other Divisions.	Exported.	Free and Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse.	Totals.
					Quantity.	Duty.							
Std. lbs.	Std. lbs.	Std. lbs.		1898.	Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
1,906,213	977,936	52,097	2,936,246	Ontario.....	5	1 50	30,889	197,732	7,463	5,952	2,301,179	393,026	2,936,246
9,447,580¾	1,250,321¾	142,468	10,840,370½	Quebec.....	92	27 62	174,574	450,236	7,915½	1,963	7,936,813¾	2,268,976½	10,840,370½
32,481	29,563	6,486	68,530	New Brunswick.	.....	.....	.....	.....	.....	..	61,225	7,305	68,530
85,530	77,761	2,311	165,602	Nova Scotia	.....	.....	52	.....	1,595	....	154,259	9,696	165,602
96,996	73,712	.....	170,708	P. E. Island....	.....	.....	.....	.....	.....	.....	161,689	9,019	170,708
25,804	41,472	4,026	71,302	Manitoba.....	.....	.....	.....	248	90	.....	65,695	5,269	71,302
24,033	69,076	2,595	95,704	B. Columbia....	.....	.....	4,668	.....	20½	.....	80,670½	10,345	95,704
11,618,637¾	2,519,841¾	209,983	14,348,462½	Totals ..	97	29 12	209,983	648,216	17,083¾	7,915	10,761,531½	2,703,636½	14,348,462½
				1899.									
393,026	3,194,539	104,841½	3,692,406½	Ontario.....	2,098,451¾	210,616 97	31,292	233,987½	399	79,501	9,120¼	1,239,655	3,692,406½
2,268,976½	10,577,144	81,083½	12,927,204	Quebec.....	7,641,395	806,653 47	152,732¼	245,268½	259,510	3,011	117,453	4,507,834¼	12,927,204
7,305	70,210	396	77,911	New Brunswick.	45,034	4,503 40	787	1,645	8	8,544	.....	21,893	77,911
9,696	182,097	3,601	195,394	Nova Scotia	115,953½	11,599 59	2,338	325	513	.....	981	75,283½	195,394
9,019	241,322	.....	250,341	P. E. Island....	165,754	16,654 20	.....	.....	.....	.....	.....	84,587	250,341
5,269	123,744	700	129,713	Manitoba.....	80,031	8,010 90	5,934	9,937	758	117	.....	32,936	129,713
10,345	126,260	2,629¼	139,234¼	B. Columbia....	93,243¾	9,617 87	168	630½	9,497	.....	13	35,682	139,234¼
2,703,636½	14,515,316	193,251¼	17,412,203¾	Totals	*10,239,863	1,067,656 40	193,251¼	491,793½	270,685	91,173	127,567¼	5,997,870¾	17,412,203¾

*Duty levied on Standard Weight instead of Actual Weight, 1st July, 1898.

	1898.
Duty collected on actual weight.....	$851,757 13
" standard weight.....	29 12
Total.....	$581,786 25

INLAND REVENUE DEPARTMENT, OTTAWA, 25th September, 1899. E. MIALL, *Commissioner.*

SESSIONAL PAPER No. 7

APPENDIX A—*Continued*—CANADA TWIST TOBACCO.

No. 18.—STATEMENT of Revenue collected for the Year ended 30th June, 1899.

DIVISIONS.	LICENSES. No.	LICENSES. Fees.	Entered for Consumption at 5c. per lb.	Duty collected, including License Fees.
		$	Lbs.	$ cts.
Belleville, Ont.	1	2	170	10 50
Cornwall "	7	14	2,301	129 05
Ottawa "	18	34	8,217	444 85
Prescott "	1	2	460	25 00
Toronto "	.....	.....	15½	0 78
Windsor "	2	4	404	24 20
Totals	29	56	11,567½	634 38
Joliette, Que.	22	36	26,440½	1,358 03
Montreal "	87	174	45,961	2,472 05
Sorel "	2	4	146	11 30
Totals	111	214	72,547½	3,841 38
Grand Totals	140	270	84,115	4,475 76

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

CANADA TWIST TOBACCO.

No. 19.—COMPARATIVE STATEMENT of Revenue collected for the Years ended 30th June, 1898 and 1899.

YEARS.	PROVINCES.	LICENSES. No.	LICENSES. Fees.	Entered for Consumption at 5c. per lb.	Duty collected, including License Fees.
			$	Lbs.	$ cts.
1898	Ontario	10	19	3,346	186 30
	Quebec	71	139	52,033	2,740 66
	Totals	81	158	55,379	2,926 96
1899	Ontario	29	56	11,567½	634 38
	Quebec	111	214	72,547½	3,841 38
	Totals	140	270	84,115	4,475 76

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—CIGARS.

No. 20.—RETURN of Manufactures

DIVISIONS.	LICENSES.		Total weight of Raw Leaf Tobacco and all other materials actually used.	Deficiencies paying duty.	CIGARS AT $7 PER THOUSAND.		CIGARS
	No.	Fees.			Produced.	Paid Duty.	Produced.
		$ cts.	Lbs.	No.	No.	No.	No.
Belleville, Ont.	1	75 00	3,242				167,800
Brantford "	9	637 50	64,940				3,530,985
Guelph "	13	862 50	102,864		2,220	2,220	6,092,910
Hamilton "	13	975 00	87,283				4,740,705
Kingston "	2	150 00	65,395				3,876,510
London "	19	1,350 00	427,455				25,726,480
Ottawa "	1	75 00	1,955		1,002	1,002	100,300
Owen Sound, Ont.	2	150 00	9,520				549,225
Perth "	1	75 00	4,081¼				233,960
Peterborough "	1	75 00	1,757				129,950
Prescott "	3	187 50	10,568				620,050
St. Catharines "	9	675 00	21,481	4,400			1,296,175
Stratford "	3	187 50	23,586	300			1,221,490
Toronto "	20	1,425 00	110,945½				6,256,040
Windsor "	4	300 00	24,152½				1,479,165
Totals	161	7,200 00	959,225¼	4,700	3,222	3,222	56,021,745
Joliette, Que.	1	75 00	4,042¼				202,780
Montreal "	30	2,182 50	1,001,538⁹⁄₁₆	4,406	6,900	6,900	51,346,120
Quebec "	6	375 00	55,661				3,387,430
Sherbrooke, Que.	6	400 00	172,354½		1,500	1,500	8,845,710
St. Hyacinthe "	1	25 00	577				
Three Rivers "	4	250 00	22,080				1,176,500
Victoriaville "	1	75 00	8,427				477,200
Totals	49	3,382 50	1,264,680⅕	4,406	8,400	8,400	65,435,740
St. John, N.B.	2	150 00	20,200				1,283,345
Halifax, N.S.	3	225 00	11,000				639,100
Winnipeg, Man.	6	412 50	72,484				3,965,250
Vancouver, B.C.	10	702 50	46,547½				2,479,475
Victoria "	10	750 00	30,078½				1,520,750
Totals	20	1,452 50	76,626				4,000,225
Grand Totals.	181	12,822 50	2,404,215⁹⁄₁₆	9,106	11,622	11,622	131,345,405

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Year ended 30th June, 1899.

AT $6 PER THOUSAND.		CANADIAN CIGARS AT $3 PER THOUSAND.			COMBINATION CIGARS AT $3 PER THOUSAND.			Duty Collected ex-Manufactory, including License Fees.
Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
133,100	34,700							873 60
2,389,110	1,141,875							14,972 16
3,123,295	2,969,615							19,617 81
2,869,750	1,870,955							18,193 50
1,326,960	2,549,550							8,111 76
15,486,930	10,239,550							94,271 58
100,300								683 82
278,400	270,825							1,820 40
53,430	180,530							395 58
121,950	8,000							806 70
396,500	223,550							2,566 50
1,082,075	214,100							7,193 85
1,079,190	142,300							6,664 44
3,668,890	2,587,150							23,438 34
1,055,515	423,650							6,633 09
33,165,395	22,856,350							206,243 13
128,820	73,960							847 92
26,285,685	25,060,435	252,700	252,700		626,220	353,220	273,000	161,789 11
1,045,350	2,342,080	92,350	72,550	19,800				6,864 75
5,040,580	3,805,130	543,150	359,450	183,700				31,732 33
		36,850	36,850					135 55
709,770	466,730	54,200	54,200					4,671 22
89,250	387,950							610 50
33,299,455	32,136,285	979,250	775,750	203,500	626,220	353,220	273,000	206,651 38
333,895	949,450							2,153 37
252,650	386,450							1,740 90
1,017,275	2,947,975							6,516 15
2,346,675	132,800				171,625	171,625		15,297 43
1,228,800	291,950							8,122 80
3,575,475	424,750				171,625	171,625		23,420 23
71,644,145	59,701,260	979,250	775,750	203,500	797,845	524,845	273,000	446,725 16

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—CIGARS.

No. 21.—COMPARATIVE STATEMENT of Manufactures

PROVINCES.	LICENSES.		Total weight of Raw Leaf Tobacco, and all other materials actually used.	Deficiencies paying duty.	CIGARS AT $7 PER THOUSAND.		CIGARS
	No.	Fees.			Produced.	Paid duty.	Produced.
1898.		$ cts.	Lbs.	No.	No.	No.	No.
Ontario	93	6,800 00	926,276	25,324	3,000	3,000	50,919,550
Quebec	46	3,137 50	1,061,677¾	9,466	750	750	55,484,185
New Brunswick	3	225 00	29,532	.....	.....	.....	1,749,095
Nova Scotia	3	225 00	11,957½	2,250	.....	.....	668,960
Manitoba	4	262 50	58,574	.....	.....	.....	2,872,760
British Columbia	22	1,570 00	74,575½	1,318	.....	.....	3,812,950
Totals	171	12,220 00	2,162,592¾	38,358	3,750	3,750	115,507,500
1899.							
Ontario	101	7,200 00	959,225¼	4,700	3,222	3,222	56,021,745
Quebec	49	3,382 50	1,264,680½	4,406	8,400	8,400	65,435,740
New Brunswick	2	150 00	20,200	.....	.....	.....	1,283,345
Nova Scotia	3	225 00	11,000	.....	.....	.....	639,100
Manitoba	6	412 50	72,484	.....	.....	.....	3,965,250
British Columbia	20	1,452 50	76,626	.....	.....	.....	4,000,225
Totals	181	12,822 50	2,404,215⅘	9,106	11,622	11,622	131,345,405

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Years ended 30th June, 1898 and 1899.

AT $6 PER THOUSAND.		CANADIAN CIGARS AT $3 PER THOUSAND.			COMBINATION CIGARS AT $3 PER THOUSAND.			Total Duty Collected Ex-Manufactory, including Licenses Fee.
Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
*450								
29,550,500	21,368,600	358,100	37,100	321,000	.....	.....	.....	184,387 23
32,901,675	22,582,510	495,260	376,060	119,200	.....	.....	.....	201,737 78
309,795	1,439,300	.....	.....	.....	.....	.....	.....	2,083 77
447,010	221,950	.....	.....	.....	.....	.....	.....	2,920 56
993,410	1,879,350	.....	.....	.....	.....	.....	.....	6,222 96
3,627,625	185,325	.....	.....	.....	35,000	35.000	.....	23,448 65
*450								
67,830,015	47,677,035	853,360	413,160	440,200	35,000	35,000	.....	420,800 95
33,165,395	22,856,350	.....	.....	.....	.....	.....	.....	206,243 13
33,299,455	32,136,285	979,250	775,750	203,500	626,220	353,220	273,000	206,651 38
333,895	949,450	.....	.....	.....	.....	.....	.....	2,153 37
252,650	386,450	.....	.....	.....	.....	.....	.....	1,740 90
1,017,275	2,947,975	.....	.....	.....	.....	.....	.....	6,516 15
3,575,475	424,750	.....	.....	.....	171,625	171,625	.....	23,420 23
71,644,145	59,701,260	979,250	775,750	203,500	797,845	524,845	273,000	446,725 16

* Written off.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—CIGARS.

DR. No. 22.—WAREHOUSE RETURN for the Year ended 30th June, 1899. CR.

Remaining in Warehouse from last year.		Placed in Warehouse.			Received from other Divisions.	Total Number to be Accounted for.			Divisions.	Entered for Consumption.				Removed in bond to other Divisions.	Exported.		Remaining in Warehouse.			Total Number accounted for.		
Foreign.	Canadian.	Foreign.	Canadian.	Combination.	Foreign.	Foreign.	Canadian.	Combination.		Foreign, at $6 p. M.	Canadian at $3 p. M.	Combination. at $3 p. M.	Duty.	Foreign.	Foreign.	Combination	Foreign.	Canadian.	Combination	Foreign.	Canadian.	Combination
No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.	$	No.	No.	No.	No.	No.	No.	No.	No.	No.
4,600		34,700				39,300			Belleville, Ont	13,600			81 60	10,000			15,700			39,300		
290,700		1,141,875				1,432,575			Brantford "	942,750			5,656 50	5,500			484,325			1,432,575		
368,000		2,969,615			25,000	3,362,615			Guelph "	2,915,390			17,492 34	69,000			378,225			3,362,615		
508,885		1,870,955				2,379,840			Hamilton "	1,760,555			10,563 33		5,000		614,285			2,379,840		
450,050		2,549,550				2,979,600			Kingston "	2,248,700			13,492 20				730,900			2,979,600		
2,277,880		10,239,550				12,517,430			London "	9,975,385			59,852 31	268,850	10,000		2,263,195			12,517,430		
					125,000	125,000			Ottawa "	10,000			60 00				115,000			125,000		
16,550		270,825			22,500	309,875			Owen Sound "	238,225			1,429 35				71,650			309,875		
237,235	231,100	180,530				417,765	231,100		Perth "	111,410	138,500		1,083 96				306,355	92,600		417,765	231,100	
		8,000				8,000			Peterborough "								8,000			8,000		
102,100		223,550				325,650			Prescott "	261,950			1,571 70				63,700			325,650		
177,250		214,100				391,350			St. Catharines "	302,400			1,814 40				88,950			391,350		
		142,300				142,300			Stratford "	113,700			682 20				28,600			142,300		
775,290		2,587,150			169,500	3,531,940			Toronto "	3,002,490			18,014 94	25,000			504,450			3,531,940		
253,350		423,650				677,000			Windsor "	550,650			3,303 90				126,350			677,000		
5,441,890	231,100	22,856,350			342,000	28,640,240	231,100		Totals	22,447,205	138,500		135,098 73	378,350	15,000		5,799,685	92,600		28,640,240	231,100	
5,050		73,960				79,010			Joliette, Que	79,010			474 06							79,010		
3,174,110		25,060,435		273,000	74,225	28,308,770		273,000	Montreal "	22,009,475		130,000	132,146 85	117,500	60,100	3,000	6,121,695		140,000	28,308,770		273,000
309,560		2,342,080	19,800			2,651,640	19,800		Quebec "	2,049,705	19,800		12,357 63	125,000			476,935			2,651,640	19,800	
743,370		3,805,130	183,700			4,548,500	183,700		Sherbrooke "	3,512,480	87,600		21,337 68	49,225			986,795	96,100		4,548,500	183,700	
153,700		466,730				620,430			Three Rivers "	477,030			2,862 18				143,400			620,430		
48,150		387,950				436,100			Victoriaville "	313,600			1,881 60				122,500			436,100		
4,433,940		32,136,285	203,500	273,000	74,225	36,644,450	203,500	273,000	Totals	28,441,300	107,400	130,000	171,360 00	291,725	60,100	3,000	7,851,325	96,100	140,000	36,644,450	203,500	273,000
907,850		949,450				1,857,300			St. John, N.B	1,098,100			6,588 60		3,000		756,200			1,857,300		
71,700		386,450			10,000	468,150			Halifax, N.S	291,450			1,748 70		1,000		175,700			468,150		
354,975		2,947,975				3,302,950			Winnipeg, Man	2,719,775			16,318 65				583,175			3,302,950		
71,000		132,800			293,850	497,650			Vancouver, B.C	329,250			1,975 50	50,000			118,400			497,650		
127,900		291,950				419,850			Victoria "	250,650			1,503 90		6,150		163,050			419,850		
198,900		424,750			293,850	917,500			Totals	579,900			3,479 40	50,000	6,150		281,450			917,500		
11,409,255	231,100	59,701,260	203,500	273,000	720,075	71,830,590	434,600	273,000	Grand Totals	55,577,730	245,900	130,000	334,594 08	720,075	85,250	3,000	15,447,535	188,700	140,000	71,830,590	434,600	273,000

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*- CIGARS.

DR. No. 23.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended 30th June, 1898 and 1899. CR.

Remaining in Warehouse from last year.		Placed in Warehouse.			Received from other Divisions.	Re-imported.	Total Number to be Accounted for.			PROVINCES.	Entered for Consumption.				Removed in Bond to other Divisions.	Exported.		Written off.	Remaining in Warehouse.			Total Number Accounted for.		
Foreign.	Canadian.	Foreign.	Canadian.	Combination.	Foreign.		Foreign.	Canadian.	Combination.		Foreign at $6 p. M.	Canadian at $3 p. M.	Combination at $3 p. M.	Duty.	Foreign.	Foreign.	Combination.	Foreign.	Foreign.	Canadian.	Combination.	Foreign.	Canadian.	Combination.
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	1898.	No.	No.	No.	$ cts.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
3,978,150	.....	21,368,600	321,000	.....	110,000	...	25,456,750	321,000	.....	Ontario	19,940,760	89,900	.....	119,914 26	62,000	12,100	.....	.....	5,441,890	231,100	.....	25,456,750	321,000	.....
3,427,835	82,650	22,582,510	119,200	.....	439,325	1,050	26,450,720	201,850	.....	Quebec	21,380,130	201,850	.....	128,886 33	519,325	79,500	.....	37,825	4,433,940	.....	.....	26,450,720	201,850	.....
496,150	.....	1,439,300	.....	.....	.....	.....	1,935,450	.....	.....	New Brunswick	990,100	.....	.....	5,940 60	.....	37,500	.....	.....	907,850	.....	.....	1,935,450	.....	.....
71,775	.....	221,950	.....	.....	.....	.....	293,725	.....	.....	Nova Scotia	222,025	.....	.....	1,332 15	.....	.....	.....	.....	71,700	.....	.....	293,725	.....	.....
206,225	.....	1,879,350	.....	.....	.....	.....	2,085,575	.....	.....	Manitoba	1,730,600	.....	.....	10,383 60	.....	.....	.....	.....	354,975	.....	.....	2,085,575	.....	.....
240,350	.....	185 325	.....	.....	32,000	...	457,675	.....	.....	British Columbia	256,575	.....	.....	1,539 45	.....	2,200	.....	.....	198,900	.....	.....	457,675	.....	.....
8,420,485	82,650	47,677,085	440,200	.....	581,325	1,050	56,679,895	522,850	.....	Totals	44,520,190	291,750	.....	267,996 39	581,325	131,300	.....	37,825	11,409,255	231,100	.....	56,679,895	522,850	.....
										1899.														
5,441,890	231,100	22,856,350	.....	.....	342,000	.....	28,640,240	231,100	.....	Ontario	22,447,205	138,500	.....	135,098 73	378,350	15,000	.....	.....	5,799,685	92,600	.....	28,640,240	231,100	.....
4,433,940	.....	32,136,285	203,500	273,000	74,225	.....	36,644,450	203,500	273,000	Quebec	28,441,300	107,400	130,000	171,360 00	291,725	60,100	3,000	.....	7,851,325	96,100	140,000	36,644,450	203,500	273,000
907,850	.....	949,450	.....	.....	.....	....	1,857,300	.....	.....	New Brunswick	1,098,100	.....	.....	6,588 60	.....	3,000	.....	.....	756,200	.....	.....	1,857,300	.....	.....
71,700	.....	386,450	.....	.....	10,000	..	468,150	.....	.....	Nova Scotia	291,450	.....	.....	1,748 70	.....	1,000	.....	.....	175,700	.....	.....	468,150	.....	.....
354,975	.....	2,947,975	.....	.....	.....	....	3,302,950	.....	.....	Manitoba	2,719,775	.....	.....	16,318 65	.....	.....	.....	.....	583,175	.....	.....	3,302,950	.....	.....
198,900	.....	424,750	.....	.....	293,850	....	917,500	.....	.....	British Columbia	579,900	.....	.....	3,479 40	50,000	6,150	.....	.....	281,450	.....	.....	917,500	.....	.....
11,409,255	231,100	59,701,260	203,500	273,000	720,075	.....	71,830,590	434,600	273,000	Totals	55,577,730	245,900	130,000	334,594 08	720,075	85,250	3,000	.....	15,447,535	188,700	140,000	71,830,590	434,600	273,000

	1898.	1899.
Total duty collected ex-manufactory and ex-warehouse	$ 676,577 34	$ 768,496 74
do on licenses	12,220 00	12,822 50
	$ 688,797 34	$ 781,319 24

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—INSPECTION OF PETROLEUM.

No. 24.—RETURN OF FEES for the Year ended 30th June, 1899.

DIVISIONS.	PACKAGES.								FEES COLLECTED.
	At 25 cts.		At 10 cts.		At 5 cts.		At 2½ cts.		
	Canadian.	Imported.	Canadian.	Imported.	Canadian.	Imported.	Canadian.	Imported.	
	No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
Belleville, Ont	....	....	788	1,011	.....	.....	.....	.....	179 90
Brantford "	....	.....	1,974	413	.....	.....	.....	.....	238 70
Cornwall "	....	....	664	871	.....	...	.....	.....	153 50
Guelph "	....	.....	1,543	1,071	.....	.....	.....	.....	261 40
Hamilton "	....	...	7,399	5,944	.....	.....	.....	.....	1,334 30
Kingston "	....	.....	12,816	2,097	.....	.....	.....	.....	1,491 30
London "	....	....	87,126	5,252	17	.....	62,629	4	10,804 49
Ottawa "	....	....	12,346	5,016	.....	.....	.....	.....	1,736 20
Owen Sound "	..	....	2,490	562	.....	.....	.....	.....	305 20
Perth "	....	.....	3,433	.....	.....	.....	.....	.....	343 30
Peterborough "	....	....	513	1,195	.....	.....	.....	.....	170 80
Port Arthur "	...	.....	.....	1,591	.....	.....	.....	120	162 10
Prescott "	....	.....	1,847	1,021	.....	2	.....	1	286 93
St. Catharines "	....	....	.....	1,063	.....	.....	.....	.....	106 30
Stratford "	....	....	3,566	1,006	....	....	.....	.....	457 20
Toronto "	....	....	39,953	28,346	....	3	.....	2	6,830 10
Windsor "	....	2	.....	1,696	.....	49	.....	421	183 59
Totals	....	2	176,458	58,155	17	54	62,629	548	25,045 31
Montreal Que	....	....	52,846	26,864	...	1	.....	450	7,982 30
Quebec "	....	.....	1,016	86	..	.....	.....	.....	110 20
Sherbrooke "	...	.	182	891	....	.....	.....	.....	107 30
Three Rivers "	....	....	3,040	.....	....	.....	.....	.....	304 00
Victoriaville "	....	....	782	.....	.....	.....	.....	.....	78 20
Totals	....	.....	57,866	27,841	.....	1	.....	450	8,582 00
St. John, N. B.	....	..	13,045	30,561	....	46	258	251	4,375 88
Cape Breton, N.S.	....	....	.....	37	...	1	.....	.....	3 75
Halifax "	5	.....	3,345	14,906	.....	.....	51	7,415	2,013 01
Pictou "	....	.....	.....	669	.....	....	.....	.....	66 90
Totals	5	.....	3,345	15,612	.....	1	51	7,415	2,083 66
Charlottetown, P.E.I.	...	...	.....	2,513	.....	.....	.....	.....	251 30
Winnipeg, Man.	34	....	3,552	18,808	.....	.....	.....	7,445	2,430 63
Calgary, N.W.T.	....	..	.....	95	.....	....	.....	3,357	93 43
Vancouver, B.C.	...	.....	132	2,294	.. ...	4,570	840	96,626	2,907 75
Victoria "	..	.....	.....	8	.....	1	.....	11,560	289 85
Totals	....	.....	132	2,302	.....	4,571	840	108,186	3,197 60
Grand Totals	39	2	254,398	155,887	17	4,673	63,778	127,652	46,059 81

E. MIALL,

Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—INSPECTION OF PETROLEUM.

No. 25.—COMPARATIVE STATEMENT for the Years ended 30th June, 1898 and 1899.

YEARS.	PROVINCES.	PACKAGES.				FEES COLLECTED.
		At 25 cts.	At 10 cts.	At 5 cts.	At 2½ cts.	
		No.	No.	No.	No.	$ cts.
1898	Ontario	31	242,951	122	72,950	26,133 85
	Quebec	.....	73,699	2	1,200	7,400 00
	New Brunswick	.....	44,495	8	1,051	4,476 71
	Nova Scotia	.....	15,428	10	7,987	1,742 99
	Prince Edward Island	.....	2,203	.....	.....	220 30
	Manitoba	.....	16,613	.....	5,893	1,808 65
	N. W. Territories	.....	94	.....	1,512	47 20
	British Columbia	.....	2,164	1	104,080	2,818 45
	Totals	31	397,647	143	194,673	44,648 15
1899	Ontario	2	234,613	71	63,177	25,045 31
	Quebec	.....	85,707	1	450	8,582 00
	New Brunswick	.....	43,606	46	509	4,375 88
	Nova Scotia	5	18,957	1	7,466	2,083 66
	Prince Edward Island	.....	2,513	.....	.....	251 30
	Manitoba	34	22,360	.....	7,445	2,430 63
	N. W. Territories	.....	95	.....	3,357	93 43
	British Columbia	.....	2,434	4,571	109,026	3,197 60
	Totals	41	410,285	4,690	191,430	46,059 81

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 26—RETURN of Manufactures

DIVISIONS.	LICENSES.		MATERIALS USED.				MANU
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.	Vinegar.
		$ cts.	Galls.	Galls.	Lbs.	Lbs.	Galls.
Brantford, Ont.	2	100 00	13,947·51	769·57	.....	.....	80,190·09
Hamilton "	1	50 00	7,837·75	103·90	.....	.....	47,826·46
Kingston "	1	50 00	6,471·98	231·37	.....	.....	45,687·50
Prescott "	1	300 00	99,846·95	.....	486,271	52,133	.....
Toronto "	7	325 00	55,269·27	1,296·30	.....	.....	329,583·99
Windsor "	3	400 00	4,143·87	.....	18,411	2,302	.....
Totals	15	1,225 00	187,517·33	2,401·14	504,682	54,435	503,288·04
Montreal, Que.	6	275 00	16,502·00	179·18	22,240	2,840	58,825·26
Quebec "	1	50 00	12,990·43	644·00	.....	.....	73,017·62
St. Hyacinthe "	1	50 00	1,757·90	26·40	262,070	31,986	5,607·64
Sherbrooke "	2	350 00	73,380·74	246·30	.....	.....	106,736·54
Totals	10	725 00	104,631·07	1,095·88	284,310	34,826	244,187·06
St. John, N.B.	1	50 00	1,616·93	28·00	.....	.....	8,459·12
Grand Totals	26	2,000 00	293,765·33	3,525 02	788,992	89,261	755,934·22

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Year ended 30th June, 1899.

FACTURED.		PAID DUTY EX-MANUFACTORY.			WAREHOUSED.			Total Duty collected Ex-Manufactory, including License Fees.
Acetic Acid.	Crude Fulminate	Vinegar.	Acetic Acid.	Duty.	Vinegar.	Acetic Acid.	Crude Fulminate	
Galls.	Lbs.	Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.	$ cts.
.....	.....	77,547·12	.....	4,616·16	2,642·97	.....	.....	4,716 16
.....	.....	28,627·57	.....	1,145·10	19,198·89	.....	.....	1,195 10
.....	.....	6,326·08	.....	253·04	39,361·42	.....	.....	303 04
.....	65,065	.....	.....	.....	.....	.....	65,065	300 00
315,812 83	.....	329,583·99	247,214·79	23,071·96	.....	68,598·04	.....	23,396 96
.....	2,655	.....	.....	.....	.....	.....	2,655	400 00
315,812·83	67,720	442,084·76	247,214·79	29,086·26	61,203·28	68,598·04	67,720	30,311 26
112,712·72	.....	58,825·26	51,605·63	4,420·34	.....	61,107·09	.....	4,695 34
.....	.....	54,420·32	.....	2,176·79	18,597·30	.....	.....	2,226 79
.....	.....	5,607·64	.....	289·60	.....	.....	.....	339 60
.....	39,799	99,938·92	.....	3,997·53	6,797 62	.....	39,799	4,347 53
112,712·72	39,799	218,792·14	51,605·63	10,884·26	25,394·92	61,107·09	39,799	11,609 26
.....	.....	8,459·12	.....	338·37	.....	.....	.....	388 37
428,525·55	107,519	669,336·02	298,820·42	40,308·89	86,598·20	129,705·13	107,519	42,308 89

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 27.—COMPARATIVE STATEMENT of Manufactures

PROVINCES.	LICENSES.		MATERIALS USED.				MANUFAC-	
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.	Vinegar.	Acetic Acid.
1898.		$ cts.	Galls.	Galls.	Lbs.	Lbs.	Galls.	Galls.
Ontario.....	15	1,075 00	152,508·45	1,918·30	305,317	37,817	509,277·02	.....
Quebec.....	9	700 00	50,980·43	938·20	76,662	9,895	182,288·94	108,720·59
New Brunswick...	1	25 00	212·23	.....	.....	.....	1,074·19	.....
Totals.....	25	1,800 00	203,701·11	2,856·50	381,979	47,712	692,640·15	108,720·59
1899.								
Ontario.....	15	1,225 00	187,517·33	2,401·14	504,682	54,435	503,288·04	315,812·83
Quebec	10	725 00	104,631·07	1,095·88	284,310	34,826	244,187·06	112,712·72
New Brunswick...	1	50 00	1,616·93	28·00	.....	.....	8,459·12	.....
Totals.....	26	2,000 00	293,765·33	3,525 02	788,992	89,261	755,934·22	428,525·55

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

for the Years ended 30th June, 1898 and 1899.

TURED.	PAID DUTY EX-MANUFACTORY.			WAREHOUSED.			Total Duty Collected Ex-Manufactory, including License Fees.
Crude Fulminate.	Vinegar.	Acetic Acid.	Duty.	Vinegar.	Acetic Acid.	Crude Fulminate.	
Lbs.	Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.	$ cts.
38,320·82	408,779·40	. . . . .	16,351 14	100,497·62	.....	38,320·82	17,426 14
7,125·00	164,973·44	50,228·54	8,608 09	17,315·50	58,492·05	7,125·00	9,308 09
.....	1,074·19	.....	42 96	.....	.....	.....	67 96
45,445·82	574,827·03	50,228·54	25,002 19	117,813·12	58,492·05	45,445·82	26,802 19
67,720·00	442,084·76	247,214·79	29,086 26	61,203·28	68,598·04	67,720·00	30,311 26
39,799·00	218,792·14	51,605·63	10,884 26	25,394·92	61,107·09	39,799·00	11,609 26
.....	8,459·12	....	338 37	.....	.....	.....	388 37
107,519·00	669,336·02	298,820·42	40,308 89	86,598 20	129,705 13	107,519·00	42,308 89

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

DR. No. 28.– WAREHOUSE RETURN for the Year ended 30th June 1899. CR.

REMAINING IN WAREHOUSE FROM LAST YEAR.		PLACED IN WAREHOUSE.			RECEIVED FROM OTHER DIVISIONS.	TOTALS.			DIVISIONS.	ENTERED FOR CONSUMPTION.			Removed to other Division.	EXPORTED.		REMAINING IN WAREHOUSE.		TOTALS.		
Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.	Vinegar.	Vinegar.	Acetic Acid.	Crude Fulminate.		Vinegar.	Acetic Acid.	Duty.		Vinegar.	Crude Fulminate.	Vinegar.	Acetic acid.	Vinegar.	Acetic acid.	Crude Fulminate.
Galls.	Galls.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Lbs.		Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs	Galls.	Galls.		Galls.	Lbs.
		2,642·97				2,642·97			Brantford, Ont	1,071·00		42 84				1,571·97		2,642·97		
5,994·61		19,198·89				25,193·50			Hamilton, Ont	25,193·50		1,007 75						25,193·50		
8,345·46		39,361·42				47,706·88			Kingston, Ont	26,807·68		1,072 32	16,662	937·30		3,299·75		47,706·88		
				65,065				65,065	Prescott, Ont						* 13					65,065
			68,598·04			11,114·49	68,598·04		Toronto, Ont	11,087·49	41,797·71	2,116 49					26,800·33	11,114.49	68,598·04	
				2,655				2,655	Windsor, Ont.						2,655					2,655
14,340·07		61,203·28	68,598·04	67,720	11,087·49	86,657·84	68,598·04	67,720	Totals	65,186·67	41,797·71	4,239 40	16,662·15	937·30	67,720	4,871·72	26,800·33	86,657·84	68,598·04	67,720
	1,113·84		07·09		6,573·68	6,573·68	62,220·93		Montreal, Que	6,573·68	58,830·28	2,616 11					3,390·65	6,573·68	62,220·93	
		18,597·30				18,597·30			Quebec, Que	1,021·33		40 87	1,947·47			15,628·50		18,597·30		
1,456·99					921·45	2,378·44			St. Hyacinthe, Que	2,378·44		95 14						2,378·44		
		6,797·62		39,799		6,797·62		39,799	Sherbrooke, Que	6,797·62		271 91			39,799			6,797·62		39,799
1,456·99	1,113·84	25,394·92	61,107·09	39,799	7,495·13	34,347·04	62,220·93	39,799	Totals	16,771·07	58,830·28	3,024 03	1,947·47		39,799	15,628·50	3,390·65	34,347·04	62,220·93	39,799
15,797·06	1,113·84	86,598·20	129,705·13	107,519	18,609·62	121,004·88	130,818·97	107,519	Grand totals	80,957·74	100,627·99	7,263 43	18,609·62	937·30	107,519	20,500·22	30,190·98	121,004·88	130,818·97	107,519

*Used in Canada.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

DR. No. 29.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended 30th June, 1898 and 1899. CR.

Remaining in Warehouse from Last Year.		Placed in Warehouse.			Received from other Divisions.	Totals.			Provinces.	Entered for Consumption.			Removed to other Divisions.	Written off.	Exported.		Remaining in Warehouse.		Totals.		
Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.	Vinegar.	Vinegar.	Acetic Acid.	Crude Fulminate.		Vinegar.	Acetic Acid.	Duty.			Vinegar.	Crude Fulminate.	Vinegar.	Acetic Acid.	Vinegar.	Acetic Acid.	Crude Fulminate.
Galls.	Galls.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Lbs.	1898.	Galls.	Galls.	$ cts.	Galls.	Galls.	Galls.	Lbs.	Galls.	Galls.	Galls.	Galls.	Lbs.
84,507·54	.....	100,497·62	.....	38,320·82	.....	185,005·16	.....	38,320·82	....Ontario	161,444·13	.....	6,457 76	9,220·96	.....	.....	38,320·82	14,340·07	.....	185,005·16	.....	38,320·82
13,258·74	.....	17,315·50	58,492·05	7,125·00	9,220·96	39,795·20	58,492·05	7,125·00	....Quebec	35,546·21	57,378·21	3,717 01	.....	2,792·00	.....	7,125·00	1,456·99	1,113·84	39,795·20	58,492·05	7,125·00
97,766·28	.....	117,813·12	58,492·05	45,445·82	9,220·96	224,800·36	58,492·05	45,445·82	Totals	196,990·34	57,378·21	10,174 77	9,220·96	2,792·00	.....	45,445·82	15,797·06	1,113·84	224,800·36	58,492·05	45,445·82
									1899.												
14,340·07	.....	61,203·28	68,598·04	67,720	11,114·49	86,657·84	68,598·04	67,720·00	....Ontario	64,186·67	41,797·71	4,239 40	16,662·15	.....	937·30	67,720·00	4,871·72	26,800·33	86,657·84	68,598·04	67,720·00
1,456·99	1,113·84	25,394·92	61,107·09	39,799	7,495 13	34,347·04	62,220·93	39,799·00	....Quebec.	16,771·07	58,830·28	3,024 03	1,947·47	.....	.....	39,799·00	15,628·50	3,390·65	34,347·04	62,220·93	39,799·00
15,797·06	1,113·84	86,598·20	129,705·13	107,519	18,609·62	121,004·88	130,818·97	107,519·00	Totals	80,957·74	100,627·99	7,263 43	18,609·62	.....	937·30	107,519·00	20,500·22	30,190·98	121,004·88	130,818·97	107,519·00

	1898.	1899.
Total duty collected, ex-manufactory and ex-warehouse ...	$ 35,176 96	$ 47,572 32
" on licenses	1,800 00	2,000 00
Totals	$ 36,976 96	$ 49,572 32

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 30.—STATEMENT showing the transactions in Vinegar in the Bonded Manufactories in the Dominion of Canada, during the Year ended 30th June, 1899.

On hand 1st July, 1898.	Manufactured during the Year.	Brought in.	Totals.	DIVISIONS.	Removed.	On hand 30th June, 1899.	Totals.
Galls.	Galls.	Galls.	Galls.		Galls.	Galls.	Galls.
.....	80,190·09	.....	80,190·09	....Brantford, Ont.....	78,618·12	1,571·97	80,190·09
5,994·61	47,826·46	.....	53,821·07	... Hamilton "	53,821·07	.....	53,821·07
8,345·46	45,687·50	.....	54,032·96	....Kingston "	50,733·21	3,299·75	54,032·96
.....	329,583·99	.....	329,583·99	....Toronto "	329,583·99	.....	329,583·99
14,340·07	503,288·04	.....	517,628·11	..... Totals.....	512,756·39	4,871·72	517,628·11
8,929·50	58,825·26	1,947·47	69,702·23	....Montreal, Que.....	65,771·61	3,930·62	69,702·23
.....	73,017·62	.....	73,017·62	... Quebec "	57,389·12	15,628·50	73,017·62
2,451·18	5,607·64	1,618·67	9,677·49	....St. Hyacinthe, Que.....	8,924·07	753·42	9,677·49
1,837·15	106,736·54	.....	108,573·69	.. Sherbrooke "	106,339·11	2,234·58	108,573·69
13,217·83	244,187·06	3,566·14	260,971·03	.....Totals	238,423·91	22,547·12	260,971·03
.....	8,459·12	.....	8,459·12	....St. John, N.B.....	8,459·12	.....	8,459·12
27,557·90	755,934·22	3,566·14	787,058·26	....Grand Totals.....	759,639·42	27,418·84	787,058·26

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX A—*Continued*—METHYLATED SPIRITS.

No. 31.—STATEMENT showing quantity of Raw Materials on hand at beginning and end of year and brought in and used during the Year 1898-99.

DR. CR.

(A)

Names of Articles.	Stock on hand 1st July, 1898.	Brought in during the year.	Total to be accounted for.	Used in manufacture of Methylated Spirits.	Sold or lost by Leakage.	Stock on hand 30th June, 1899.	Total accounted for.
	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.
Alcohol	1,719·81	87,559·18	89,278·99	86,217·67	.....	3,061·32	89,278·99
Wood naphtha	3,967·93	27,356·00	31,323·93	29,811·59	128·92	1,383·42	31,323·93

(B)

STATEMENT showing quantity of Raw Materials used and Methylated Spirits produced therefrom.

Alcohol used. Statement (A) above.	Wood Naphtha used. Statement (A) above.	Methylated Spirits used. Statement (C) below.	Total to be accounted for.	Methylated Spirits produced.	Loss in Manufacture.		Total accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	p. c.	Pr'f galls.
86,217·67	29,811·59	....	116,029·26	114,991·59	1,037·67	0·90	116,029·26

(C)

STATEMENT showing quantity of Methylated Spirits on hand at beginning and end of year, and brought in, sold and otherwise accounted for during the year.

Stock on hand 1st July, 1898.	Manufactured as above. Statement (B).	Brought in during the year.	Total to be accounted for.	Sold.	Used in Methylated Spirits Warehouse.	Re-used in manufacture of Methylated Spirits.	Stock on hand 30th June, 1899.	Total accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'fgalls.
4,958·63	114,991·59	138·85	120,089·07	115,646·39	.....	....	4,442·68	120,089·07

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

E. MIALL,
Commissioner.

APPENDIX A—*Continued.*

No. 32.—STATEMENT of Lumber measured, culled and counted, through the Office of the Supervisor of Cullers, at the Port of Quebec, during the Fiscal Year ended 30th June, 1899.

Pieces.	Description.	Measured culled and counted.	Tons standard.	Rate.	Cullers' fees.	Total accrued.
			$ cts.	cts.	$ cts.	$ cts.
33,672	Waney White Pine	Stringed	52,082 25			
1,772	" Ash	"	1,413 09			
6,915	" Birch	"	3,633 10			
53	" Whitewood	"	67 35			
170	" Walnut	"	101 34			
1	" Red Pine	"	2 13			
8	" Butternut	"	5 20			
189	" Cherry	"	49 14			
63	" Spruce	"	40 28			
1	" Elm	"	0 18			
10	" Maple	"	10 39			
66	" Hickory	"	22 10			
			57,430 15	9⅜	5,384 10	
329	Waney White Pine	Culled	501 07	12 9/10	61 64	
21,835	Square White Pine	Measured	22,267 26	6¼	1,391 73	
6,630	Square Red Pine	Measured	6,234 32			
13,866	" Oak	"	22,868 37			
11,747	" Elm	"	12,807 18			
7,540	" Birch	"	3,946 18			
36	" Spruce	"	28 06			
5	" Maple	"	4 10			
13	" Tamarack	"	10 15			
			45,900 16	8¼	3,786 78	
						10,624 25
				Add for	fractions	0 13
						10,624 38

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

HYDRAULIC AND OTHER RENTS, &c.

LESSEES' ACCOUNTS, 1898-99

APPENDIX

DR. No. 33.—HYDRAULIC and other Rents, &c.,

Balances due on 1st July, 1898.	Rents and Interest accrued up to the 30th of June, 1899.	Totals.	Numbers.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
.....	200 00	200 00	1	Ottawa River..	Perley & Pattee....	J. R. Booth. .....
.....	100 00	100 00	2	" ..	Thompson & Perkins...	" .....
.....	300 00	300 00	3	" ...	Lyman Perkins.....	" .....
.....	300 00	300 00	4	" ...	R. Blackburn *et al*.....	McKay Milling Co. Ld.
.....	100 00	100 00	5	" ...	J. & J. Petrie.....	Mrs. M. Petrie.....
.....	100 00	100 00	6	" ..	A. H. Baldwin	Ottawa Electric Co....
.....	300 00	300 00	7	" ...	.....	Ottawa Electric Ry.Co.
.....	400 00	400 00	8	" ...	Perley & Pattee.....	Ottawa Electric Co....
.....	100 00	100 00	9	" ...	J. M. Currier.....	N. S. Blaisdell.....
.....	600 00	600 00	10	" ...	Harris, Bronson & Co...	The Bronson & Weston Lumber Co.....
.....	200 00	200 00	11	" ...	Levi Young.....	Ottawa Electric Ry.Co.
.....	104 00	104 00	12	" ...	.....	J. R. Booth. .....
.....	10 00	10 00	13	" ...	.....	Bronson & Weston....
.....	100 00	100 00	14	" ...	.....	" .....
.....	96 00	96 00	15	" ...	Perley & Pattee.....	J. R. Booth.....
24 00	8 00	32 00	16	" ...	L. M. Coutlee.....	Mary Conroy.....
570 84	.....	570 84	17	" ...	.....	John Rochester.....
.....	50 00	50 00	18	" ...	Nérée Têtreau.....	Thos. Ahearn. .....
200 00	.....	200 00	19	" ...	Hon. J. Skead.....	.....
96 00	.....	96 00	20	" ...	"	.....
.....	1 00	1 00	21	" ...	G. A. Grier & Co	Ottawa Invertment Co.
940 00	40 00	980 00	22	" ...	.....	D. Carmichael.....
380 00	.....	380 00	23	" ...	.....	John Rankin.....
.....	150 00	150 00	24	" ...	J. R. Booth.....	.....
35 00	5 00	40 00	25	" ...	Colin Dewar.....	.....
.....	50 00	50 00	26	" ...	Bronson & Weston.....	.....
.....	1 00	1 00	27	" ...	.....	Alfred Desjardins.....
.....	10 00	10 00	28	" ...	.....	Ottawa Electric Co....
.....	1 00	1 00	1	St. Lawrence R.	Que. Har. Commissioners	.....
.....	25 00	25 00	2	" ..	Rich. and Ont. Nav. Co..	.....
.....	1 00	1 00	3	" ..	.....	Narcisse Blais.....
1 00	1 00	2 00	4	Quebec.....	Corporation of Quebec...	.....
.....	5 00	5 00	5	Richibucto Har.	Wm. Hudson.....	.....
.....	1 00	1 00	6	Rondeau Har...	School Trustees.....	.....
.....	1 00	1 00	7	Collingwood Har	Great North'n Transit Co.	.....
2 00	1 00	3 00	8	Ottawa.....	E. G. Laverdure.....	.....
1 00	1 00	2 00	9	Walkerton, Ont.	D. Robertson & J. Rowland..	.....
.....	1 00	1 00	10	Three Rivers	Corporation of Three Riv.	.....
165 00	.....	165 00	11	British Columbia	A. Peel	.....
90 00	.....	90 00	12	" ..	Jonathan Maury.....	.....
.....	25 00	25 00	13	" ..	Roderick Finlayson.....	.....
25 00	25 00	50 00	14	" ..	Joseph Spratt.	.....
.....	1 00	1 00	15	" ..	Bank of British Columbia	.....
1 00	1 00	2 00	16	" ..	W. Dodd	.....
.....	12 00	12 00	17	" ..	D. W. Gordon	.....
.....	5 00	5 00	18	" ..	S. Williams.....	.....

SESSIONAL PAPER No. 7

A—*Continued.*

Lessees' Accounts, 1898–99. CR.

Description of Property.	Numbers.	Date to which Account is made up.	Paid during the Fiscal Year.	Balances due on 30th June, 1899.	Totals.
			$ cts.	$ cts.	$ cts.
Lots B and C, Chaudière St., service ground	1	June 30, 1899	100 00	100 00	200 00
Lot D, " "	2	" 30, 1899	50 00	50 00	100 00
Lots E, F and G, South Head St.	3	" 30, 1899	150 00	150 00	300 00
Lots H, I and J, grist mill, South Head St.	4	" 30, 1899	300 00		300 00
Lot K, fanning mill, South Head St	5	Dec. 31, 1898	100 00		100 00
Lot L, service ground	6	" 31, 1898	100 00		100 00
Lots Q, R and T, service ground, North Middle St.	7	" 31, 1898	300 00		300 00
Lots M, N, O and P, service ground (no water used).	8	" 31, 1898	400 00		400 00
Lot S, service ground	9	June 30, 1899	50 00	50 00	100 00
Lots U, V, W, X, Y and Z, service ground.	10	" 30, 1899	600 00		600 00
Two strips of land	11	Jan. 1, 1900	200 00		200 00
Lumber yard at head of Slides	12	Sept. 20, 1899	104 00		104 00
Bridge over Slides	13	June 30, 1900	10 00		10 00
Strip of land, Amelia Island	14	Jan. 1, 1900	100 00		100 00
Reserve, head of Chaudière Island	15	" 1, 1900	96 00		96 00
Small island, Deschênes Rapids	16	" 1, 1899		32 00	32 00
Portion of lot 39, Concession "A," Nepean	17	Feb. 1, 1885		570 84	570 84
Excavated channel slide and two dams, Little Chaudière	18	Jan. 1, 1900	50 00		50 00
Water lots opposite lot 30, Concession "A," Nepean.	19	Dec. 1, 1891		200 00	200 00
Three small islands, Ottawa River	20	May 1, 1882		96 00	96 00
Covering over portion of Ottawa Slides	21	Nov. 10, 1899	1 00		1 00
Water lot, Calumet	22	June 30, 1899		980 00	980 00
East portion of Hawley's Island	23	" 30, 1881		380 00	380 00
Piece of land, south-west end of Union Bridge.	24	Nov. 12, 1899	75 00	75 00	150 00
Piece of land on Victoria Island	25	June 15, 1900		40 00	40 00
Piece of land, south side of Middle St., Victoria Island.	26	Aug. 31, 1899	50 00		50 00
Piece of land, Long Point Rouge, Templeton, Ottawa County	27	Oct. 24, 1899		1 00	1 00
Lot Pa, South Head St	28	Jan. 10, 1900	10 00		10 00
Small lot near Custom House, Quebec	1	Sept. 1, 1899	1 00		1 00
Roadway from pier at Coteau Landing	2	July 1, 1899		25 00	25 00
Privilege to erect bridge on St. Charles River.	3	Feb. 6, 1900	1 00		1 00
Old Provincial Government Building on Mountain Hill	4	June 25, 1900	1 00	1 00	2 00
Piece of land at North Beach	5	" 30, 1899	5 00		5 00
Use of old log house formerly used as Custom House, Shrewsbury, Ont	6	Sept. 11, 1898	1 00		1 00
Use of old breakwater for storing coal	7	Feb. 5, 1900	1 00		1 00
South-east half of lot 8, Ottawa	8	Dec. 18, 1899	3 00		3 00
Right of way over strip of land	9	April 27, 1900	2 00		2 00
Lot of land on St. Christopher Island, St. Maurice River.	10	Dec. 11, 1899	1 00		1 00
Portion of Assay Office, New Westminster	11	June 11, 1881		165 00	165 00
" "	12	" 11, 1881		90 00	90 00
Privilege to erect two bulkheads, Rock Bay, Victoria Harbour	13	" 1, 1900		25 00	25 00
Privilege to build a wharf opposite his own property Victoria Harbour	14	June 1, 1900	25 00	25 00	50 00
Right of drainage through Government property, Nanaimo	15	Dec. 1, 1899	1 00		1 00
Old Government House, Yale	16	July 24, 1898	2 00		2 00
Beach lots A C E and F, front of Government reserve and lots A B C and D front of lots 7, 8 and 9, Nanaimo Harbour	17	Aug. 27, 1899	12 00		12 00
Frontage on lot 7, block M, Victoria	18	July 16, 1899	5 00		5 00

APPENDIX

DR. No. 33.—HYDRAULIC and other Rents, &c.,

Balances due on 1st July, 1898.	Rents and Interest accrued up to 30th June, 1899.	Totals.	Numbers.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
	5 00	5 00	19	British Columbia	Geo. A. Huff	
	1 00	1 00	20	"	Can. Pac. Railway Co	
	100 00	100 00	21	"	John Reid	
70 00		70 00	22	Rivière du Lièvre	Dominion Phosphate Co., Ltd., London, Eng	
	1 00	1 00	23	Charlottetown	Rt. Rev. Bishop McIntyre	Rt. Rev. Bishop McDonald
20 00	20 00	40 00	24	Rivière St. Maurice	Laurentides Pulp Co., Ltd	
80 00	20 00	100 00	25	"	Jos. Ant. Gagnon	
	16 00	16 00	26	Antigonish, N.S.		L. C. Archibald.
	1 00	1 00	27	Owen Sound	Grand Trunk Railway	
60 00	120 00	180 00	28	Windsor	Archie McNee	
	1 00	1 00	29	Lévis, Que		Cyrille Robitaille
2,760 84	3,717 00	6,477 84				

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

SESSIONAL PAPER No. 7

A—*Continued.*

Lessees' Accounts, 1898–99. CR.

Description of Property.	Numbers.	Date to which Account is made up.	Paid during the Fiscal Year.	Balances due on 30th June, 1899.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.
Permission to build a wharf on lot A, block 2, Somas River, Alberni, B.C	19	Aug. 12, 1899	5 00	.....	5 00
Portion of Custom House lot, New Westminster	20	Apl. 14, 1900	1 00	.....	1 00
Lot 1, block 13, cor. Begbie and Columbia Sts., New Westminster	21	May 12, 1900	100 00	.....	100 00
Permission to erect a landing at Little Rapids, Rivière du Lièvre	22	Apl. 30, 1898	.....	70 00	70 00
Leave to connect drain to main service of public building	23	May 6, 1900	1 00	.....	1 00
Tract of land, Chûte de la Grand 'Mère, St. Maurice River	24	June 17, 1900	20 00	20 00	40 00
Water lot on St. Maurice River	25	Mar. 8, 1900	.....	100 00	100 00
Tract of land and water lot, McNairs Cove	26	Dec. 30, 1899	16 00	.....	16 00
Lot of land west of Sydenham River	27	" 31, 1899	1 00	.....	1 00
Lot on Ouellette St., Windsor, Ont	28	Oct. 31, 1900	.....	180 00	180 00
.....	29	Apl. 4, 1900	1 00	.....	1 00
Totals	....	.....	3,052 00	3,425 84	6,477 84

E. MIALL,
Commissioner.

APPENDIX

No. 33 (A)—HYDRAULIC and other Rents, &c.—

Balances due on 1st July, 1898.	Totals.	Numbers.	Location.	Name of Proprietors.
$ cts.	$ cts.			LAND SALES—PRINCIPAL ACCOUNT.
12,092 83	12,092 83	1	Hamilton and Port Dover Road	Choat & Kern
433 34	433 34	2	Bonner's property, Quebec.	Timothy Sullivan, now M. Murphy
333 34	333 34	3		John Bailey, now Alex. Powell
300 00	300 00	4		Abraham Thompson
147 80	147 80	5		John Boomer
248 40	248 40	6		John Garbatz, now J. C. Nolan
154 80	154 80	7		N. H. Bowen
600 00	600 00	8		Estate Robert Reid
333 33	333 33	9		John Chevalier
533 33	533 33	10		Daniel Holden
333 33	333 33	11		George Creeley
63 00	63 00	12		Thomas McAdam
15,573 50	15,573 50			LAND SALES—INTEREST ACCOUNT.
6,298 25	6,298 25	1	Hamilton and Port Dover Road.	Choat & Kern (matured)
558 00	558 00	2	Bonner's property, Quebec.	Timothy Sullivan, now M. Murphy
120 00	120 00	3		John Bailey, now Alex. Powell
306 00	306 00	4		Abraham Thompson
155 22	155 22	5		John Boomer
275 82	275 82	6		John Garbatz, now J. C. Nolan
208 95	208 95	7		N. H. Bowen
828 00	828 00	8		Estate Robert Reid
190 00	190 00	9		John Chevalier
298 68	298 68	10		Daniel Holden
35 91	35 91	11		George Creeley
100 00	100 00	12		Thomas McAdam
100 00	100 00	13		Joseph Brook, tenant.
9,474 83	9,474 83			

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

SESSIONAL PAPER No. 7

A—*Concluded.*

Lessees' Accounts, 1898–99—*Concluded.*

Description of Property.	Numbers.	Date to which the account is made up.	Balances due on 30th June, 1899.	Totals.
			$ cts.	$ cts.
Hamilton and Port Dover Road & Caledonia Bridge....	1	.....	12,092 83	12,092 83
Lot No. 1, Wolfe Street.....	2	.....	433 34	433 34
" 9 "	3	.....	333 34	333 34
" 49 "	4	.....	300 00	300 00
" 73 and 74, Tower Street.....	5	.....	147 80	147 80
" 64, Wolfe street and 211 and 252 Ware Street....	6	.....	248 40	248 40
" 67 and 68, Monument Street.....	7	.....	154 80	154 80
" 22 and 23, Wolfe Street	8	.....	600 00	600 00
" 32, Wolfe Street.....	9	.....	333 33	333 33
" 65 and 66, Wolfe Street.....	10	.....	533 33	533 33
" 31, Wolfe Street.....	11	.....	333 33	333 33
" 135, Church Street.....	12	.....	63 00	63 00
			15,573 50	15,573 50
.....	1	June 30, 1874..	6,298 25	6,298 25
Lot No. 1, Wolfe Street.....	2	May 1, 1889..	558 00	558 00
" 9 "	3	" ..	120 00	120 00
" 49 "	4	" ..	306 00	306 00
" 73 and 74, Tower Street.....	5	" ..	155 22	155 22
" 64, Wolfe street, and 211 and 252 Ware Street...	6	" ..	275 82	275 82
" 67 and 68, Monument Street.....	7	" ..	208 95	208 95
" 22 and 23, Wolfe Street.....	8	" ..	828 00	828 00
" 32, Wolfe Street.....	9	Nov. 1, 1863..	190 00	190 00
" 65 and 66, Wolfe Street.....	10	" ..	298 68	298 68
" 31, Wolfe Street.....	11	" ..	35 91	35 91
" 135, Church Street.....	12	" ..	100 00	108 00
Monument Hotel.....	13	" ..	100 00	100 00
			94,74 83	9,474 83

E. MIALL,
Commissioner.

APPENDIX B.

No. 1.—Details of Excise Expenditures for the Year ended 30th June, 1899.

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.
McAllister, A....	Salary as Collector from July 1 to May 17, and from June 9 to 30.	.....	31 92	1,472 26	
Standish, J. G ..	" Special Class Exciseman for year...	.....	28 04	1,371 96	
Pole, C. W.	" Deputy Collector " ..	.....	24 00	1,176 00	
McCoy, W	" 1st Class Exciseman " ..	.....	19 96	980 04	
McCuaig, A. F..	" Deputy Collector " ..	...	16 04	783 96	
McFee, A. C	" 3rd Class Exciseman " ..	.....	22 54	622 46	
	Salaries	.....	142 50	6,406 68	
	Contingencies..	.....	.....	410 89	
					6,817 57
	Brantford.				
Spence, John.....	Salary as Collector for year....	.. ..	31 96	1,568 04	
Sinon, E. H.....	" Deputy Collector for year.....	.. .	24 00	1,176 00	
Walsh, D. J.....	" Special Class Exciseman from July 1 to Dec. 31.	.....	12 00	588 00	
Bell, J. E	" 1st Class Exciseman for year... ...	..	19 97	980 03	
		Insurance,			
Boyle, P.....	" " " "	71 76	29 34	876 40	
Hart, P. D.....	" 2nd Class " "	.....	16 96	833 04	
Weyms, C.	" 1st " " from Jan. 1 to June 30..	.....	10 00	490 02	
Orr, H. N.....	" 2nd Class Exciseman from Mar. 1 to June 30.....	.....	8 72	241 28	
	Insurance....	71 76			
	Salaries.....	.....	152 95	6,752 81	
	Contingencies.....	.....	.....	1,076 66	
					7,829 47
	Cornwall.				
Mulhern, M. M..	Salary as Collector for year	.....	20 00	980 00	
	Contingencies.....	.....	.....	109 39	
					1,089 39
	Guelph.				
Powell, J. B.....	Salary as Collector for year	.....	36 00	1,764 00	
Till, T. M.	" Deputy Collector for year...	.....	25 96	1,274 04	
Dawson, W.....	" Special Class Exciseman for year...	.....	28 04	1,371 96	
Woodward, G. W.	" " " " ..	.....	24 00	1,176 00	
Lynes, K.....	" " " " ..	...	24 00	1,176 00	
Broadfoot, S.....	" Accountant " ..	.....	19 96	980 04	
Bish, P.... ...	" 1st Class Exciseman " ..	.....	19 96	980 04	
Spence, F. H	" " " " ..	.....	19 96	980 04	
Bowman, A.....	" " " " .	.....	19 97	980 03	
O'Donohue, M. J.	" " " " ..	.....	18 30	895 45	
Yates, J. M. ...	" 2nd Class Exciseman from July 1 to April 30.....	....	14 10	694 20	
O'Brien, E. C....	" 2nd Class Exciseman for year	. ...	16 96	833 04	
Kilroy, E. T.....	" 1st " "	...	18 30	895 45	
Howie, A.... .	" 3rd " "	.....	15 00	735 00	
Brain, A. F.	" 2nd " "	.....	26 16	723 84	
Alteman, P. J...	" 3rd " "	.....	21 50	593 50	
	Salaries.....	.....	348 17	16,052 63	
	Contingencies.....	. .....	.....	1,365 64	
					17,418 27

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Hamilton.	$ cts.	$ cts.	$ cts.	$ cts.
Miller, W. F	Salary as Collector for year		43 96	2,156 04	
Ross, S. F	" Deputy Collector for year		30 00	1,470 00	
Spereman, J. J	" Special Class Exciseman from July 1 to Oct. 31		10 64	522 68	
Cameron, D. M	" Special Class Exciseman for year		30 00	1,470 00	
Donaghy, W	" " "		28 04	1,371 96	
Baby, W. A. D	" " "		28 04	1,371 96	
O'Brien, J. F	" 1st Class Exciseman for year		19 96	980 04	
Crawford, W. P	" Accountant "		21 50	1,053 50	
Irwin, R	" 1st Class Exciseman "		19 96	980 04	
Dumbrille, R. W	" 1st " "		19 53	957 97	
Weir, J	" 1st " "		19 53	957 97	
Hobbs, G. N	" 1st " "		16 96	833 04	
Logan, J	" 2nd " "		16 96	833 04	
Amor, W	" 2nd " "		16 96	833 04	
Wardell, R. S. R	" 1st " "		29 68	820 32	
MacKay, G. W	" 3rd " "		15 00	735 00	
Hayhurst, T. H	" 3rd " " from July 1 to Dec. 31, and 2nd Class Exciseman from Jan. 1 to June 30	18 72	10 50	645 78	
Bishop, J. B	" Probationary Exciseman from Nov. 9 to June 30	16 08		306 09	
Blackman, Chas	" Messenger for year	12 52		487 48	
	Salaries	47 32	377 22	18,785 95	
	Contingencies			494 72	
					19,280 67
	Kingston.				
Dickson, C. T	Salary as Collector for year		29 07	1,423 43	
Earle, R. H	" Special Class Exciseman for year		24 00	1,176 00	
Grimason, T	" Deputy Collector "		24 00	1,176 00	
Hanley, A	" Asst. Accountant "		19 96	980 04	
McFarland, C. D	" 1st Class Exciseman "		19 97	980 03	
Lyons, E	" 1st " "		19 53	957 97	
Browne, G. W	" 2nd " "		16 96	833 04	
O'Donnell, J	" 3rd " "		15 00	735 00	
Fahey, E	" 3rd " "		10 00	490 00	
	Salaries		178 49	8,751 51	
	Contingencies			713 38	
					9,464 89
	London.				
Alexander, Thos	Salary as Collector for year		36 00	1,764 00	
Davis, T. G	" Deputy Collector for year		30 00	1,470 00	
Conway, B. J	" Special Class Exciseman for year		30 00	1,470 00	
McSween, J	" 1st " "		19 96	980 04	
Hicks, W. H	" Deputy Collector "		19 96	980 04	
Coles, F. H	" Accountant "		19 96	980 04	
Girard, I	" 1st Class Exciseman "		19 96	980 04	
Stewart, J	" 1st " "		19 96	980 04	
Lee, E	" 1st " "		19 96	980 04	
Marcon, F. E	" 1st " "		19 96	980 04	
Wilson, D	" 1st " from July 1 to Oct. 31		6 20	305 44	
Rowland, E	" Asst. Accountant for year		19 77	970 23	
Webbe, C. E. A	" 2nd Class Exciseman from July 1 to Feb. 28		11 28	555 36	
Tracy, J. P	" 2nd Class Exciseman for year		16 96	833 04	
Foster, H	" 2nd " "		16 95	833 05	
Whitehead, J. P	" 2nd " "		26 16	723 84	
	" Deputy Collector "	16 28	11 34	622 38	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898–99—*Continued.*

To whom Paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	London—Concluded.	$ cts.	$ cts.	$ cts.	$ cts.
Talbot, J.	Salary as 3rd Class Exciseman for the year	15 00		585 00	
Spereman, J. J.	" Special Class Exciseman from Nov. 1 to June 30		21 32	1,045 36	
	Salaries	31 28	345 74	17,057 94	
	Contingencies			1,235 77	
					18,293 71
	Ottawa.				
Costigan, H. A.	Salary as Collector for year	40 00	15 96	1,544 04	
Esmonde, J. R.	" Deputy Collector from July 1 to Oct. 31			400 00	
Slattery, R.	" 1st Class Exciseman for year		19 96	980 04	
Neville, C.	" Deputy Collector "			1,033 28	
Lett, F. P. A.	" 3rd Class Exciseman from July 1 to Oct. 31		5 00	245 00	
Waller, J.	" 3rd Class Exciseman for year		15 00	735 00	
Doyle, J. E. H.	" 3rd " "		15 00	735 00	
McGuire, T.	" Deputy Collector from Nov. 1 to June 30	30 00		570 00	
Hinchey, E. H.	" Probationary Exciseman from Nov. 16 to May 15, and 3rd Class Exciseman, May 16 to June 30		4 57	320 51	
	Salaries	70 00	75 49	6,562 87	
	Contingencies			221 13	
					6,784 00
	Owen Sound.				
Graham, W. J.	Salary as Collector for year		24 00	1,176 00	
Nichols, J. T.	" Deputy Collector for year		19 96	980 04	
Johnson, J. J.	" 2nd Class Exciseman for year		16 96	833 04	
Chisholm, W. N.	" Deputy Collector "		16 95	833 05	
Blyth, Alex.	" 3rd Class Exciseman "	16 32	11 38	624 80	
	Salaries	16 32	89 25	4,446 93	
	Contingencies			641 97	
					5,088 90
	Perth.				
McLenaghan, N.	Salary as Collector for year	33 00		1,287 00	
Mason, F.	" Special Class Exciseman for year		30 00	1,470 00	
Goodman, A. W.	" 1st " " "		19 96	980 04	
Clarke, T.	" Deputy Collector for year	15 00		585 00	
Rowan, W. E.	" " "	10 00	5 94	384 06	
Egan, W.	" " "			399 96	
George, J.	" " "	5 06	2 94	192 00	
Mills, A. E.	" " "	3 72		146 28	
	Salaries	66 78	58 84	5,444 34	
	Contingencies			516 90	
					5,961 24
	Peterborough.				
Hall, J. J.	Salary as Collector for year		24 00	1,176 00	
Cahill, Thos.	" Deputy Collector for year		19 96	980 04	
Howden, R.	" " "		16 04	783 96	
Bickle, J. W.	" " "		13 96	686 04	
Knowleson, J. B.	" " "		13 96	686 04	
	Salaries		87 92	4,312 08	
	Contingencies			252 22	
					4,564 30

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APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Port Arthur.	$ cts.	$ cts.	$ cts.	$ cts.
Ironside, G. A...	Salary as Collector for year...		20 00	980 00	
	Contingencies...			52 29	
					1,032 29
	Prescott.				
Dumbrille, J.....	Salary as Collector for year...		36 00	1,764 00	
Gerald, W. H....	" Special Class Exciseman for year....		30 00	1,470 00	
Keilty, T.....	" Deputy Collector for year.....		25 96	1,274 04	
Macdonald, A. B.	" 1st Class Exciseman for year.		19 96	980 04	
Gow, J. E.....	" 1st Class Exciseman from July 1 to Dec. 31.....		9 96	490 02	
Marshall, F.....	" Exciseman for year.....		16 96	833 04	
Keeler, G. S.....	" 2nd Class Exciseman for year		16 96	833 04	
Wood, J. A.....	" Deputy Collector "		.....	799 92	
Ferguson, J.....	" 3rd Class Exciseman "		15 00	735 00	
Johnston, G. E..	" " " "		15 00	735 00	
Walsh, D. J.....	" Special Class Exciseman from Jan. 1 to June 30.....		12 00	588 00	
	Salaries.....		197 80	10,502 10	
	Contingencies.....		.....	582 20	
					11,084 30
	St. Catharines.				
Hesson, C. A....	Salary as Collector for year.....		24 00	1,176 00	
Harris, J. G.....	" Deputy Collector for year.....		34 96	965 04	
Milliken, E	" 2nd Class Exciseman for year		16 96	833 04	
Schram, R. L. H.	" 3rd " " "		22 54	622 46	
	Salaries.....		98 46	3,596 54	
	Contingencies.....		.....	639 87	
					4,236 41
	Stratford.				
Cavan, A.....	Salary as Collector for year.....		31 96	1,568 04	
Rennie, G..	" Deputy Collector for year.....		24 00	1,176 00	
Dingman, N. J ..	" Exciseman "		24 00	1,176 00	
Clark, A. F.....	" Accountant "		19 96	980 04	
Egener, A.....	" 1st Class Exciseman "		19 53	957 97	
Orr, H. N.....	" 3rd Class Exciseman from July 1 to Dec. 1, and 2nd Class Exciseman from Jan. 1 to Feb. 28.....		14 86	410 14	
	Salaries.....		134 31	6,268 19	
	Contingencies.....		.....	636 47	
					6,904 66
	Toronto.				
Stratton, W. C ..	Salary as Collector for year.....		43 96	2,156 04	
Gerald, C.....	" Special Class Exciseman for year....		31 96	1,568 04	
Dudley, W. H...	" " "		31 96	1,568 04	
Bennett, J.....	" Deputy Collector from July 1 to April 30		25 00	1,225 00	
Blair, J. B.	" Accountant for year.....		28 04	1,371 96	
Henderson, W...	" Deputy Collector for year.....		29 58	1,449 17	
Iler, B	" Special Class Exciseman for year...		25 96	1,274 04	
Rogerson, J. M..	" " " July 1 to Jan. 31		14 00	686 00	
Metcalf, W. F...	" " " for year.....		24 00	1,176 00	
Westman, T.....	" " " "		24 00	1,176 00	
Boomer, J. B....	" Assistant Accountant "		24 00	1,176 00	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom Paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation	Amounts paid.	Total amounts paid.
	Toronto.	$ cts.	$ cts.	$ cts.	$ cts.
Boyd, S. T.	Salary as Deputy Collector for the year		24 00	1,176 00	
Dick, J. W.	" Special Class Exciseman for year		24 00	1,176 00	
Shanacy, M.	" Deputy Collector "		22 04	1,077 96	
Coleman, C	" " "		19 96	980 04	
Evans, G. T.	" 1st Class Exciseman for year		19 96	980 04	
Weyms, C	" " July 1 to Dec. 31		9 96	490 02	
Helliwell, H. N.	" " for year		19 96	980 04	
McDonald, J. A.	" " "		19 96	980 04	
O'Leary, T. J.	" " "		19 96	980 04	
Flynn, D. J.	" " "		19 96	980 04	
Jamieson, R. C.	" " "		19 96	980 04	
Dodds, E. W.	" " "		18 00	882 00	
Graham, W. T.	" " "		19 53	957 97	
Doyle, B. J.	" " "		19 53	957 97	
Brennan, D. J.	" " "		19 53	957 97	
Cook, W. R	" " "		18 30	895 45	
Howard, W.W.S.	" " "		18 30	895 45	
Barber, J. S.	" 2nd " "		16 96	833 04	
Murray, A. S. E.	" 2nd " "		16 96	833 04	
Hurst, L. B	" 2nd " "		17 43	853 82	
Adams, J. S.	" 3rd " "		15 00	735 00	
Jones, A	" 3rd " "		15 00	735 00	
Coulter, A.	" 3rd " "		23 02	636 98	
Pringle, J.	" Deputy Collector "	5 06		194 94	
Dager, H. J.	" Deputy Collector (Class B) from Oct. 6 to June 30	29 43		559 76	
Frankland, H. R.	" Deputy Collector (Class A) from June 1 to June 30	5 41		102 92	
Boyd, J. F. S	" Messenger for year		14 96	485 04	
	Salaries	39 90	754 70	37,122 90	
	Contingencies			1,368 85	
					38,491 75
	Windsor.				
Kenning, J. H.	Salary as Collector for year		43 96	2,156 04	
Ramon, P.	" Deputy Collector for year		30 00	1,470 00	
Bouteiller, G. A.	" Special Class Exciseman for year		31 96	1,568 04	
Crowe, W.	" Accountant "		28 04	1,371 96	
Dunlop, C	" Deputy Collector "		24 00	1,176 00	
Taylor, G. W.	" Special Class Exciseman from July 1 to Dec. 31		12 00	588 00	
Brennan, J	" Accountant for year		22 04	1,077 96	
Allen, G. A	" 1st Class Exciseman for year		19 96	980 04	
Marcon, F. E.	" 1st " from Nov. 1 to June 30		13 33	652 53	
Gow, J. E.	" 1st Class Exciseman from Jan. 1 to Feb. 28, and Special Class Exciseman from March 1 to June 30		11 32	555 34	
Bayard, G. A.	" 1st Class Exciseman for year		16 95	833 05	
Jubenville, J. P.	" 2nd " "		16 96	833 04	
Thomas, R	" 2nd " "		16 96	833 04	
Falconer, J. E.	" 3rd " "		15 00	735 00	
Keogh, P. M.	" 3rd " "		15 00	735 00	
Crotty, J	" 3rd " "		15 00	735 00	
Cahill, J. W.	" 3rd " "		15 00	735 00	
Scott, M. W.	" Deputy Collector for year			199 92	
Belleperche, A.J.E	" " from Feb. 20 to June 30	10 80		205 27	
	Salaries	10 80	347 48	17,440 23	
	Contingencies			936 75	
					18,376 98

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amount paid.	Total amounts paid.
	Joliette.	$ cts.	$ cts.	$ cts.	$ cts.
Leprohon, R. M.	Salary as Collector from July 1 to April 30	.....	16 60	816 70	
Basinet, L.	" Deputy Collector from July 1 to May 9, Acting Collector from May 10 to June 30	.....	.....	342 73	
Taylor, G. W.	" Special Class Exciseman from Jan. 1 to June 30	.....	12 00	588 00	
Marion, J. E. E.	" 3rd Class Exciseman for year	18 72	7 50	723 78	
Richard, J. B. T.	" Deputy Collector for year	7 50	4 50	288 00	
Moreau, A.	" " from Jan. 9 to June 30	14 45	.....	272 64	
	Salaries	40 67	40 60	3,031 85	
	Contingencies	.....	.....	436 95	
					3,468 80
	Montreal.				
Lawlor, H.	Salary as Collector for year	.....	43 98	2,156 02	
Macdonald, D.	" Deputy Collector for year	.....	30 00	1,470 00	
Toupin, F. X. J. A.	" " "	.....	30 00	1,470 00	
Lecours, H. T.	" Accountant "	.....	28 04	1,371 96	
Caven, W.	" Special Class Exciseman for year	.....	25 96	1,274 04	
Fox, J. D.	" Assistant Accountant "	.....	24 00	1,176 00	
Forest, E. R.	" Cashier "	.....	24 00	1,176 00	
Fox, Thomas	" 1st Class Exciseman "	.....	19 96	980 04	
Villeneuve, J.	" 1st " "	.....	19 96	980 04	
Scullion, W. J.	" 1st " "	.....	19 96	980 04	
Macintyre, D.	" 1st " "	.....	19 96	980 04	
Hawkins, A. C.	" 1st " "	.....	18 60	838 42	
Bulmer, W.	" 1st " "	.....	16 96	833 04	
Malo, T.	" 2nd " "	.....	16 96	833 04	
Dumouchel, L.	" 2nd " "	.....	16 96	833 04	
Courtney, J. J.	" 2nd " "	.....	16 96	833 04	
Verner, F.	" 1st " "	.....	16 96	833 04	
Dixon, H. G. S.	" 1st " "	.....	16 96	833 04	
Manning, J.	" Exciseman "	.....	16 96	833 04	
Lane, T. M.	" 1st Class Exciseman "	.....	18 30	895 45	
Scullion, P. J.	" 2nd " "	.....	14 98	672 52	
Millier, E.	" 3rd " "	.....	15 00	735 00	
Baby, J.	" 3rd " "	.....	15 00	735 00	
Panneton, G. E.	" 3rd " "	.....	15 00	735 00	
Pinsonnault, A.	" 3rd " "	18 72	7 50	723 78	
Laporte, G.	" 3rd " "	.....	15 00	735 00	
Watkins, J. A.	" 3rd " "	.....	15 00	735 00	
Costigan, J. J.	" 3rd " "	.....	15 00	735 00	
Codd, H. J. S.	" 3rd " "	.....	15 00	735 00	
O'Flaherty, E. J.	" 3rd " "	.....	15 00	735 00	
Brabant, J. B. G. N.	" 3rd " "	.....	15 00	735 00	
Bélair, A. P.	" 3rd " "	18 72	.....	731 28	
Ryan, W.	" 3rd " "	.....	15 00	735 00	
Mainville, C. P.	" 3rd " "	.....	15 00	735 00	
Renaud, A. H.	" 3rd " "	.....	23 02	636 98	
Desaulniers, J. E. A.	" 3rd " "	15 72	11 02	603 26	
Fortier, V.	" Deputy Collector "	15 00	10 50	574 50	
Andrews, A. A.	" Probationary Exciseman from July 1 to Aug. 2, and 3rd Class Exciseman from Aug. 3 to June 30	.....	20 45	570 67	
Comte, L. A. A. J.	" 3rd Class Exciseman from Sept. 19 to June 30	.....	19 68	558 64	
St. Michel, F. X.	" Deputy Collector for year	5 06	.....	194 94	
Laurier, J. E.	" Probationary Exciseman from April 1 to June 30	6 24	.....	118 74	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898–99—*Continued.*

To whom Paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Montreal—Concluded.	$ cts.	$ cts.	$ cts.	$ cts.
Snowdon, J. W..	Salary as Probationary Excise Officer from June 13 to June 30	1 24	.....	23 75	
Bruyère, H. P...	" Probationary Deputy Collector (Class B.) from June 19 to June 30	0 83	.....	15 83	
	Salaries	81 53	713 59	35,089 22	
	Contingencies	.....	.....	4,016 39	
					39,105 61
	Quebec.				
LaRue, S.....	Salary as Collector for year	....	36 00	1,764 00	
Cahill, J. H.....	" Deputy Collector for year	.....	.....	1,299 96	
Coleman, J. J....	" 1st Class Exciseman for year	.....	19 96	980 04	
Rouleau, J.....	" 3rd " "	.....	15 00	735 00	
Lemoine, J.....	" 3rd " "	.....	15 00	735 00	
Bourget, O.....	" 3rd " "	.....	15 00	735 00	
Lépine, L.....	" 3rd " "	.....	15 00	735 00	
Fahey, O.....	" 3rd " "	.....	15 00	735 00	
Sexton, J.....	" 3rd " "	.....	15 00	735 00	
LaRue, J. B. A..	" Deputy Collector "	.....	24 52	675 48	
Bourassa, J.....	" 3rd Class Exciseman "	.....	25 66	709 34	
Beaulieu, J. B....	" Probationary Exciseman from July 1 to Sept. 7, and 3rd Class Exciseman from Sept. 8 to June 30	.....	19 86	561 52	
Timmons, P.....	" Probationary Exciseman from July 1 to Oct 12, 3rd Class Exciseman from Oct. 13 to June 30	.....	19 27	552 48	
Blair, A.....	" Deputy Collector for year	.....	.....	99 96	
	Salaries	.....	235 27	11,052 78	
	Contingencies	.....	.....	2,878 96	
					13,931 74
	Sherbrooke.				
Simpson, A. F...	Salary as Collector for year	.....	28 04	1,371 96	
Quinn, J. D.....	" Special Class Exciseman for year	.....	24 00	1,176 00	
Murray, D.	" 1st Class " "	.....	19 97	980 03	
Chartier, E.....	" Deputy Collector "	24 04	.....	935 96	
Deland, A. N....	" " "	16 28	11 34	622 38	
Bowen, F. C.....	" 3rd Class Exciseman "	16 06	11 26	617 66	
Rousseau, E. H..	" Deputy Collector "	12 56	7 44	480 00	
Grosbois, (de) C.B.	" " "	12 56	7 44	480 00	
	Salaries	81 50	109 49	6,663 99	
	Contingencies	.....	.....	1,458 85	
					8,122 84
	Sorel.				
Fortier, J. J. O..	Salary as Collector for year	.....	20 00	980 00	
	Contingencies	.....	.....	34 25	
					1,014 25
	St. Hyacinthe.				
Boivin, C. A.....	Salary as Collector for year	.....	19 96	980 04	
Daveluy, J. P....	" 3rd Class Exciseman for year	18 72	7 50	723 78	
	Salaries	18 72	27 46	1,703 82	
	Contingencies	.....	.....	90 25	
					1,794 07

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amount paid.	Total amounts paid.
	Three Rivers.	$ cts.	$ cts.	$ cts.	$ cts.
Hébert, C. D.	Salary as Collector for year	.....	24 00	1,176 00	
Duplessis, C. Z.	" 3rd Class Exciseman for year	.....	15 00	735 00	
	Salaries	.....	39 00	1,911 00	
	Contingencies	.....	.....	134 01	
					2,045 01
	Victoriaville.				
Poirier, J. N.	Salary as Deputy Collector for year	.....	15 00	485 00	
	Contingencies	.....	.....	563 45	
					1,048 45
	St. John.				
Atherton, R.	Salary as Collector for year	.....	31 96	1,568 04	
Clark, J. A.	" Deputy Collector for year	.....	24 00	1,176 00	
Belyea, T. H.	" Accountant "	.....	19 96	980 04	
McCloskey, J. R.	" 1st Class Exciseman "	.....	19 96	980 04	
Fitzpatrick, W. J.	" 1st " "	.....	19 97	980 03	
Geldart, O. A.	" 1st " "	.....	19 16	937 09	
Ferguson, J. C.	" 2nd " "	.....	16 96	833 04	
Smyth, B. B.	" 2nd " "	.....	16 95	833 05	
Hill, A. M.	" Deputy Collector "	.....	10 04	489 96	
Dibblee, W.	" " "	.....	3 72	296 28	
	Salaries	.....	182 68	9,073 57	
	Contingencies	.....	.....	949 48	
					10,023 05
	Cape Breton.				
McDonald, M. A.	Salary as Collector from July 1 to Sept. 30	.....	3 75	183 75	
	Contingencies	.....	.....	68 70	
					252 45
	Halifax.				
Grant, H. H.	Salary as Collector for year	.....	36 00	1,764 00	
King, R. M.	" Deputy Collector for year	.....	25 96	1,274 04	
James, T. C.	" Accountant "	.....	19 96	980 04	
Carroll, D.	" 1st Class Exciseman for year	.....	19 96	980 04	
Blethen, C. W.	" " "	.....	18 86	926 14	
Wainwright, F.G	" 2nd " "	.....	16 96	833 04	
Hubley, H. H.	" 2nd " "	.....	16 95	833 05	
Tompkins, P.	" 3rd " "	.....	15 00	735 00	
Hagarty, P.	" 3rd " "	.....	15 00	735 00	
Munro, H. D.	" 3rd " "	.....	15 00	735 00	
Gorman, A. M.	" 3rd " "	.....	12 00	588 00	
	Salaries	.....	211 65	10,383 35	
	Contingencies	.....	.....	699 85	
					11,083 20
	Pictou.				
Fraser, P.	Salary as Collector for year	.....	19 81	970 19	
McDonald, A. J.	" Deputy Collector from October 27 to June 30	20 40	.....	387 66	
	Salaries	20 40	19 81	1,357 85	
	Contingencies	.....	.....	381 52	
					1,739 37

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898–99.—*Continud.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Charlottetown.	$ cts.	$ cts.	$ cts.	$ cts.
Nash, S. C.	Salary as Collector for year	.....	24 00	1,176 00	
Moore, T.	" Deputy Collector for year	.....	19 96	980 04	
	Salaries	.....	43 96	2,156 04	
	Contingencies	....	.....	97 46	
					2,253 50
	Winnipeg.				
Gosnell, T. S.	Salary as Collector for year	.....	36 00	1,764 00	
Watson, W. W.	" Deputy Collector for year	.....	.....	1,200 00	
Hawkins, W. L.	" Accountant "	.....	24 00	1,176 00	
Code, A.	" " "	.....	24 00	1,176 00	
Girdestone, R. J. M.	" Deputy Collector "	.....	19 96	980 04	
Thomas, P.	" Deputy Collector from July 1 to Dec. 31	.....	9 00	441 00	
Larivière, A. C.	" 2nd Class Exciseman for year	.....	26 16	723 84	
Verner, T. H.	" 3rd Class Exciseman from July 1 to Dec. 31, 2nd Class Exciseman from Jan. 1 to June 30	.....	23 58	651 42	
O'Meara, F. M.	" Deputy Collector for year	15 36	10 76	588 88	
Barnes, G.	" " "	12 56	7 44	480 00	
Conklin, W. M.	" Probationary Exciseman from July 1 to Dec. 31, 3rd Class Exciseman from Jan. 1 to June 30	27 52	.....	522 48	
Ross, H. E.	" Deputy Collector for year	....	11 92	388 08	
Jameson, S. B.	" " "	.....	9 00	291 00	
McNiven, J. D.	" Deputy Collector from July 11 to June 30	12 14	.....	231 10	
Christie, W. J.	" Deputy Collector from July 1 to 7	....	0 56	27 66	
Sparling, J. W.	" Deputy Collector (class B.) from Dec. 28 to June 30	20 41	.....	388 15	
Saucier, X.	" 1st Class Exciseman from Jan. 1 to June 30	....	8 50	416 52	
	Salaries	87 99	210 88	11,446 17	
	Contingencies	....	.....	2,102 71	
					13,548 88
	Calgary.				
Thomas, Philip.	Salary as Deputy Collector from July 1 to Dec. 16 and Acting Collector from Dec. 16 to June 30	.....	11 14	546 88	
Saucier, X.	" 1st Class Exciseman from July 1 to Dec. 31	.....	8 46	416 52	
Fletcher, R. W.	" Deputy Collector for year	15 00	10 50	574 50	
Ives, G. C.	" " "	10 00	.....	390 00	
Osborne, F. A.	" " "	.....	11 92	388 08	
	Salaries	25 00	42 02	2,315 98	
	Contingencies	....	.....	1,609 50	
					3,925 48
	Vancouver.				
Miller, J. E.	Salary as Collector for year	.....	30 00	1,470 00	
Parkinson, E. B.	" 3rd Class Exciseman for year	20 06	13 98	765 96	
Wolfenden, W.	" Deputy Collector for year	17 50	6 96	675 54	
Jones, W. S.	" " from July 1 to March 31	7 50	10 50	432 00	
Bishop, A.	" Deputy Collector for year	15 00	10 50	574 50	
Cargill, W.	" " "	15 00	10 50	574 50	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom Paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Vancouver—Concluded.	$ cts.	$ cts.	$ cts.	$ cts.
Swannell, F. W...	Salary as Deputy Collector for year....	15 00	10 73	580 93	
Stuart, A. K....	" " "	12 56	7 44	480 00	
Howell, Thos ...	" " "	10 00	5 94	384 06	
Parson, C. H....	" " "	5 06	2 94	192 00	
Stevens, D. B....	" " "	9 96	7 86	445 58	
	Salaries.....	127 64	117 35	6,575 07	
	Contingencies.....	.....	.....	3,478 67	
					10,053 74
	Victoria.				
Jones, R.....	Salary as Collector for year	.....	30 00	1,470 00	
Henwood, G.	" Exciseman "	.....	19 04	930 96	
O'Sullivan, D....	" Deputy Collector for year.....	.....	31 44	868 56	
Ridgman, A. H..	" 3rd Class Exciseman for year.....	.....	24 10	665 90	
McAloney, J. A..	" Deputy Collector "	7 50	4 50	288 00	
	Salaries for year.....	7 50	109 08	4,223 42	
	Contingencies.....	.....	.....	853 45	
					5,076 87
	DISTRICT INSPECTORS.				
	Ontario.				
Hamilton, W. L..	Salary from July 1 to April 30....	.....	41 60	2,041 70	
	Contingencies.....	.....	.....	455 55	
					2,497 25
Morrow, J..... ..	Salary for year.....	... ..	50 00	2,450 00	
	Contingencies.....	.....	.....	276 81	
					2,726 81
Gow, J.....	Salary for year.....	....	50 00	2,450 00	
	Contingencies.....	....	.....	360 15	
					2,810 15
	Quebec.				
Beauchamp, J. P.	Salary for year	.....	37 98	1,861 98	
	Contingencies	.....	.....	71 99	
					1,933 97
LeMoine, Sir Jas.	Salary for year.....	.....	.....	2,500 00	
	Contingencies	.....	.....	243 31	
					2,743 31
	New Brunswick.				
Burke, T.....	Salary for year....	.....	44 00	2,156 00	
	Contingencies.....	.....	.....	695 11	
					2,851 11
	Manitoba.				
Barrett, J. K ...	Salary for year	.....	50 00	2,450 00	
	Contingencies.....	.....	.....	1,030 20	
					3,480 20
	British Columbia.				
Gill, W.....	Salary for year.....	.... .	50 00	2,450 00	
	Contingencies	.....	.....	989 15	
					3,439 15
	Chief Inspector.				
Gerald, W. J....	Contingencies.....	.....	.....	.....	182 81
	Inspector of Bonded Factories.				
Morrow, John...	Contingencies.....	.....	.....	....	186 08

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Excise Contingencies.	$ cts.	$ cts.
Potvin, Napoleon	Petty expenses	140 57	
B. A. B. Note Co	To pay for stamps and labels supplied	4,233 40	
Amer. B. Note Co.	" "	14,795 12	
Registrar Exchequer Court	Writ of assistance	2 90	
Pritchard&Andrews	Rollers, daters, stencils, stamps, &c	294 94	
Bailey, Geo	Keys, repairing locks, &c	87 55	
Whitehead, Mrs. J.	Cleaning safe and storerooms	76 75	
Eimer & Amend	Burette stands and floats	66 91	
Lyman, Sons & Co.	Bottles, flasks, &c	7 23	
Westman, Thomas	Travelling expenses from Ottawa to Toronto and return and board allowance from 18th July, 1898 to 31st March, 1899, while at Ottawa on duty	353 32	
Tucker & Reeves	26 sets of japanned iron padlocks	151 84	
Gerald, Charles	Travelling expenses from Toronto to Belleville and return, also to Berthier and return on departmental duty	143 32	
Parr, J. A.	Lumber	74 15	
Graves Bros.	Screws, locks, &c	7 22	
Butterworth & Co.	1 doz. copper tobacco dryers	81 00	
Canadian Express Co	Express charges	16 50	
Murphy, J. J.	1 copper oven and stand, and 1 oil stove	13 85	
Burrow, Stewart & Milne Co	36 tobacco percentage scales	279 00	
Fréchette, Achille	Technical proof reading and translation	99 40	
Oertling, L.	Thermometers, hydrometers, glass beakers, &c	766 14	
O'Brien, J. F.	Travelling expenses from Hamilton to Ottawa and return on official business	53 70	
Lett, Stephen	Certificate as to mental condition of K. Lynes, an officer of I. R. D	5 00	
	Total, General Contingencies		21,749 81
	Law Costs.		
Dechêne, F. G. M.	Professional services in *re* Regina *vs.* Cadrion		133 38
Letellier, B.	Law costs in *re* Regina *vs.* Gagnon	55 90	
	" Regina *vs.* Perrault	64 90	
	" Regina *vs.* Gagnon	15 35	
	" Regina *vs.* P. Mercier	22 20	
	" Regina *vs.* C. Audet	23 00	
	" Regina *vs.* J. Gagnon	43 00	
	" Regina *vs.* G. Lemelin	23 00	
	" Regina *vs.* A. Bourget	86 05	
	" Regina *vs.* Jos. Jacques	34 75	
			368 15
McMillan, Hugh	" Regina *vs.* J. Shaw	51 74	
	" Regina *vs.* J. Farley	35 80	
			87 54
Westgate, John	" Regina *vs.* J. Shaw		4 05
Lowe, W. H.	Expenses in Seizure No. 86, Guelph		1 22
Pouliot, J. C.	Law costs in *re* Regina *vs.* M. Dubé	62 56	
	" Regina *vs.* I. Poitras	115 40	
	" Regina *vs.* P. Dubé	144 86	
	" Regina *vs.* P. Chassé	64 00	
	Expenses in connection with imprisonment of P. Chassé	22 30	
	" " P. Dubé	32 00	
	Law costs in *re* Regina *vs.* Brisbois	40 30	
			481 42

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898–99—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	Law Costs—Continued.	$ cts.	$ cts.
Roger, G. M. ..	Professional services *in re* Regina *vs.* Fobert & Conway..	.....	113 00
Plamondon, J. D..	Expenses in seizure No. 69 Sorel....	6 35	
	Law costs *in re* Regina *vs.* La Traverse	125 55	
	" Regina *vs.* Moreau.....	63 35	
			195 25
Dugas, F. O... ..	Expenses *in re* Regina *vs.* J. Rourke.....	12 20	
	Law costs *in re* "	35 95	
	" Regina *vs.* Marcel Lefebvre.....	17 20	
			65 35
Martigny, J.C.L. de	Law costs *in re* Regina *vs.* J. Rourke.....	30 40	
	Expenses in seizure 940 Montreal.....	30 00	
	" 933 "	10 00	
	" 138 Joliette.....	10 00	
	Law costs *in re* Regina *vs.* E. Poulin.....	30 00	
	Expenses in seizure 953 Montreal...	70 50	
			180 90
Johnston, Adam...	Law costs *in re* Regina *vs.* Clawson.....	.....	22 28
Kerr, Macdonald...	Law costs *in re* Regina *vs.* Steele & Honeysett.....	.....	2 00
Davidson & Patterson..... .	" Regina *vs.* W. B. Reid & Co.	8 00	
	" Regina *vs.* W. Foster...	10 00	
			18 00
Wade & Paton.....	Expenses incurred in unsuccessful attempt to arrest A. Robar.....	6 34	
	Law costs *in re* Regina *vs.* John Redy.	20 00	
			26 34
Clute Norman.....	Expenses *in re* Regina *vs.* W. Bailey..	.....	6 00
Fay, Fred. R.... .	Expenses *in re* Regina *vs.* W. Bailey..	1 75	
	" Regina *vs.* McNaughton.....	1 85	
			3 60
McKay, Jno... ...	Law costs *in re* Regina *vs.* R. S. Henderson.....	12 98	
	" Regina *vs.* Van Norman	12 98	
			25 96
Duffy & Leonard...	Law costs *in re* Regina *vs* Jos. Clow.....	10 00	
	" Regina *vs.* P. Clow..	20 00	
	Profsssional services *in re* Regina *vs.* Pierre Cordeau. ..	68 00	
	" Regina *vs.* Wm. Young.....	25 20	
			123 20
McFarlane, A. G..	Expenses *in re* Regina *vs.* S. R. Boyer.....	3 75	
	" Regina *vs.* D. McGaffigan..	3 85	
	" Regina *vs.* C. M. Sherwood.....	4 45	
			12 05
Henderson, Alex...	Professional services *in re* Regina *vs.* D. de Montigny....	41 25	
	Law costs in Regina *vs.* Scuitto, Clem & T. J. Roberts..	82 50	
			123 75
Macdonnell, Samuel	Law costs *in re* Regina *vs.* Alex. McDonald.....	48 75	
	" Regina *vs.* Neil McDonald.....	25 00	
	" Regina *vs.* Archibald McDonald.....	25 21	
	" Regina *vs.* A. Kennedy.....	19 20	
	" Regina *vs.* J. A. Kennedy..... ...	47 90	
	" Regina *vs.* Dorothy Kennedy.....	21 80	
			187 86
Ross, W. B.....	Law costs in seizure 167, Halifax.....	20 00	
	" *re* Regina *vs.* John O'Neil	42 53	
	Professional services in *re* Regina *vs.* A. E. Lawlor	23 00	
	Law costs in *re* Regina *vs.* John Ross and John McKay..	22 02	
			107 55
Guignon, Théodore.	Expenses in seizure 940, Montreal.....	15 00	
	" 933 "	14 95	
			29 95
O'Reily, J. R	Law costs in *re* Regina *vs.* D. P. Horan.....	....	15 00
McCully, F. A....	" " Regina *vs.* G. Gothro.....	29 86	
	" and disbursements in *re* Regina *vs.* G. Gothro.	87 55	
	" in *re* Regina *vs.* G. Gothro.....	8 00	
			125 41

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	Law Costs—Continued.	$ cts.	$ cts.
Curll, Jas. A	Magistrate's fees in *re* Regina *vs.* Kedy		3 60
Starratt, Charles	Expenses in *re* Regina *vs.* Kedy		12 80
Daniels, O. T	Law costs in *re* Regina *vs.* Wm. Baily	25 00	
	" Regina *vs.* McNaughton	38 25	
	" " "	20 00	
			83 25
Roy, Cyprias	Law costs in *re* Regina *vs.* Terrien	127 80	
	" Regina *vs.* A. Pelletier	131 61	
			259 41
Chisholm, Wm.	Law costs and fees in seizure 42, Cornwall		17 40
Broderick, J. S	" in *re* Regina *vs.* C. F. Bailey	10 00	
	" in *re* Regina *vs.* C. L. Ramsdell	10 00	
	" in *re* Regina *vs.* W. N. Ives	10 00	
	" in *re* Regina *vs.* C. L. Ramsdell	10 00	
	" in *re* Regina *vs.* W. H. Boright	10 00	
	" in *re* Regina *vs.* Thos. Rowell	10 00	
	" in *re* Regina *vs.* Griffith	20 00	
			80 00
Fontaine, R. E	Law costs in *re* Regina *vs.* Dame G. Gauthier		57 95
Hesson, C. A	Expenses in seizure 21, St. Catharines		16 40
Clute & Williams	Law costs in *re* Regina *vs.* C. Robinson		63 45
Bowes & Senkler	" Regina *vs.* LeChasseur & Gagnon		40 03
Gouin, Lomer	" Regina *vs.* Elzéar Poulin	61 93	
	" Regina *vs.* Isaac Ipstein	20 00	
	" Regina *vs.* Maisonneuve	10 00	
	" Regina *vs.* W. Desjardins	57 80	
	" Regina *vs.* David Cadieux	48 13	
	" Regina *vs.* T. Doré	36 33	
	" Regina *vs.* P. Robidoux	84 00	
	" Regina *vs.* Patenaude	84 00	
	" Regina *vs.* Braur	36 43	
	" P. Poleto *vs.* H. Lawlor	200 00	
	" Regina *vs.* Sanserre dit Massé	26 83	
			665 45
Duffy, H. T	Expenses in *re* Regina *vs.* Jos. Clow		16 90
Grenier & Tessier	Law costs in *re* Regina *vs.* R. Perron		68 60
Hall, John S	" Regina *vs.* D. Favre	11 70	
	" Regina *vs.* A. Patenaude	20 00	
	" Regina *vs.* J. Guennette	11 50	
	" Regina *vs.* A. Dion	22 00	
	Professional services in *re* Regina *vs.* Lamoureux	20 00	
	" Regina *vs.* McDonald	10 00	
	Law costs in *re* Regina *vs.* Lamoureaux and Poupart	180 38	
			275 58
Sinclair & Patterson	Law costs in *re* Regina *vs.* H. Chisholm		26 10
Stone, H. E	" Regina *vs.* R. Smith	25 10	
	" Regina *vs.* J. Chuger	10 30	
	Professional services in *re* Regina *vs.* James Clark	20 43	
			55 83
Johnson, Thomas	Law costs in *re* Regina *vs.* Bilbrough		22 50
Boyer, James	Expenses in seizure 343, Toronto		6 70
Chisholm, D. C	Law costs in *re* Regina *vs.* D. Fraser	45 10	
	" Regina *vs.* M. Fraser	24 20	
			69 30
McClive, H. M	Law costs in *re* Regina *vs.* Donnelly		24 10
Rioux, S. C	" Regina *vs.* Poitras		100 58
Ellis, P.	Magistrate and constable's fees in *re* Regina *vs.* Wm. Foster		11 20
Robitaille & Roy	Law costs in *re* Regina vs. H. Simard	25 05	
	" Regina *vs.* Geo. Gervais	27 00	
	" Regina *vs.* F. X. Thérien	24 65	
			76 70

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	Law Costs—Concluded.	$ cts.	$ cts.
Leduc, J. D.	Law costs in *re* Regina *vs.* F. Labelle	51 66	
	" Regina *vs.* Elzéar Poulin	88 26	
	Bailiff's fees in *re* Regina *vs.* Elzéar Poulin	34 25	
	Law costs in seizure 986, Montreal	68 18	
			242 35
Macdonald, Ang. R.	Sheriff's fees in seizure 76, Pictou		25 30
Angers, C. P.	Law costs in *re* Regina *vs.* H. Bélanger	24 01	
	" Regina *vs.* J. M. Rousseau	24 40	
			48 41
Lavery, J. I.	Law costs in *re* Regina *vs.* Augustin Dufour	37 07	
	" Regina *vs.* Albert Fecteau	9 83	
	" Regina *vs.* F. Grosteau	6 90	
	" Regina *vs.* C. Cordallaz	22 20	
	" Regina *vs.* George Vezina	45 00	
			121 00
Casgrain, Angers & Lavery	Law costs in *re* Regina *vs.* Chas. Bégin	11 49	
	" Regina *vs.* J. G. Coté *et al.*	30 00	
			41 49
Rogers & Stewart	Charges for administering declarations		11 50
Taylor, O. M.	Expenses in *re* Regina *vs.* Caldwell	1 75	
	" Regina *vs.* McNaughton	2 25	
			4 00
Dewitt, James R.	Expenses in *re* Regina *vs.* McNaughton		10 00
Chute, N. E.	" "		40 85
Lount, George W.	Law costs in *re* Regina *vs.* E. Lippett		20 00
Mathers, T. G.	" Regina *vs.* Robt. Forsyth	12 15	
	Expenses in *re* Regina vs. Jas. Coulter	40 00	
	Law costs in *re* Regina *vs.* Martindale	52 80	
			104 95
Garner, L. V.	Constables expenses in *re* Regina *vs.* William and Elizabeth Chrysler		15 30
Clogstan, John H.	Expenses in seizure 21, St Catharines		20 00
McClive & McClive	Law costs in *re* Regina *vs.* P. Donnelly	42 76	
	" Regina *vs.* Chrysler	37 76	
			80 52
Rochon, Alfred	Law costs in *re* Regina *vs.* Spaulding		174 50
Foran, T. P.	Expenses in seizure 150, Ottawa		68 90
Galer, G. N.	Constables expenses in *re* Regina *vs.* G. Dennis		61 75
Ferguson, A.	" Regina *vs.* G. Gothro	19 38	
	" Regina *vs.* C. Gothro	8 31	
			27 69
Paradis, E. Z.	Law costs in *re* Regina *vs.* J. Bessette		20 00
Griffiths, R. H.	Expenses in *re* Regina *vs.* J. W. King		6 80
Maclean, A. K.	Law costs in *re* "		23 00
Farley, John	" Regina *vs.* W. Simmons		85 00
Carrier, A. F.	Expenses in *re* Regina *vs.* W. Desjardins	13 30	
	" Regina *vs.* Langlois	26 60	
			39 90
Dutcher, J. S.	Expenses in *re* seizure 336		5 00
	Total law costs		5,811 25

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Place of Residence.	Service.	Amounts paid.	Totals.
		Commission to Customs Officers.	$ cts.	$ cts.
Brodeur, S. A.	Valleyfield, Que.	From 1st July, 1897, to 30th June, 1899.	500 00	
Beauchesne, P. C.	Paspébiac, Que	" "	57 25	
Valleau, A. G.	Desercnto, Ont	" "	300 00	
Anderson, Thos. E.	Napanee, Ont.	" "	450 00	
Cameron, A. McK.	Meaford, Ont.	" to 30th June, 1898.	200 00	
Stanley, T. D.	St. Mary's, Ont.	" to 30th June, 1899.	302 82	
Plummer, H.	Sault St. Marie, Ont	" to 30th June, 1898.	150 00	
Kavanagh, A. J.	Gaspé, Que.	" to 30th June, 1899.	59 60	
Joncas, P. L.	Magdalen Islands, Que	" "	19 74	
Ratchford, C. E	Amherst, N.S	" "	300 00	
Champness, Fred	Lethbridge, N. W.T.	" "	300 00	
Little, W. F.	Anthracite, N. W.T.	" to 30th June, 1898.	71 59	
Watson, George	Collingwood, Ont.	" "	125 00	
McPherson, W. J.	Kincardine, Ont.	" "	65 47	
Britton, W. H.	Gananoque, Ont	" "	59 80	
Tennant, J. F	Gretna, Man.	" "	150 00	
Scarth, W. F	Virden, Man	" "	200 00	
Anderson, J. J.	Sackville, N.B.	25th Aug., 1897 "	145 09	
Park, W. A	Newcastle, N.B.	1st July, 1897 "	200 00	
Street, A. F.	Fredericton, N.B.	" "	250 00	
Baldwin, J. E	Bathurst, N.B.	" "	127 53	
Gagné, A	Chambord, Que.	" "	1 07	
Dawson, J. H.	Nakusp, B.C	" to 31st Aug., 1898.	175 00	
Gilpin, R. R.	Grand Forks, B.C.	" to 30th June, 1898.	29 00	
Standen	Gananoque, Ont	21st Dec., 1897, to 6th Jan., 1898.	19 97	
McDonald, J. Fred.	New Glasgow, N.S.	1st July, 1897, to 30th June, 1898.	150 00	
A. Boyd	Antigonish, N.S.	" "	103 08	
Drewett, F. J.	Strathroy, Ont.	20th Feb., 1897, to 1st May, 1898.	73 48	
Murray, W. H.	"	1st May, 1897, to 11th May, 1898.	7 50	
Hamilton, A. G.	North Sydney, N.S.	" to 30th June, 1898.	150 00	
Blair, H. C.	Truro, N.S.	1st July, 1898, to 30th May, 1899.	200 00	
Fauquier, F. G	Nakusp, B.C	30th Aug., 1897, to 15th Dec., 1898.	145 09	
McGuire, F. J.	Trenton, Ont.	14th Oct., 1898, to 30th June, 1899.	150 00	
Pelletier, N. G.	Rivière du Loup, Que	1st July, 1898 "	250 00	
		Total Commission to Customs Officers		5,488 08
		Commission on Tobacco Stamps.		
Archambault, Delle G	St. Alexis, Que	Allowance of 5 p. c. on sale of stamps	38 50	
Ferland, Ed	"	" "	0 50	
Forest, Z		" "	7 75	
Paquette, O.	St. Eustache, Que.	" "	30 75	
Roy, Jos		" "	12 50	
		Total		90 00

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	Duty-Pay.	$ cts.	$ cts.
Gerald, Charles	From 1st July, 1898, to 30th Jnne, 1899	200 00	
Jamieson, R. C	" "	150 00	
Howard, W. W. S.	" "	100 00	
O'Leary, T. J	" "	100 00	
Flynn, D. J	" "	100 00	
Brennan, D. J	" "	100 00	
Doyle, B. J	" "	100 00	
Hurst, L. B	" "	100 00	
Bouteiller, G. A.	" "	200 00	
Taylor, G. W	" "	150 00	
Brennan, Jno	" "	100 00	
Allen, G. A.	" "	125 00	
Cahill, J. W.	" "	100 00	
Falconer, J. E	" "	100 00	
Bayard, G. A	" "	100 00	
Keogh, P. M.	" "	100 00	
Crotty, Jno	" "	100 00	
Thomas, Robert	" "	100 00	
Kilroy, E. T.	" "	100 00	
Dawson, W	" "	100 00	
Howie, A.	" "	150 00	
Bish, P	" "	100 00	
Standish, J. G.	" "	100 00	
McCoy, W	" "	150 00	
Baby, W. A. D	" "	115 48	
Weir, James	" "	134 50	
Gerald, W. H.	" "	150 00	
Gow, J. E.	" "	150 00	
Johnston, G. E	" "	100 00	
Keeler, G. S.	" "	100 00	
Mason, F	" "	100 00	
Goodman, A. W.	" "	100 00	
Caven, W.	" "	200 00	
Millier, E	" "	150 00	
Scullion, W. J.	" "	100 00	
Coleman, J. J	" "	150 00	
Lépine, L	" "	75 00	
Cameron, D. M	" "	200 00	
Iler, B.	" "	200 00	
Quinn, J. D.	" "	150 00	
Murray, A. S. E.	" "	100 00	
Walsh, D. J.	" "	119 00	
Foster, H	" "	100 00	
Marcon, F. E.	" "	99 99	
Malo, T	" "	100 00	
McFee, A. C	" "	100 00	
Dingman, N. J.	" "	200 00	
Irwin, R.	23rd August, 1898 "	69 02	
Spereman, J. J.	1st July, 1898, to 27th October, 1898	30 97	
Codd, H. J. S	1st January, 1899, to 30th June, 1899	25 00	
Moreau, Auguste.	10th January, 1899 "	43 80	
Traversy, F. X.	18th March, 1899 "	28 78	
Weyms, C.	23rd January, 1899 "	44 08	
Sexton, J.	1st July, 1898, to 17th March, 1899.	71 22	
	Total duty-pay		6,131 84
	Grand total		373,327 93
	ADD—Printing	4,106 44	
	Stationery	990 00	
	Lithographing	283 25	
			5,379 69

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1898-99—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	Statement No. 1—Concluded.	$ cts.	$ cts.
	Preventive Service :—		
	Salaries	2,537 46	
	Contingencies	10,582 97	
			13,120 43
	Authorized disbursements (less superannuation)		391,828 05
	ADD—Balances due to Collectors, 1st July, 1898	796 57	
	" by " 30th June, 1899	413 08	
			1,209 65
			393,037 70
	LESS—Balances due by Collectors, 1st July, 1898	438 08	
	" to " 30th June, 1899	747 25	
			1,185 33
	Actual disbursements agreeing with Statement No. 4, page 12		391,852 37

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 2.—DETAILS of Fees paid to Cullers for the Fiscal Year ended 30th June, 1899.

Office.	Articles.	Names of Cullers.	Amounts paid.	Totals.
			$ cts.	$ cts.
Quebec.....	Square timber	Bergeron, Joseph	700 00	
	" "	Frederick, Antoine.....	700 00	
	" "	Kelly, Edward..	700 00	
	" "	McKendry, Daniel	700 00	
	" "	McPeak, William.....	700 00	
	" "	O'Brien, Martin O.....	700 00	
		Total Fees paid to Cullers....	....	4,200 00

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 3.— DETAILS of Cullers' Expenditures for the Fiscal Year ended 30th June, 1899.

Office.	Names.	Nature of Service.	Deductions for		Amounts paid.	Totals.	Grand Totals.
			Retirement.	Superannuation.			
			$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
QUEBEC	Patton, James	Supervisor of Cullers for the year		42 00	2,058 00		
	Whelan, W. F	Specification Clerk		15 00	735 00		
	Gallagher, F	"		15 00	735 00		
	Bellerive, Geo	"		15 00	735 00		
	Harney, Thos	Book-keeper and Cashier		15 00	735 00		
	Croteau, J. M	Specification Clerk	18 72		731 28		
		Total salaries	18 72	102 00		5,729 28	
		Contingencies.					
	Foley, Mary	Charwoman			96 00		
	Duggan & Co., James	Night-watchman			35 00		
	Fitzgerald, Martin	Office boy			96 00		
	Harney, Thomas	Petty expenses			48 07		
	Post Office, Quebec	Rent of drawer			6 00		
	Hearn, John, Estate	Rent of office			625 00		
	Telephone Co., Bell	Rent of telephone			40 00		
	Rancour, Noël	Ice for season			15 00		
	Mulroney, W. J. & G.	Inks			4 30		
	Holmes, Margaret	General house-cleaning			43 00		
	Guérard, Louis	Placing double windows, &c			26 90		
	Turgeon, P. L	Soap, brooms, &c			9 56		
	Gas Co., Quebec	Gas consumed			29 41		
	Kane, J. R	Plumbing			27 43		
	Cotter, John	Telephoning			2 00		
	Canada Lumberman	Subscription to paper			1 00		
	Kelly, Edward	Expenses to Montreal			19 85		

Fitzgerald & Co., J.	*Removing snow, &c*	*18 00*		
Lemieux, Z.	*Locksmith*	*0 60*		
Chronicle Printing Co.	*Subscription to "Chronicle"*	*3 00*		
Arnold Thomas	*Cartage of snow*	*25 00*		
	Total contingencies		1,171 12	
	Cullers' expenses.			
Bergeron, Joseph	Expenses	64 89		
Frederick, Antoine	"	141 79		
Kelly, Edward	"	83 74		
McPeak, William	"	165 91		
McKindry, Daniel	"	146 36		
O'Brien, Martin	"	138 16		
	Total Cullers' expenses		740 85	
	Total expenditures			7,641 25
	Paid to retired Cullers.			
Jobin, Jacques	Superannuation	200 00		
Morrissette, Joseph	"	200 00		
Demers, Louis	"	200 00		
Dorval, Philippe	"	200 00		
Walsh, William	"	200 00		
Villeneuve, Jacques	"	200 00		
Bédard, Jérémie	"	200 00		
McNaughton, John	"	200 00		
Beaupré, Noël	"	200 00		
Frenette, Joseph	"	200 00		
Malone, James C.	"	200 00		
Duggan, Edward	"	200 00		
Gilchen, Thomas	"	200 00		
McInenly, Thomas	"	200 00		
Laflamme, Joseph	"	200 00		
Patry, Thomas	"	200 00		
Courchy, Charles	"	200 00		
Lynch, John	"	200 00		
Vachon, John B.	"	200 00		
Murphy, Thomas	"	200 00		
Demers, F. X.	"	200 00		
Munro, Willliam	"	200 00		
Malone, Thomas	"	200 00		

APPENDIX B.—No. 3.—Details of Cullers' Expenditures for the Fiscal Year ended 30th June, 1899—*Concluded.*

Office.	Names.	Nature of service.	Amounts paid.	Totals.	Grand Totals.
		Contingencies—Concluded.	$ cts.	$ cts.	$ cts.
QUEBEC—*Con.*	Dorval, George	Superannuation	200 00		
	Ferland, Pierre	"	200 00		
	Barsalo, E	"	200 00		
	McCormick, John	"	200 00		
	Morency, Denis	"	200 00		
		Total paid to retired Cullers			5,600 00
		Grand total			17,441 25
		ADD—Printing		2 26	
		Stationery		37 16	
					39 42
		Authorized disbursements (less—surperannuation)			17,480 67
		ADD—Balance due by Supervisor 30th June, 1898			75 00
					17,555 67
		LESS " 1st July, 1899			75 00
		Actual disbursements agreeing with Statement No. 8, page 18			17,480 67

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures for the Year ended 30th June, 1899.

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario.	$ cts.	$ cts.
Brantford	Murray, D	For his portion penalty collected from C. H. A. Lees		100 00
	Bell, J. E.	For his portion of seizure No. 41		50 00
	Spence, J.	To pay informer penalty in seizure No. 42	25 00	
		For his portion of seizure No. 42	9 28	
				34 28
	Floody, E.	" " 42		9 27
Cornwall	Mulhern, M. M.	To pay informer penalty in seizure No. 42	50 00	
		" " 44	5 00	
		" " 45	5 00	
		" " 46	25 00	
		For his portion of seizure No. 44	2 20	
		" " 45	2 45	
				89 65
	Floody, E.	" " 42		12 24
	Gerald, W. H.	" " 42		12 23
	Slattery, R.	" " 43		9 95
Guelph	Brain, A. F.	" penalty collected from A. Bauer		25 00
	Powell, J. B.	To pay informer penalty in seizure No. 88		50 00
	Floody, E.	For his portion of seizure No. 86		11 40
Hamilton	Miller, W. F.	" " 34		12 50
	Crawford, W. P.	" " 34		12 50
London	Alexander, T.	" " 53	3 50	
		" " 54	25 00	
		Po pay informer penalty in seizure No. 57	25 00	
		For his portion of seizure No. 59	1 75	
				55 25
	Floody, E.	" " 55	2 00	
		" " 56	2 05	
		" " 57	17 75	
				21 80
	Davis, T. G.	" " 53		3 50
	Foster, H.	" " 54		25 00
Ottawa	Costigan, H. A.	" " 139	4 60	
		" " 155	1 00	
		" " 156	0 88	
		" " 158	0 90	
		" " 160	0 66	
		" " 161	3 90	
		" " 162	1 53	
		" " 164	0 03	
		" " 169	1 46	
		" " 171	0 45	
		" " 172	4 83	
		" " 173	26 03	
		" " 174	2 71	
		" " 175	5 00	
		" penalty collected fr. F. Bloomfield	1 00	
		To pay informer penalty in seizure No. 150	50 00	
		" " 155	10 00	
		" " 156	2 50	
		" " 158	2 50	
		" " 160	2 50	
		" " 161	5 00	
		" " 168	5 00	
		" " 169	5 00	
		" " 170	5 00	
		" " 171	2 50	
		" " 173	37 50	
		" " 175	10 00	
		" " 179	10 00	
				202 48

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario—Continued.	$ cts.	$ cts.
Ottawa—*Con* ...	Casey, J.....	For his portion of seizure No. 140.....	3 02	
		" " 169.....	1 47	
				4 49
	Floody, E.....	" " 139	4 60	
		" penalty collected fr. F. Bloomfield	1 00	
				5 60
	Gerald, W. H.....	" seizure No. 148.....	... .	0 10
	Keiler, R. M.....	" " 148.....	.....	0 10
	Slattery, R..... ...	" " 140.....	3 03	
		" " 143.....	5 00	
		" " 146	5 00	
		" " 150	14 78	
		" " 155...	1 00	
		" " 156.....	0 87	
		" " 158.....	0 90	
		" " 160.....	0 65	
		" " 161.....	3 91	
		" " 162.....	1 53	
		" " 164.....	0 03	
		" " 168.....	4 65	
		" " 169.....	1 47	
		" " 171.....	0 45	
		" " 172.....	4 82	
		" " 173.....	26 04	
		" " 174.... ..	2 71	
		" " 175.....	5 00	
				81 84
Owen Sound...	Floody, E....	" " 31.....	.....	16 00
Peterborough..	Hall, J. J.....	" " 6..... ..	1 25	
		" " 7.	1 25	
		" " 8..	1 25	
		" " 11.....	1 25	
		" " 12.....	1 25	
				6 25
	Floody, E.....	For his portion of seizure No. 6.... ...	1 25	
		" " 7.....	1 25	
		" " 8.....	1 25	
		" " 9.....	1 25	
		" " 10	1 25	
		" " 11.....	1 25	
		" " 12.....	1 25	
		" " 13.....	1 50	
		" " 14.....	1 50	
		" " 15...	1 50	
		" " 16.....	2 50	
		" " 18	2 50	
		" " 19.....	20 22	
				38 47
	Cahill, T....	" " 9	1 25	
		" " 10.....	1 25	
				2 50
	Knowlson, J. B.....	" " 19.....	.....	20 22
Prescott.....	Dumbrille, J..	To pay informer penalty in seizure No. 36	47 50	
		" " 37	10 00	
				57 50
	Gerald, W. H	For his portion of seizure No. 31.....	7 30	
		" " 32...	21 71	
				29 01
	Keiler, R. M	" " 31	7 30	
		" " 32	21 71	
				29 01

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Continued.*

Divisions.	To whom paid	Service.	Amounts paid.	Totals.
		Ontario—*Continued.*	$ cts	$ cts.
St. Catharines..	Hesson, C. A..	To pay informer penalty in seizure No. 23	5 00	
		" " 24	5 00	
				10 00
	Floody, E.....	For his portion of seizure No. 20.....	.....	20 57
Stratford.....	Caven, A.....	" penalty collected from J. Groff	... .	6 25
		To pay informer "	.....	12 50
	Floody.....	For his portion of seizure No. 100	29 30	
		" penalty collected from J. Groff	6 25	
				35 55
Toronto.....	Stratton, W. C	To pay informer penalty in seizure No. 328	5 00	
		" " 333	25 00	
		" " 335	25 00	
		" " 336	25 00	
		" " 337	25 00	
		" " 338	25 00	
		" " 348½	25 00	
		" " 349	25 00	
		" " 350	7 50	
				187 50
	Floody, E.....	For his portion of seizure No. 328	5 00	
		" " 333	12 50	
		" " 335	19 79	
		" " 336	19 79	
		" " 337	19 79	
		" " 338	19 79	
		" " 348	2 50	
		" " 348½.....	12 50	
				111 66
	Cook, W. R	" " 330	.....	39 24
	Dick, J. W.....	" " 330	39 24	
		" " 348½.....	12 50	
				51 74
	Iler, B.....	" " 329	.....	25 00
	Coulter, A. E.....	" " 329	.....	25 00
	Westman, T.....	" " 333	.....	12 50
	Shanacy, M.....	" " 349	.....	8 90
	Franklin, H. R.....	To pay informer penalty in seizure No. 348		2 50
Windsor.....	Floody, E.....	For his portion of seizure No. 62	.....	3 60
		Quebec.		
Joliette.....	Curless, C...	For his portion of seizure No. 116.....	.....	1 92
	Watkins, J. A.....	" " 116.....	.....	1 91
Montreal.....	Lawlor, H.....	To pay informer penalty in seizure No. 926	25 00	
		" " 943	2 50	
		" " 947	5 00	
		" " 950	25 00	
		" " 954	25 00	
		" " 957	25 00	
		" " 958	50 00	
		" " 960	12 50	
		" " 962	75 00	
		" " 963	5 00	
		" " 964	5 00	
		" " 967	10 00	
		" " 968	5 00	
		" " 970	5 00	
		" " 976	2 50	
		" " 977	2 50	
		" " 978	5 00	
		" " 979	50 00	
		" " 982	5 00	

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Continued.	$ cts.	$ cts.
Montreal—*Con.*	Lawlor, H—*Con.*	To pay informer penalty in seizure No. 983	5 00	
		" " 988	50 00	
		" " 989	50 00	
		For his portion of seizure No. 893	10 22	
		" " 898	15 43	
		" " 905	16 59	
		" " 907	13 05	
		" " 926	12 70	
		" " 929	1 72	
		" " 936	26 72	
		" " 944	1 00	
		" " 970	4 02	
				546 45
	Gerald, W. H.	" " 935		0 19
	Courtney, J. M.	" " 864		13 37
	Toupin, F. X., J. A.	" " 864		13 38
	Fox, J. D.	" " 910		4 97
	Floody, E	" " 908		2 50
	Danis, A. D.	" " 839		0 12
	Bailey, J.	" " 839		0 12
	Kingsberry, W C.	" " 839		0 12
	Keiler, R. M.	" " 935		0 20
	O'Donnell, M.	" " 966		0 02
	Curless, C.	" " 856	25 00	
		" " 858	26 40	
		" " 859	25 63	
				77 03
	Warren, G. S.	" " 879	8 89	
		" " 895	2 21	
		" " 901	59 97	
		" " 934	2 59	
		" " 962	38 22	
				111 88
	Watkins, J. A.	" " 911	2 50	
		" " 913	3 32	
		" " 922	0 87	
		" " 924	12 40	
		" " 925	6 69	
		" " 928	25 00	
		" " 934	2 59	
		" " 947	5 75	
		" " 960	61 33	
		" " 962	38 21	
		" " 964	1 69	
		" " 966	0 03	
				160 38
	Comte, L. A. A. J.	" " 899	0 21	
		" " 911	2 50	
		" " 913	3 31	
		" " 919	12 56	
		" " 922	0 88	
		" " 924	12 40	
		" " 925	6 69	
		" " 927	0 57	
		" " 928	25 00	
		" " 950	8 33	
		" " 963	1 66	
		" " 964	1 69	
		" " 967	2 50	
		" " 968	5 15	
		" " 976	1 57	
		" " 978	2 12	
				87 14

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Continued.	$ cts.	$ cts.
Montreal—*Con.*	Brabant, J. B. G. N.	For his portion of seizure No. 879	8 89	
		" " 891	49 00	
		" " 892	25 50	
		" " 893	10 23	
		" " 895	2 22	
		" " 898	15 42	
		" " 899	0 21	
		" " 900	12 98	
		" " 901	59 98	
		" " 902	1 12	
		" " 903	2 57	
		" " 904	20 95	
		" " 905	16 58	
		" " 906	12 62	
		" " 907	13 05	
		" " 910	4 96	
		" " 912	2 60	
		" " 917	25 20	
		" " 926	12 70	
		" " 929	1 73	
		" " 946	0 10	
		" " 950	8 33	
		" " 954	15 32	
		" " 955	0 15	
		" " 956	0 21	
		" " 957	12 25	
		" " 958	30 43	
		" " 963	1 66	
		" " 964	1 69	
		" " 965	0 25	
		" " 967	2 50	
		" " 970	4 03	
		" " 976	1 57	
		" " 978	2 12	
		" " 979	20 94	
				400 06
	Cinq-Mars, A.	" " 895	2 22	
		" " 900	12 99	
		" " 902	1 13	
		" " 903	2 57	
		" " 904	20 95	
		" " 905	16 58	
		" " 906	12 63	
		" " 910	4 96	
		" " 912	2 60	
		" " 917	25 20	
		" " 929	1 73	
		" " 943	1 70	
		" " 946	0 10	
		" " 950	8 34	
		" " 954	15 33	
		" " 955	0 15	
		" " 956	0 22	
		" " 957	12 25	
		" " 958	30 42	
		" " 963	1 66	
		" " 964	1 70	
		" " 965	0 25	
		" " 967	2 50	
		" " 970	4 02	
		" " 976	1 56	

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898–99—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Continued.	$ cts.	$ cts.
Montreal—*Con.*	Cinq-Mars —*Con*....	For his portion of seizure No. 978.....	2 12	
		" " 979.....	20 94	
				206 82
Quebec.	LaRue, G	" " 420.....	.....	16 66
		To pay informer penalty in seizure No. 441	50 00	
		" " 442	50 00	
		" " 444	25 00	
		" " 445	25 00	
		" " 449	50 00	
		" " 454	1 50	
		" " 455	50 00	
		" " 462	10 00	
		" " 475	300 00	
		" " 481	125 00	
		" " 489	12 50	
				699 00
	Watkins, J. A	" " 401	....	0 46
	Simpson, A. F.....	" " 386	....	0 85
	Dupuis, J.....	" " 339	....	0 20
	LaRue, P.....	" " 339	....	0 20
	Dubé, P.....	" " 401	.. ..	0 47
	Bourget, O.....	For his portion of seizure No. 382.....	9 00	
		" " 395.....	31 08	
		" " 412.....	23 96	
		" " 420.....	16 66	
		" " 421.....	0 63	
		" " 423	21 50	
		" " 424	0 70	
		" " 437.....	12 62	
		" " 441.....	24 90	
		" " 442	11 62	
		" " 443..	13 02	
		" " 449.....	20 10	
		" " 450..... ...	4 04	
				189 83
	Trudel, E.	" " 382	9 00	
		" " 395.....	31 07	
		" " 412.....	23 97	
		" " 421.....	0 62	
		" " 423.....	21 50	
		" " 424.....	0 70	
		" " 437..... ...	12 63	
		" " 441.....	24 90	
		" " 442.....	11 63	
		" " 443.....	13 01	
		" " 449.....	20 10	
		" " 462..... .	16 10	
				185 23
	Bourassa, J.	" " 420.....	16 68	
		" " 431.....	12 50	
		" " 434	5 00	
		" " 450.....	4 03	
		" " 454.....	1 50	
				39 71
	Heeker, E.....	" " 425.....	... .	44 25
	Lépine, L.....	" " 443.....	.....	13 02
	Mercier, C. A..... .	" " 462.....	....	16 09
	Dubé, M.....	" " 435.....	....	25 00
	LeBel, W	" " 463.....	5 00	
		" " 470.....	3 75	
				8 75

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Continued.*

Division.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec - Continued.	$ cts.	$ cts.
Quebec—*Con* ..	Lambert, E. A	For his portion of seizure No. 438	36 19	
		" " 440	54 68	
		" " 444.....	45 46	
		" " 445	139 01	
				275 34
	Pelletier, N. G.....	" " 431.....	12 50	
		" " 435	30 88	
		" " 446.....	23 38	
		" " 447.....	103 47	
		" " 451.....	21 50	
		" " 452.....	21 25	
		" " 467.....	12 38	
		" " 468.....	71 50	
				296 86
	Cameron, D. M.....	" " 401.....	0 47	
		" " 414.....	13 11	
		" " 415.....	13 12	
		" " 416	13 12	
		" " 417	13 12	
				52 94
St. Hyacinthe .	Boivin, C. A.....	" " 66.....	43 30	
		" " 69.....	2 80	
				46 10
		To pay informer penalty in seizure No. 67	50 00	
		" " 69	7 50	
				57 50
	Simpson, A. F.....	For his portion of seizure No. 67	.....	52 15
Sherbrooke	Simpson, A. F	To pay informer pen. col. from N. A. Burke	25 00	
		" " C. Gilmour	25 00	
		" " J. G. Brochu	25 00	
		" " C. F. Bailey	32 50	
		" " E. L. Scott	25 00	
		" penalty in seizure No. 133	25 00	
		" " 135	25 00	
		" " 136	25 00	
		" " 138	25 00	
		" " 140	25 00	
		" " 141	25 00	
		" " 157	25 00	
		" " 159	25 00	
		" " 160	25 00	
		" " 163	25 00	
		" " 164	25 00	
		" " 165	75 00	
		" " 169	5 00	
		" " 170	25 00	
		" " 171	55 00	
		" " 174	25 00	
		" " 176	50 00	
		" " 177	50 00	
		" " 180	100 00	
		" " 181	25 00	
		" " 182	25 00	
		" " 184	25 00	
		" " 185	12 50	
		" " 186	25 00	
		" " 187	25 00	
				930 00
		For his portion of seizure No. 117	0 88	
		" " 121.....	17 47	
		" " 127.....	25 00	

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1897-98—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Continued.	$ cts.	$ cts.
Sherbrooke—*Con*	Simpson, A. F—*Con.*	For his portion of seizure No. 128	46 59	
		" " 129	52 65	
		" " 130	23 52	
		" " 131	44 13	
		" " 132	22 00	
		" " 143	24 09	
		" " 146	12 33	
		" " 147	11 60	
		" " 148	25 00	
		" pen. col. from L. Hébert	25 00	
		" seizure No. 149	21 59	
		" " 150	23 30	
		" " 151	29 33	
		" " 152	13 45	
		" " 154	99 20	
		" " 155	27 59	
		" " 156	22 57	
		" " 160	21 78	
		" " 163	25 97	
		" " 164	22 65	
		" " 165	79 21	
		" " 170	21 47	
		" " 171	53 97	
		" " 174	24 72	
		" " 176	51 13	
		" " 177	45 82	
		" " 181	28 10	
		" " 182	20 15	
		" pen. col. from G. W. Ballentyne	25 00	
		" " N. Burke	25 00	
		" " C. Gilmour	25 00	
		" " J. G. Brochu	25 00	
		" " H. Hunt	25 00	
		" " C. F. Bailey	32 50	
				1,119 76
	Chartier, E.	" seizure No. 159	.....	12 95
	Brabant, J. B. G. N.	" " 142	0 24	
		" " 145	8 25	
				8 49
	Cinq-Mars, A.	" " 142	0 24	
		" " 145	8 25	
				8 49
	Bowen, F. C.	" " 146	12 34	
		" " 147	11 60	
		" " 159	12 95	
		" " 180	155 06	
				191 95
Terrebonne	Brabant, J. B. G. N.	" " 55	31 60	
		" " 56	8 69	
		" " 60	3 50	
		" " 61	14 82	
				58 61
	Cinq-Mars, A.	" " 60	3 50	
		" " 61	14 82	
				18 32
	Comte, L. A. A. J.	" " 61	.....	14 82
Three Rivers.	Hébert, C. D.	To pay informer penalty in seizure No. 108	5 00	
		" " 109	2 50	
		" " 110	2 50	
				10 00
	Duplessis, C.	For his portion of seizure No. 108	.....	1 50

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		New Brunswick.	$ cts.	$ cts.
St. John.	Atherton, R.... ...	To pay informer penalty in seizure No. 11	0 25	
		" " 87	2 50	
				2 75
	Floody, E	For his portion of seizure No. 68.....	3 75	
		" " 70.....	3 75	
		" " 80.....	2 75	
		" " 81.....	2 75	
		" " 82... ...	2 75	
				15 75
	Vandine, Don.....	" " 92	5 75	
		" " 93.....	1 75	
				7 50
	Curless, C.....	" " 64.....	....	4 50
		Nova Scotia.		
Cape Breton...	McDonald, M. A....	To pay informer penalty in seizure No. 58	.....	25 00
		For his portion of seizure No. 52... ..	55 65	
		" " 58.....	41 40	
		" " 64	2 50	
				99 55
Halifax.....	Grant, H. H..	" " 164.....	.. ..	89 60
		To pay informer penalty in seizure No. 166	50 00	
		" " 172	100 00	
				150 00
	Tompkins, P.....	For his portion of seizure No. 161.... ...	.....	50 00
Pictou.....	Fraser, P.....	" " 62.....	2 50	
		" " 63	2 50	
		" " 64.....	2 50	
				7 50
		Manitoba.		
Winnipeg.....	Gosnell, T. S..	To pay informer penalty in seizure No. 46	50 00	
		" " 58	100 00	
		" " 59	25 00	
		" " 60	25 00	
				200 00
	Christie, W. J.....	For his portion of seizure No 53.....	.....	1 75
		" " 47...	0 55	
		" " 48	6 00	
		" " 49.....	6 00	
				12 55
	Verner, J. H.....	" " 48.....	6 00	
		" " 49.....	6 00	
				12 00
	Barrett, J. K.... ..	" " 52.... ...	21 35	
		" " 53.....	1 75	
				23 10
	Costigan. H. A.....	" " 46.....	... .	50 00
		British Columbia.		
Vancouver.....	Miller, J. E.....	To pay informer penalty in seizure No. 13	25 00	
		" " 14	25 00	
		" " 15	25 00	
				75 00
		For his portion of seizure No. 8	31 70	
		" " 10..... .	10 89	
		" " 13.....	26 18	

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1898-99—*Concluded.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		British Columbia—Concluded.	$ cts.	$ cts.
Vancouver—*Con.*	Miller, J. E.—*Con.*	For his portion of seizure No. 14	32 50	
		" " 15	34 50	
				135 68
	Stewart, A. K.	" " 11	25 75	
		" " 12	25 75	
				51 50
	Lawlor, H.	To pay informer penalty in seizure No. 8		31 70
Victoria	Jones, R.	" " 20	12 50	
		" " 21	12 50	
		" " 25	12 50	
		" " 26	12 50	
				50 00
		For his share of seizure No. 19	10 75	
		" " 20	6 50	
		" " 21	6 25	
		" " 22	0 75	
				24 25
	Ridgman, A. H.	" " 24		93 90
	Henwood, G.	" " 19	10 75	
		" " 20	6 50	
		" " 21	6 25	
		" " 22	0 75	
		" " 25	5 00	29 25
		Grand total		8,847 56

RECAPITULATION.

Ontario	$ 1,580 65
Quebec	6,024 08
New Brunswick	30 50
Nova Scotia	421 65
Manitoba	299 40
British Columbia	491 28
Total	$ 8,847 56

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 5.—DETAILS of Sundry Minor Expenditures for the Fiscal Year ended 30th June, 1899.

To whom paid.	Service.	Amounts paid.	Totals.
	MINOR REVENUES.	$ cts.	$ cts.
Williams, C. James....	Advertising in "The Watchman," Arnprior, for tenders for McNab's Ferry	5 76	
Meredith, W. H.. . .	Advertising in "The Pontiac Advance," Quyon, for tenders for McNab's Ferry	7 20	
"Le Temps".... ...	Advertising for tenders for Ottawa to Kettle Island..	7 40	
"Ottawa Free Press"..	" " "	11 00	
Meredith, W. H... ...	Advertising for tenders in "The Pontiac Advance," Quyon, for Portage du Fort and Gould's Landing Ferry	4 50	
"The Pembroke Observer".....	Advertising for tenders for Portage du Fort and Gould's Landing Ferry	4 00	
			39 86
	LAW COSTS.		
Ross, W. B	Law costs in *re* Regina vs. Archibald	8 65	
Cowper, T. D	Professional services *re* Kirkland's lease Queenston's Ferry	25 00	
			33 65
	Total		73 51
	INSPECTION OF STAPLES.		
Roy, Georges.....	Salary as Chief Inspector of Hides, from 1st July, 1898, to 30th June, 1899	1,500 00	
"	Travelling and other expenses in connection with raw hides inspection	78 52	
Wills, E. A., Secretary Board of Trade, Toronto	Expenses of Board meetings to determine the standards of grain	709 12	
Bell, C. N., Secretary Board of Trade, Winnipeg..	Expenses of Board meetings to determine the standards of grain... ... $2,184 65		
Hadrill, G., Secretary Board of Trade, Montreal.....	LESS—Proceeds from sale of grain. 174 65	2,010 00	
	Expenses of Board meetings to determine the standards of grain	429 80	
Lawlor, H.....	Express charges on samples of flour	32 76	
Bryson, Graham & Co..	18 glass covered jars for grain standards.	9 75	
Holland Bros....	Reporting wheat inspection delegation, 5 copies, 306 folios at 30c	91 80	
Gibbs, Frank E...	Expenses to Ottawa *re* change in Grain Inspection Act (as representative)	36 50	
Castle, C. N	Expenses to Ottawa *re* change in Grain Inspection Act (as representative of the Western Grain Standards Board)	175 80	
		5,074 05	
	LESS—Proceeds from sale of grain by H. H. Grant	6 56	
	Total		5,067 49

APPENDIX B—*Continued.*

No. 5.—DETAILS of Sundry Minor Expenditures, 1898–99—*Continued.*

To whom paid.	Service.	Deductions for Superannuation.	Amounts paid.	Totals.
	ADULTERATION OF FOOD.		$ cts.	$ cts.
Macfarlane, Thomas	Salary as Chief Analyst for the year	$49 28	2,417 36	
McGill, A	" Assistant Analyst for the year	36 00	1,764 00	
Tourchot, A. L. J	" 2nd " "		1,199 98	
Watson, James	" Clerk in laboratory "		949 96	
Tyrell, M. J	" Clerk in laboratory, from 1st Aug., 1898, to 30th June, 1899		504 13	
Lévesque, H	" Messenger in laboratory for the year		329 83	
Watson, Jas	" Food Inspector for the year		200 00	
Kidd, Thomas	" " "		500 00	
Costigan, J. J	" " "	5 00	245 00	
Ferguson, J. C	" " "	3 00	147 00	
Waugh, Richard J	" " "		300 00	
Conklin, E	Salary as Food Inspector, from 1st Oct., 1898 to 31st Jan., 1899		66 64	
Saucier, X	Salary as Food Inspector, from 1st July, 1898, to 30th Sept., 1898, and from 1st Feb., 1899, to 30th June, 1899	2 64	130 64	
	Total salaries	98 92		8,754 54
	Contingencies.			
Macfarlane, Thos	Travelling and other expenses		941 85	
Alexander, T	" "		4 65	
Watson, J	" "		660 99	
Kidd, Thomas	" "		442 25	
Costigan, J. J	" "		395 20	
Ferguson, J. C	" "		154 51	
Waugh, R. J	" "		94 83	
Saucier, X	" "		93 46	
Parkinson, E. B	" "		13 00	
				2,800 74
Bowman, M	Allowance under the Act for retaining fees		200 00	
	" " rent		100 00	
	" " materials used in analysis		100 00	
	Fees for analysis		648 25	
				1,048 25
Ellis, W. H	Allowance under the Act for retaining fees		200 00	
	" " rent		100 00	
	" " materials used in analysis		100 00	
	Fees for analysis		974 66	
				1,374 66
Kenrick, E. B	Allowance under the Act for retaining fees		200 00	
	" " rent		100 00	
	" materials used in analysis		100 00	
	Fees for analysis		562 00	
	Travelling expenses		38 40	
				1,000 40
Valade, F. X	Allowance under the Act for retaining fees		200 00	
	" " rent		100 00	
	" " materials used in analysis		100 00	
	Fees for analysis		864 00	
				1,264 00
Harrison, F. T.	Allowance under the Act for retaining fees		200 00	
	" " materials used in analysis		100 00	
	Fees for analysis		1,011 00	
				1,311 00
Fiset, M.	Allowance under the Act for retaining fees		200 00	
	" " materials used in analysis		100 00	
	Fees for analysis		956 00	
				1,256 00

APPENDIX B—*Continued.*

No. 5.—DETAILS of Sundry Minor Expenditures, 1898-99.—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	ADULTERATION OF FOOD—*Concluded.*	$ cts.	$ cts.
	Contingencies.		
Fagan, C. J.	Allowance under the Act for retaining fees	200 00	
	" " rent	50 00	
	" " materials used in analysis	50 00	
	Fees for analysis	120 00	
			420 00
Edwards, J. B.	Allowance under the Act for retaining fees	200 00	
	" " rent	8 33	
	" " materials used in analysis	100 00	
	Fees for analysis	1,201 42	
		1,509 75	
	LESS—Paid Miss Tyrell's salary for month of July, 1898 $ 45 83		
	Paid A. C. McFarlane's salary from Sept. 1, 1898, to April 1, 1899 450 00		
	Paid Montreal Gas Co. for gas supply in laboratory 13 70		
		509 53	
			1,000 22
Tyrell, Miss M. J	Services assisting J. B. Edwards for month of July, 1898	45 83	
Macfarlane, A. C	" " from Sept. 1, 1898, to April 1, 1899	450 00	
Wright, Miss S. E.	" in laboratory, Ottawa, for the year	500 00	
Whitehead, Mrs. J.	" cleaning instruments, sample bottles, &c., for the year	154 50	
Potvin, Napoléon	Sundry petty expenses, freight, &c	176 16	
Gooderham & Worts	Spirits for laboratory	48 81	
Bailey, G	Material supplied and work done	213 05	
Toronto Electric Light Co	Difference paid on exchange of motor	35 00	
Butterworth & Co.	Materials supplied and work performed for laboratory	24 09	
Eimer & Amend	Chemical apparatus and materials for laboratory	422 88	
Lyman, Sons & Co.	Chemicals, &c., supplied to laboratory	95 60	
Fries Bros	" "	1 47	
Merck, C	" "	31 85	
Montreal Gas Co.	Gas supplied to J. B. Edwards	13 70	
Murphy, John, & Co.	Good supplied to laboratory	11 82	
Skinner, J. & Co.	Chemicals, &c., supplied to laboratory	89 80	
Mitchell & Co.	Goods for laboratory	38 55	
The Capital Ice Co.	Ice supplied from Oct. 1, 1898, to May 31, 1899	12 00	
Graves Bros	Locks, &c	0 88	
Park, Davis & Co	Chemicals, &c., supplied to laboratory	19 68	
Leeming, Miles & Co.	Olive oil	2 25	
Pardee, F. F	Disbursements in *re* Regina *vs.* Gowanlock & Gannon	5 00	
Weir, R. S	Professional services in *re* Regina *vs.* P. Massicotte	22 90	
	" " Nantel	20 00	
	" " Dupuis & frères	22 90	
Hibbard, F. W	" " Boileau	10 00	
	Total adulteration of food expenditure		22,698 53
	LESS—Sale of apparatus to the Marine Biological Laboratory and to other persons, also analyst's supplies to sundry persons, &c		66 55
			22,631 98
	Grand total		27,772 98

APPENDIX B—*Continued.*

No. 5.—DETAILS of Sundry Minor Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	MINOR EXPENDITURES—*Concluded.*	$ cts.	$ cts.
	ADD—Printing	260 95	
	Stationery	174 17	
			435 12
	Authorised disbursements (less superannuation)		28,208 10
	LESS—Balances due by Food Inspectors, July 1, 1898		25 91
			28,182 19
	ADD—Balances due by Food Inspector, July 1, 1899		25 81
	Actual disbursements agreeing with statement No. 12, page 21		28,208 00

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B.—*Continued.*

No. 6.—DETAILS of Departmental Expenditures for the Year ended 30th June, 1899.

Names.	Rank.	Period.	Deductions for Superannuation.	Amounts paid.	Totals.
			$ cts.	$ cts.	$ cts.
Sir Henri G. Joly de Lotbinière	Minister	For the year		7,000 00	
Miall, E.	Commissioner	"	64 00	3,136 00	
Gerald, W. J	Assistant Commissioner and Chief Inspector	"	60 00	2,940 00	
Himsworth, W.	Chief Clerk and Secretary	"	48 00	2,352 00	
Campeau, F. R. E.	Chief Clerk and Chief Accountant	"	40 00	1,960 00	
Hall, C. R.	Assistant Accountant	"	36 00	1,764 00	
Valin, J. E.	Accountant's Branch Clerk	"	36 00	1,764 00	
Carter, Wm.	Assistant Secretary	"	36 00	1,764 00	
Heron, W. L.	Statistical Clerk, Accountant's Branch	From July 1, '98, to March 31, '99	27 00	1,323 00	
Shaw, J. F.	Chief Statistical Clerk, Accountant's Branch	For the year	29 00	1,421 00	
Doyon, J. A.	Weights and Measures Clerk, Accountant's Branch	"	28 00	1,372 00	
Blatch, F. K.	Clerk of Supplies, Secretary's Branch	"	28 00	1,372 00	
Newby, F.	Secretary's Branch Clerk	"	28 00	1,372 00	
Byrnes, Jno.	Accountant's Branch Clerk	"	28 00	1,372 00	
Quain, R.	" "	"	28 00	1,372 00	
Fowler, G.	Stamp Clerk, Secretary's Branch	"	28 00	1,372 00	
Dunne, J. P.	Accountant's Branch Clerk	"	27 00	1,323 00	
Burns, John	Weights and Measures Clerk, Accountant's Branch	"	27 00	1,323 00	
Winter, C. F.	Second Class Clerk	"	23 00	1,127 00	
LeBel, J. A. W.	Secretary's Branch Clerk	"	38 50	1,061 50	
Hughes, P. A.	Accountant's Branch Clerk	"	38 50	1,061 50	
Hudon, L. E.	Statistical Clerk, Accountant's Branch	"	38 50	1,061 50	
McCullough, A.	Secretary's Branch Clerk	"	13 10	641 90	
Clément, A.	Private Secretary	From July 1, '98, to Oct. 31, '98		200 00	
Bouchette, R. Errol	"	From Nov. 1, '98, to June 30, '99		400 00	
Halliday, W. A.	Accountant's Branch Clerk	For the year	16 50	533 50	
Potvin, Napoléon	Messenger	"	13 80	446 20	
Yetts, R. P.	"	"	10 80	349 20	
	Total Salaries		790 70		43,184 30

APPENDIX B—*Continued.*

No. 6.—DETAILS of Departmental Expenditures, 1898-99—*Continued.*

Names.	Service.	Amounts paid.	Totals.
	Contingencies.	$ cts.	$ cts.
Hagerty, Miss B	Extra clerk for the year	394 52	
Lawless, Miss E. M	" "	414 96	
Robillard, G. A	" "	365 52	
Sullivan, Miss M.	Clerical assistance from August 8, 1898, to February 7, 1899	200 00	
Clément, A	Private Secretary, services for fiscal year to June 30, 1898	300 00	
"	Travelling expenses	25 00	
Campeau, F. R. E.	"	115 50	
Doyon, J. A.	"	78 00	
Himsworth, Wm.	"	42 65	
Postmaster	Postage	25 43	
The Bell Telephone Co.	Telephone messages	30 70	
C. P. R. Telegraph Co.	Telegraph account	248 66	
G. N.W. "	"	210 15	
Controller of Stationery	Stationery	818 35	
" "	Parliamentary publications	69 29	
" "	Books	137 05	
Queen's Printer	Printing	1,081 12	
"	Lithographing	89 86	
Manley, H.	Picture (international group, framed)	8 00	
Sproule, W. H. & Co.	Repairing clocks, &c	5 75	
Jones, Yarrell & Poulter, London, Eng.	Subscription	40 87	
Griswold, Kate E., Boston, Mass.	"	1 00	
Mail & Empire, Toronto	"	11 17	
Le Prix Courant, Montreal	"	1 50	
The Star "	"	12 00	
L'Ouest Canadien, Edmonton	"	1 00	
Le Soleil, Quebec	"	17 76	
Saturday Night, Toronto	"	12 00	
The Electric World, New York	"	3 00	
Le Canada Francais, St. Jean	"	1 25	
Morning Chronicle, Quebec	"	6 00	
The Journal, St. Catharines	"	3 00	
Bulletin des Recherches Historiques, Lévis	"	4 00	
The Catholic Record, London	"	2 00	
The Globe, Toronto	"	12 00	
Progrès de L'Est, Sherbrooke	"	2 00	
The Tribune, Winnipeg	"	4 00	
La Presse, Montreal	"	6 00	
Le Temps, Ottawa	"	3 00	
Canadian Mining Review, Ottawa	"	6 00	
La Patrie, Montreal	"	9 00	
Canadian Gazette, London, Eng.	"	8 76	
Le Progrès, Windsor	"	1 50	
Daily Witness, Montreal	"	12 00	
Commercial and Financial Chronicle, New York	"	10 00	
Farmers' Advocate, London	"	1 00	
The Journal, Ottawa	"	12 00	
" Paper Trade Journal, New York	"	4 00	
" Gazette, Montreal	"	18 00	
" Free Press, Ottawa	"	12 00	
" Herald, Montreal	"	24 00	
" Scientific American and Supplement, New York	"	7 89	
" Acadian Recorder, Halifax	"	6 25	
" Citizen, Ottawa	"	30 00	
La Minerve, Montreal	"	7 76	
The Times, Hamilton	"	6 00	
Brampton Times, Brampton	"	3 00	

APPENDIX B—*Continued.*

No. 6.—DETAILS of Departmental Expenditures, 1898-99—*Concluded.*

Names.	Service.	Amounts paid.	Totals.
	Contingencies.	$ cts.	$ cts.
L'Echo de Montmagny	Subscription	1 00	
The Spectator, Hamilton	"	18 00	
Canadian Express Company	Freight	4 50	
Dominion "	"	1 50	
Storr, A. M.	Cartage	84 25	
Batterton, T.	Cab hire	22 00	
Maveity, Mrs. S.	Washing towels	60 00	
Bryson, Graham & Co	Sundries for department	6 61	
Payment, T.	" "	16 75	
Dupont, J. C.	" "	6 20	
Sproule, W. H.	" "	4 00	
Potvin, Napoléon	Sundry petty expenses	14 60	
	Total departmental contingencies		5,222 63
	Authorized disbursements (less superannuation)		48,406 93
	ADD—Balance due June 30, 1899		16 66
			48,423 59
	LESS—Balance due July 1, 1898		16 66
	Actual disbursements agreeing with Statement No. 17, page 40		48,406 93

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 7.—DETAILS of Weights and Measures Expenditures for the Year ended 30th June, 1899.

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.
Johnson, W	Salary as Inspector for year		24 00	1,176 00	
Slattery, T	" Mechanical Inspector for year		13 96	686 04	
Irwin, S	" Assistant " "		13 96	686 04	
Behan, J. J	" " " "			600 00	
Errett, R. W	" " " "			199 92	
	Salaries		51 92	3,348 00	
	Contingencies			2,009 43	
					5,357 43
	Hamilton.				
Freed, A. T	Salary as Inspector for year			1,399 92	
McDonald, J	" Assistant Inspector for year		16 04	783 96	
Marentette, A	" " "		16 04	783 96	
Fitzgerald, E. W	" " "			750 00	
Laidman, R. H	" " "			699 96	
Wheatley, A. E	" " "			649 92	
Jarvis, Henry	" " "			499 92	
	Salaries		32 08	5,567 64	
	Contingencies			1,362 91	
					6,930 55
	Ottawa.				
Macdonald, J. A	Salary as Inspector for year			1,200 00	
Breen, J	" Assistant Inspector for year			600 00	
Windsor, J. A	" " "			600 00	
McFarlane, J., sen.	" " "		7 04	552 96	
Elliott, T. H	" " "			483 18	
	Insurance	41 76			
	Salaries	41 76	7 04	3,436 14	
	Contingencies			1,274 85	
					4,710 99
	Toronto.				
Piper, H	Salary as Inspector for year		25 96	1,274 04	
Milligan, R. J	" "			750 00	
Wright, R. J	" "		15 00	735 00	
Murdoch, Jas	" "			499 92	
Smith, J. C	" " from Dec. 22 to June 30			316 10	
	Salaries		40 96	3,575 06	
	Contingencies			1,144 10	
					4,719 16
	Windsor.				
Hayward, W. J	Salary as Inspector for year		24 00	1,176 00	
Coughlin, D	" Mechanical Inspector for year			799 92	
Thomas, J. S	" Assistant " "			799 92	
Hughes, R. A	" " " "			649 92	
	Salaries		24 00	3,425 76	
	Contingencies			1,154 92	
					4,580 68

APPENDIX B—*Continued.*

No. 7.—DETAILS of Weights and Measures Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Montreal.	$ cts.	$ cts.	$ cts.	$ cts.
Chalus, J. O.	Salary as Inspector for year		31 96	1,568 04	
Daoust, J. A	" Assistant Inspector for year		16 04	783 96	
Gervais, S.	" " "		16 04	783 96	
Hébert, J. A. P.	" " "			799 92	
Langlois, J. H.	" " "			799 92	
Baker, J. S.	" " "			699 96	
Dessert, V.	" " "			600 00	
Tomlinson, W. M.	" " "			600 00	
Fournier, L. A	" " "			499 92	
	Salaries		64 04	7,135 68	
	Contingencies			1,878 64	
					9,014 32
	Quebec.				
Guay, G. N.	Salary as Inspector for year			999 96	
Kelly, M. J	" Assistant Inspector for year		23 96	737 76	
	(Insurance	38 28			
Pinhey, H.	" Mechanical Inspector for year			600 00	
Chabot, F. X.	" Assistant " "		12 00	588 00	
Guay, A.	" " " "			600 00	
Petit, J. B	" " " "		6 32	493 68	
Moreau, J. A.	" Caretaker "		6 00	294 00	
	Salaries	38 28	48 28	4,313 40	
	Contingencies			1,447 51	
					5,760 91
	Three Rivers.				
Gravel, A. I.	Salary as Inspector for year			799 92	
Provost, J. J	" Assistant Inspector for year	17 50	6 96	675 54	
	Salaries	17 50	6 96	1,475 46	
	Contingencies			267 01	
					1,742 47
	St. John.				
Wilmot, J. B	Salary as Inspector for year		24 00	1,176 00	
Cowan, E.	" Assistant Inspector for year		13 96	686 04	
Richard, D.	" " "		12 00	588 00	
	Salaries		49 96	2,450 04	
	Contingencies			326 38	
					2,776 42
	Cape Breton.				
Lawrence, Geo. C.	Salary as Inspector from Nov. 2 to June 30			531 06	
	Contingencies			298 63	
					829 69
	Halifax.				
Frame, A.	Salary as Inspector for year			999 96	
Waugh, R. J.	" Assistant Inspector for year			600 00	
	Salaries			1,599 96	
	Contingencies			605 87	
					2,205 83

APPENDIX B—*Continued.*

No. 7.—DETAILS of Weights and Measures Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund, &c.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Pictou.	$ cts.	$ cts.	$ cts.	$ cts.
Dustan, W. M.....	Salary as Inspector for year.....	.....	19 96	980 04	
Chisholm, J. J.....	" Assistant Inspector for year...	.....	.....	600 00	
	Salaries.....	.....	19 96	1,580 04	
	Contingencies.....	.....	.....	563 39	
					2,143 43
	Charlottetown.				
Davy, E.....	Salary as Inspector for year.....	.....	.....	900 00	
Hughes, H.....	" Assistant Inspector for year....	.....	.....	600 00	
	Salaries.....	.....	.....	1,500 00	
	Contingencies.....	.....	.....	197 75	
					1,697 75
	Winnipeg.				
Magness, Robt.....	Salary as Inspector for year	.....	.....	1,374 92	
McDonald, A. W..	" Assistant Inspector for year ..	.....	.....	600 00	
Girdlestone, R.J.M.	" " "	.....	4 04	195 96	
Francis, G. M.....	" " " ...	.....	.....	499 92	
Ross, H. E.....	" " "	.....	.....	99 96	
	Salaries.....	.....	4 04	2,770 76	
	Contingencies.....	.....	.....	1,767 25	
					4,538 01
	Calgary.				
Thomas, P.....	Salary as Inspector from Dec. 17 to June 30	.....	.....	108 02	
Costello, J. W.	" Assistant Inspector.....	.....	13 96	686 04	
	Salaries.....	.....	13 96	794 06	
	Contingencies.....	.....	.....	145 35	
					939 41
	Victoria.				
Findley, Hugh.....	Salary as Inspector for year.....	.....	.....	799 92	
McAloney, J. A....	" Assistant Inspector for year....	.....	.....	349 92	
	Salaries.....	.....	.....	1,149 84	
	Contingencies	.....	.....	1,007 60	
					2,157 44
	General.				
Miall, E...	Salary as Commissioner of Standards for the year.....	.....	16 00	....	784 00
Higman, O.....	Contingencies	.....	.....	....	122 42

APPENDIX B—*Continued.*

No. 7.—DETAILS of Weights and Measures Expenditures, 1898-99—*Concluded.*

To whom paid.	Service.	Amounts paid.	Total amounts paid.
	General Contingencies.	$ cts.	$ cts.
Burgess, T. H.	Services as mechanical assistant from 1st July, 1898, to 1st June, 1899	733 26	
Bernard, F. X.	Services as clerk from 17th March, 1899, to 10th June, 1899, 74 days at $1.25	92 50	
Graves Bros.	Nails, screws, locks, &c	9 40	
Bailey, Geo.	Steel clamps, hand vice, &c	40 05	
The "Free Press"	50 circulars *re* metric system	4 50	
Dominion Plating Works	Nickel plating scales	10 00	
Harris & Campbell	19 wooden shelves	15 60	
McFarlane, J.	Nickel plating scales	2 50	
Pritchard & Andrews Co	Punches, model dater, &c	44 91	
Parr, J. A.	Lumber	8 75	
Carson, H. L.	12 leather weights and measures bags	33 00	
Potvin, Napoléon	Petty expenses	17 68	
Havez, Vve. L.	Advance on account of 12 setts of metric system supplies	250 00	
Macdonald, E. M.	Expenses collecting inspection fees from Dr. D. W. McKenzie	6 06	
British American Bank Note Co.	To pay for stamps and labels supplied	62 31	
American Bank Note Co.	" " "	330 00	
			1,660 52
	Law Costs.		
Plewes, David	Expenses drawing up agreement *re* violation of Weights and Measures Act in sale of rennet		6 00
Fraser, O. K.	Expenses drawing up undertaking of D. Derbyshire		7 00
Gouin, Lomer	Law costs *in re* Regina *vs.* Laverty	10 00	
"	" Regina *vs.* A. Brisson	25 00	
			35 00
Macdiarmid, W.	Law costs *in re* Daniel Coughlin's investigation		49 85
Clute & Williams	Professional services in charges pending for illegal possession of spring balance		5 50
	Total general contingencies		1,763 87
	Grand total		62,774 78
	Add—Printing	381 21	
	Stationery	557 56	
	Lithographing	6 72	
			945 49
	Authorized disbursements (less superannuation)		63,720 27
	Add—Old balances due by Inspectors, 1st July, 1898		193 26
			63,913 53
	Less—Balances due by Inspectors, 1st July, 1898	15 00	
	" to " 30th June, 1899	538 70	
	Old balances due by Inspectors, 30th June, 1899	193 26	
			746 96
	Actual disbursements agreeing with Statement No. 20 (A), page 46		63,166 57

E. MIALL,
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INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 8.—DETAILS of Gas Inspection Expenditures for the year ended 30th June, 1899.

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Barrie.	$ cts.	$ cts.	$ cts.	$ cts.
Shanacy, M	Salary as Inspector for year		2 00	98 00	
	Contingencies			1 85	
					99 85
	Belleville.				
Johnson, W	Salary as Inspector for year		4 96	245 04	
McRae, W. D	" Assistant Inspector from Feb. 13 to June 30			38 08	
	Salaries		4 96	283 12	
	Contingencies			209 53	
					492 65
	Berlin.				
Lynes, K	Salary as Inspector for year		2 00	98 00	
	Contingencies			27 62	
					125 62
	Brockville.				
Johnston, C. W	Contingencies				111 54
	Cobourg.				
Bickle, J. W	Salary as Inspector for year		2 00	98 00	
	Contingencies			57 75	
					155 75
	Cornwall.				
Mulhern, M. M	Salary as Inspector for year		2 00	98 00	
	Contingencies			50 00	
					148 00
	Guelph.				
Broadfoot, S	Salary as Inspector for year		2 00	98 00	
	Contingencies			22 85	
					120 85
	Hamilton.				
McPhie, D	Salary as Inspector for year		31 96	1,568 04	
Dennis, W. A	" Assistant Inspector for year			99 96	
	Salaries		31 96	1,668 00	
	Contingencies			168 50	
					1,836 50
	Kingston.				
Behan, J. J	Salary as Inspector for year			399 96	
	Contingencies			97 29	
					497 25

APPENDIX B—*Continued.*

No. 8.—DETAILS of Gas Inspection Expenditures, 1898-99.—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Listowel.	$ cts.	$ cts.	$ cts.	$ cts.
Male, Thos.	Salary as Inspector for year			99 96	
	Contingencies			90 51	
					190 47
	London.				
Williams, J.	Salary as Inspector for year		20 00	980 00	
	Contingencies			432 05	
					1,412 05
	Napanee.				
Johnson, W. (acting)	Contingencies				10 45
	Ottawa.				
Roche, H. G.	Salary as Inspector for year			900 00	
	Contingencies			557 40	
					1,457 40
	Owen Sound.				
Graham, W. J.	Salary as Inspector for year		4 00	196 00	
	Contingencies			125 00	
					321 00
	Peterborough.				
Cahill, T	Salary as Inspector for year		4 00	196 00	
	Contingencies			10 55	
					206 55
	Sarnia.				
Hicks, W. H.	Contingencies				21 00
	Stratford.				
Rennie, G.	Salary as Inspector for year		4 00	196 00	
	Contingencies			14 50	
					210 50
	Toronto.				
Johnstone, J. K.	Salary as Inspector for year		28 04	1,371 96	
Pape, Jas.	" Assistant Inspector for year			799 92	
	Salaries		28 04	2,171 88	
	Contingencies			48 39	
					2,220 27
	Montreal.				
Aubin, A.	Salary as Inspector for year			1,399 92	
O'Flaherty, M. J.	" Assistant Inspector for year			799 92	
	Salaries			2,199 84	
	Contingencies			850 75	
					3,050 59

APPENDIX B—*Continued.*

No. 8.—DETAILS of Gas Inspection Expenditures, 1898-99—*Continued.*

To whom paid.	Service.	Deductions for Retirement Fund.	Deductions for Superannuation.	Amounts paid.	Total amounts paid.
	Quebec.	$ cts.	$ cts.	$ cts.	$ cts.
Le Vasseur, N...	Salary as Inspector for year		19 96	980 04	
Moreau, J. A....	" Caretaker		6 00	294 00	
	Salaries		25 96	1,274 04	
	Contingencies			172 76	
					1,446 80
	Sherbrooke.				
Simpson, A. F..	Salary as Inspector for year		2 00		98 00
	Fredericton.				
Fowler, J. D	Salary as Inspector for year				200 00
	St. John.				
Rowan, A.....	Salary as Inspector for year		20 00	980 00	
	Contingencies			169 17	
					1,149 17
	Halifax.				
Miller, A.....	Salary as Inspector for year		24 00	1,176 00	
Munro, H. D....	" Assistant Inspector for year		1 96	98 04	
	Salaries		25 96	1,274 04	
	Contingencies			777 55	
					2,051 59
	Charlottetown.				
Brace, R. K.....	Salary as Inspector for year			200 00	
	Contingencies			30 40	
					230 40
	Winnipeg.				
Magness, R	Contingencies				145 83
	Nanaimo.				
McAloney, J. A..	Salary as Inspector for year				100 00
	New Westminster.				
Wolfenden, W...	Salary as Inspector for year	2 50	0 96		96 54
	Vancouver.				
Miller, J. E.....	Salary as Inspector for year		2 00	98 00	
	Contingencies			68 95	
					166 95
	Victoria.				
Jones, R.... ...	Salary as Inspector for year		4 00	196 00	
	Contingencies			312 88	
					508 88
	General.				
McPhie, D ...	Contingencies				580 33

APPENDIX B—*Continued.*

No. 8.—DETAILS of Gas Inspection Expenditures, 1898–99—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Dominion Express Co.	Express charges	8 86	
Sugg, Wm. & Co.	12 burners and chimneys	156 34	
Canadian Rubber Co.	Rubber tubing, &c	88 20	
The Pritchard-Andrews Co	6 steel meter seals	78 00	
	Total general contingencies		331 40
	Grand total		19,794 18
	ADD—Printing	132 71	
	Stationery	113 67	
			246 38
	Authorized disbursements (less superannuation)		20,040 56
	ADD—Balances due by inspectors, June 30, 1899.		212 88
			20,253 44
	LESS—Balances due by Inspectors, July 1, 1898.	212 88	
	June 30, 1899.	201 62	
			414 50
	Actual disbursements agreeing with Statement No. 22, page 51		19,838 94

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 9.—DETAILS of Electric Light Inspection, Expenditures for the year ended 30th June, 1899.

To whom paid.	Service.	Amounts paid.	Totals.
	Belleville.	$ cts.	$ cts.
Johnson, Wm.	Contingencies		94 36
	Hamilton.		
McPhie, D.	Contingencies		20 40
	London.		
Williams, J.	Contingencies		23 65
	Toronto.		
Johnstone, J. K.	Contingencies		204 30
	Montreal.		
Aubin, A.	Contingencies		309 22
	Quebec.		
Le Vasseur, N.	Contingencies		12 25
	Sherbrooke.		
Simpson, A. F.	Contingencies		72 84
	St. John.		
Rowan, A.	Contingencies		141 64
	Halifax.		
Merill, A.	Contingencies		66 76
	Vancouver.		
Miller, J. E.	Contingencies		43 96
	Victoria.		
Jones, R.	Contingencies		99 37
	Chief Electrical Engineer.		
Higman, O.	Salary for the year	2,000 00	
	Contingencies	278 04	
			2,278 04

APPENDIX B—*Continued.*

No. 9.—DETAILS of Electric Light Inspection Expenditures—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Potvin, Napoléon	Petty expenses	28 50	
The Canadian General Electric Co	Equipment of Kingston office, 72 connections for storage battery, soldering, etc	21 29	
Bailey, Geo	Repairs, etc., in Electrical Laboratory	7 45	
Higman, O., jr	Services from 1st to 30th July, '98, 1st Aug. to 20th Sept., '98, 1st to 30th June, '99, 3 months and 19 days at $75 per month	272 50	
Ahearn & Soper	6 Kelvin voltmeters; Equipment of Toronto and Hamilton offices, etc	1,877 81	
Harris & Campbell	Lumber, etc., and work performed	30 23	
Shedrick, C. E.	Repairs to Hoyt Ammeter	10 00	
Cole's National Mfg. Co.	1 rubber sheet for covering instruments	1 50	
Eimer & Amend	1 hydrometer, tubes	7 25	
Canada Atlantic Ry. Co.	Freight on instruments	21 57	
Ottawa Electric Co	Three and one-half months' current for Electrical Laboratory	16 44	
Butterworth & Co	Screw-drivers, plyers, solder, pan, etc	5 65	
British American Bank Note Co	For stamps supplied	4 29	
Smith, S. & Son	1 non-magnetizable chronograph	30 66	
Biddle, Jas. G	1 Queen X Ray tube	15 20	
Ritchie, E. S. & Sons	Repairs to induction coil	13 20	
Topley, W. J.	Tripod, photographs, etc	9 30	
Edison Decorative Lamp Dept. General Electric Co	Repairing X Ray tubes	8 40	
Stephen Bros	Oil and paint	1 40	
The Weston Electrical Instrument Co	1 multiplier, and repairs	27 06	
Graves Bros	Hardware	3 08	
Sproule, W. H. & Co	6 chronograph watches	60 00	
			2,472 78
	LESS—Difference in exchange, on refund from Oscar Schölzig		1 08
	Law Costs.		2,471 70
Martigny, J. C. L. de	Law costs in *re* Regina *vs.* E. Poulin		60 00
McMillan & Dunbar	" Regina *vs.* Corley & Collins and Bailiff's Fees		28 52
Maclean, A. K.	" Regina *vs.* Bridgewater Power Co. and Magistrate's Fees		28 25
Mickle, C. J.	" Regina *vs.* John Bearman		10 80
Carrier, A. F.	" Regina *vs.* St. Jerome Power and Electric Co		26 40
	Total general contingencies		2,625 67
	Grand total		5,992 46
	ADD—Printing	34 26	
	Stationery	5 97	
			40 23
	Actual disbursements agreeing with Statement No. 24, page 53		6,032 69

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, 25th September, 1899.

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department on Salary, during the Year ended 30th June, 1899.

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Adams, J. S		1							
Alexander, Thos		1							
Allen, G. A		1							
Alteman, Peter J		1							
Amor, Wm		1							
Armstrong, Walter		1							
Atherton, R		1							
Aubin, A					1	1			
Baby, Jos		1							
Baby, W. A. D		1							
Baker, J. S				1					
Barber, J. S		1							
Barnes, G		1							
Barrett, J. K		1							
Basinet, Louis		1							
Bayard, Gilbert A		1							
Beauchamp, J. P		1							
Beaulieu, J. B		1							
Behan, J. J				1	1	1			
Belair, A. (Plessis dit)		1							
Bell, James E		1							
Bellerive, Geo			1						
Belyea, T. H		1							
Bickle, J. W		1			1				
Bish, Philip		1							
Bishop, A		1							
Blackman, C		1							
Blair, A		1							
Blair, J. B		1							
Blatch, F. K	1								
Blethen, C. W		1							
Blyth, Alex		1							
Boivin, C. A		1							
Boomer, J. B		1							
Bourassa, Joseph		1							
Bourget, O		1							
Bouteiller, G. A		1							
Bowman, Allan		1							
Boyd, J. F. S		1							
Boyd, S. I		1							
Boyle, P		1							
Bowen, F. C		1							
Brabant, J. B. G. N		1							
Brace, R. K					1				
Brain, A. F		1							
Breen, John				1					
Brennan, D. J		1							
Brennan, John		1							
Broadfoot, S		1			1				
Browne, G. W		1							
Bulmer, Wm		1							
Burgess, Thos. H				1					
Burke, T		1							
Burns, John	1								
Byrnes, John	1								
Cahill, J. H		1							
Cahill, J. W		1							
Cahill, T		1			1				

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898-99—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Cameron, D. M		1			1				
Campeau, F. R. E	1								
Cargill, W		1							
Carroll, D		1							
Carter, William	1								
Caven, A		1							
Caven, W		1							
Chabot, F. X				1					
Chalus, J. O				1					
Chartier, Etienne		1							
Chisholm, J. J				1					
Chisholm, W. Noble		1							
Clark, A. F		1							
Clark, James Alfred		1							
Clarke, Thomas		1							
Codd, Herbert J. S		1							
Code, Abraham		1						1	
Coleman, Charles		1							
Coleman, J. J		1							
Coles, F. H		1							
Comte, L. A. A. J		1							
Conklin, Ewan		1							
Conway, B. J		1							
Cook, W. R		1							
Costello, J. W				1					
Costigan, H. A		1							
Costigan, J. J		1							
Coughlin, D				1				1	
Coulter, Alex		1							
Courtney, J. J		1							
Cowan, Edgar				1					
Crawford, W. P		1							
Croteau, T. M			1						
Crotty, John		1							
Crowe, W		1							
Daoust, J. A				1					
Daveluy, J. P		1							
Davis, T. G		1							
Davy, Edward				1					
Dawson, W		1							
Deland, A. N		1							
Dennis, W. A					1				
Desaulniers, J. E. A		1							
Dessert, Victor				1					
Dibblee, William		1							
Dick, J. W		1							
Dickson, C. T		1							
Dingman, N. J		1							
Dixon, H. G. S		1							
Dodds, E. W		1							
Donaghy, William		1							
Doyle, B. J		1							
Doyle, J. E. H		1							
Doyon, J. A	1								
Dudley, W. H		1							
Dunne, J. P	1								
Dumbrille, J		1							
Dumbrille, R. W		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898-99—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Dumouchel, Léandre		1							
Dunlop, C		1							
Duplessis, C. Z		1							
Dustan, W. W				1					
Earle, R. H		1							
Egan, Wm		1							
Egener, A		1							
Elliott, T. H				1					
Errett, R. W				1					
Evans, G. T		1							
Fahey, Ed		1							
Fahey, Owen		1							
Falconer, James E		1							
Ferguson, J		1							
Ferguson, John C		1							
Finley, Hugh				1					
Fitzgerald, E. W				1					
Fitzpatrick, W. J		1							
Fletcher, R. W		1							
Flynn, D. J		1							
Forest, E. R		1							
Fortier, J. J. O		1							
Fortier, V		1							
Foster, Henry		1							
Fournier, L. A				1					
Fowler, George	1								
Fowler, J. D					1				
Fox, J. D		1							
Fox, Thomas		1							
Frame, Archibald				1					
Francis, G. M				1					
Fraser, G. J		1							
Fraser, P		1							
Freed, A. T				1					
Gallagher, F			1						
Geldart, O. A		1							
George, John		1							
Gerald, C		1							
Gerald, W. H		1							
Gerald, W. J	1	1							
Gervais, Samuel				1					
Gill, Wm		1							
Girard, Irené		1							
Girdlestone, R. J. M		1		1					
Goodman, A. W		1							
Gorman, Arthur M		1							
Gosnell, T. S		1		1					
Gow, James		1							
Gow, J. E		1							
Graham, W. J		1			1				
Graham, W. T		1							
Grant, H. H		1							
Gravel, A. I				1					
Grimason, Thomas		1							
Grosbois (de), Chas. B		1							
Guay, Alphonse				1					
Guay, G. N				1					
Hagan, James		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898-99—*Continued.*

Names.	Services.								
	Inside.	Excise.	Callers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Hagarty, P.		1							
Hall, C. R.	1								
Hall, J. J.		1							
Halliday, W. A.	1								
Hanley, A.		1							
Harney, Thomas			1						
Harris, J. G.		1							
Hart, P. D.		1							
Hawkins, A. C.		1							
Hawking, W. L.		1							
Hayhurst, T. H.		1							
Hayward, W. J.				1					
Hébert, C. D.		1							
Hébert, J. A. P.				1					
Helliwell, H. N.		1							
Henderson, W.		1							
Henwood, Geo.		1							
Hesson, C. A.		1							
Hicks, W. H.		1			1				
Higman, O.						1			
Hill, A. M.		1							
Himsworth, Wm.	1								
Hobbs, G. N.		1							
Howard, W. W. S.		1							
Howden, R.		1							
Howell, Thomas		1							
Howie, A.		1							
Hubley, H. H.		1							
Hudon, L. E.	1								
Hughes, Henry				1					
Hughes, P. A.	1								
Hughes, R. A.				1					
Hurst, Levi B.		1							
Iler, B.		1							
Ironside, G. A.		1							
Irwin, Robert		1							
Irwin, Samuel				1					
Ives, G. C.		1							
James, T. C.		1							
Jameson, S. B.		1							
Jamieson, R. C.		1							
Jarvis, Henry				1					
Johnson, J. J.		1							
Johnson, Wm.				1	1	1			
Johnston, G. E.		1							
Johnstone, J. K.					1	1			
Jones, Andrew		1							
Jones, Richard		1			1	1			
Jubenville, J. P.		1							
Keeler, G. S.		1							
Keilty, T.		1							
Kelly, M. J.				1					
Kenning, J. H.		1							
Keogh, P. M.		1						1	
Kidd, Thomas									
Kilroy, E. T.		1							
King, R. M.		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898-99—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food In-pection.	Inspection of Staples.
Knowlson, J. B.		1							
Laidman, Richard H.				1					
Lane, T. M.		1							
Langlois, Joseph Henri				1					
Laporte, Geo.		1							
LaRivière, A. C		1							
LaRue, George		1							
LaRue, J. B. Alexandre		1							
Lawlor, H		1							
LeBel, J. A. W.	1								
Lecours, H. T		1							
Lee, Edward		1							
LeMoine, Jas. Sir		1							
LeMoine, Jules		1							
Lépine, Louis		1							
LeVasseur, N					1	1			
Levêque, Hector								1	
Logan, John		1							
Lynes, K		1			1				
Lyons, E		1							
Macdonald, A. B		1							
Macdonald, D		1							
Macdonald, J. A				1					
Macfarlane, Thos								1	
Macintyre, D		1							
Mackay, G. W		1							
Magness, Robt				1	1	1			
Mainville, C. P		1							
Male, Thomas					1				
Malo, T		1							
Manning J		1							
Marcon, F. E		1							
Marentette, Alex				1					
Marion, J. E. E.		1							
Marshall, F		1							
Mason, F		1							
Metcalf, W. F		1							
Miall, E	1			1					
Miller, A					1	1			
Miller, J. E		1			1	1			
Miller, W. F		1							
Millier, Elie		1							
Milligan, R. J				1					
Milliken, E		1							
Mills, A. E		1							
Moore, T		1							
Moreau, J. Alf				1	1				
Morrow, John		1							
Mulhern, M. M.		1			1				
Munro, H. D		1			1				
Murdoch, James				1					
Murray, A. S. E		1							
Murray, David		1							
McAllister, A		1							
McAloney, Joseph A.		1		1	1				
McCloskey, J. R		1							
McCoy, Wm		1							
McCuaig, Aug. F		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898-99—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
McCullough, A.	1								
McDonald, A. W				1					
McDonald, J				1					
McDonald, J. A		1							
McFarlane, C. D		1							
McFarlane, J				1					
McFee, A. C		1							
McGill, A								1	
McLenaghan, N		1							
McPhie, Donald					1	1			
McSween, James		1							
Nash, S. C		1							
Neville, Cornelius		1							
Newby, F	1								
Nichols, J. T		1							
O'Brien, E. C		1							
O'Brien, J. F		1							
O'Donnell, J		1							
O'Donohue, M. J		1							
O'Flaherty, E. J		1							
O'Flaherty, M. J					1				
O'Leary, T. J		1							
O'Meara, F. M		1							
Orr, Henry N		1							
Osborne, F. A		1							
O'Sullivan, D		1							
Panneton, G. E		1							
Pape, James					1	1			
Parent, F		1							
Parkinson, Edward B		1							
Parsons, C. H		1							
Patton, James			1						
Petit, J. B				1					
Pinhey, Henry				1					
Pinsonnault, Alfred		1							
Piper, H				1					
Poirier, Joseph A		1							
Pole, C. W		1							
Potvin, Napoléon	1								
Powell, J. B		1							
Pringle, James		1							
Prosser, Elijah							1		
Provost, J. J				1					
Quain, Redmond	1								
Quinn, J. D		1							
Ramon, Pierre		1							
Renaud, A. H		1							
Rennie, George		1			1				
Richard, D				1					
Richard, J. B. T		1							
Ridgman, A. H		1							
Roche, H. G					1	1			
Ross, H. E		1		1					
Ross, S. F		1							
Rouleau, J		1							
Rousseau, Elzéar H		1							
Rowan, A					1	1			
Rowan, W. E		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898–99—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Roy, George									1
Ryan, Wm		1							
Saucier, X		1						1	
Schram, R. L. H		1							
Scott, M. W		1							
Scullion, P. J		1							
Scullion, W. J		1							
Sexton, J		1			1				
Shanacy, M		1			1				
Shaw, J. F	1								
Simpson, A. F		1			1	1			
Sinon, E. H		1							
Slattery, R		1							
Slattery, Thomas				1					
Smyth, B. B		1							
Spence, F. H		1							
Spence, John		1							
Spereman, J. J		1							
Standish, J. G		1							
Stevens, D. B		1							
Stewart, James		1							
St. Michel, F. X		1							
Stratton, W. C		1							
Stuart, A. K		1							
Swannell, F. W		1							
Talbot, John		1							
Taylor, G. W		1							
Thomas, J. S				1					
Thomas, Philip		1					1		
Thomas, Robert		1							
Till, T. M		1							
Timmons, P		1							
Tomlinson, W. M				1					
Tompkins, P		1							
Toupin, F. X. J. A		1							
Tourchot, A. L								1	
Tracey, J. P		1							
Tyrrell, M								1	
Valin, J. E	1								
Verner, Francis		1							
Verner, Thomas H		1		1				1	
Villeneuve, J		1							
Wainright, F. G		1							
Waller, J		1							
Walsh, Daniel J		1							
Wardell, R. S. R		1							
Watkins, J. A		1							
Watson, James								1	
Watson, W. W		1							
Waugh, R. J				1				1	
Webbe, C. E. A		1							
Weir, James		1							
Westman, T		1							
Weyms, C		1							
Wheatley, Alfred E				1					
Whelan, W. F			1						
Whitehead, J. P		1							
Williams, J					1	1			

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1898-99—*Concluded.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weight and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Wilmot, J. B.				1					
Wilson, David		1							
Winsor, John A				1					
Winter, C. F.	1								
Wolfenden, William		1			1				
Wood, James A		1							
Woodward, G. W.		1							
Wright, Robert J.				1					
Yetts, R. P.	1								
Total	24	303	6	64	35	16	2	12	1

APPENDIX B—*Continued.*

No. 11.—List of Persons employed by the Inland Revenue Department on salary, during a portion of the Year ended 30th June, 1899.

Names.	Period.	Services.				
		Inside.	Excise.	Weights and Measures.	Gas.	Preventive.
Andrews, A. A	From 3rd Aug., 1898, to 30th June, 1899.		1			
Belleperche, A. J. E.	" 20th Feb., 1899, to 30th June, 1899		1			
Bennett, James	" 1st July, 1898, to 30th April, 1899		1			
Bishop, J. B.	" 9th Nov., 1898, to 30th June, 1899		1			
Bouchette, R. Erroll	" 1st Nov., 1898, to 30th June, 1899	1				
Bruyère, Henri P.	" 19th June, 1899, to 30th June, 1899		1			
Casey, John	" 1st Dec., 1898, to 30th June, 1899					1
Christie, W. J	" 1st July, 1898, to 7th July, 1898		1			
Clément, A	" 1st July, 1898, to 31st Oct., 1898	1				
Curless, Charles	" 1st July, 1898, to 30th April, 1899					1
Dager, Herman J	" 6th Oct., 1898, to 30th June, 1899		1			
Desmarais, Frédéric	" 27th April, 1899, to 30th June, 1899		1			
Esmond, J. R.	" 1st July, 1898, to 31st Oct., 1898		1			
Frankland, H. R.	" 1st June, 1899, to 30th June, 1899		1			
Hamilton, W. L.	" 1st July, 1898, to 30th April, 1899		1			
Heron, W. L.	" 1st July, 1898, to 31st March, 1899	1				
Hinchey, E. H.	" 16th May, 1899, to 30th June, 1899		1			
Jones, W. S.	" 1st July, 1898, to 31st March, 1899		1			
Laurier, J. E	" 1st April, 1899, to 30th June, 1899		1			
Lawrence, G. C	" 2nd Nov., 1898, to 30th June, 1899			1		
Leprohon, R. M	" 1st July, 1898, to 30th April, 1899		1			
Lett, F. P. A	" 1st July, 1898, to 31st Oct., 1898		1			
Macdonald, Angus J.	" 27th Oct., 1898, to 30th June, 1899		1			
Moreau, Auguste	" 9th Jan., 1899, to 30th June, 1899		1			
McDonald, M. A	" 1st July, 1898, to 30th Sept., 1898		1			
McGuire, Terrance	" 1st Nov., 1898, to 30th June, 1899		1			
McNiven, J. D.	" 11th July, 1898, to 30th June, 1899		1			
McRae, W. D.	" 13th Feb., 1899, to 30th June, 1899				1	
Rogerson, J. M	" 1st July, 1898, to 31st Jan., 1899		1			
Rowland, E.	" 1st July, 1898, to 28th Feb., 1899		1			
Smith, J. C.	" 22nd Dec., 1898, to 30th June, 1899			1		
Snowdon, James W	" 13th June, 1899, to 30th June, 1899		1			
Sparling, James W.	" 28th Dec., 1898, to 30th June, 1899		1			
Yates, J. M.	" 1st July, 1898, to 30th April, 1899		1			
	Totals	3	26	2	1	2

APPENDIX B—*Concluded.*

List of Persons employed by the Inland Revenue Department on salary, during the Year ended 30th June, 1899—*Concluded.*

RECAPITULATION.

Employed during the year	414
" a portion of the year	34
Total	448

Services.

Employed in the Inside Service	25
" Excise "	304
" Culler's Office	6
" Weights and Measures	54
" Gas	6
" Electric Light Inspection	1
" Preventive Service	3
" Food Inspection	7
" Inspection of Staples	1
" Inside and Excise Service	1
" " Weights and Measures	1
" Excise and Preventive	1
" " Weights and Measures and Adulteration	3
" " Gas	13
" " Food Inspection	2
" Weights and Measures and Gas	1
" " " Food Inspection	2
" Gas and Electric Light	9
" Excise, Gas and Electric Light	3
" " " Weights and Measures	1
" " Weights and Measures and Food Inspection	1
" Weights and Measures, Gas and Electric Light	3
Total corresponding with above	448

E. MIALL,
Commissioner.

Inland Revenue Department,
Ottawa, 25th September, 1899.

INDEX.

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1899

PART II

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1899

[No. 7a—1900.]

REPORT

OF THE

COMMISSIONER OF INLAND REVENUE

ON THE

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

To the Honourable
The Minister of Inland Revenue.

SIR,—I have the honour to submit herewith my annual report on the inspection of weights and measures, gas and electric light, with the usual statements in connection therewith, for the fiscal year ended June 30, 1899.

1. The total revenue collected during the year for the inspection of weights and measures, was $48,453.95 as against $44,034.59 collected during the year ended June 30, 1898.

2. The total expenditure was $63,643.31, as against $63,447.01 expended during the year ended June 30, 1898.

3. Appendix "A" gives a summary statement of the receipts and expenditures of each inspection division.

4. In Appendices "B," "C" and "D" will be found a detailed statement of weights, measures and weighing machines presented for verification, verified and rejected during the year The number of all descriptions may be summarily stated as follows:—

—	Presented.	Verified.	Rejected.	Percentage of Rejections.
Weights, Dominion	72,130	71,460	670	0·92
Measures of capacity, Dominion	101,032	100,789	243	0·24
Lineal measures	8,231	8,020	211	2·56
Balances, equal arms	13,976	13,679	297	2·12
" steelyards	4,522	4,406	116	2·34
" platform scales	31,376	30,225	1,151	3·66
Troy weights	66	66		
Irregular weights	1,922	1,913	9	0·46
" measures	596	596		

Inspection of Gas.

5 The total revenue collected during the fiscal year ended June 30, 1899, for the inspection of gas and gas meters, was $18,617.00, as compared with $18,678.00 collected during the year ended June 30, 1898.

6. The total expenses were $20,029.28, as against $20,165.59 expended during the year ended June 30, 1898.

7. Appendix "E" gives a summary statement of the receipts and expenditures of each gas inspection district.

8. A statement of the illuminating power and purity of gas inspection during the year will be found in Appendix "F."

9. The illuminating power, where inspection has been made, has been as follows:—

Place.	Number of Tests made.	Number of times below Standard.	Place.	Number of Tests made.	Number of times below Standard.
Barrie	11		Sarnia	11	
Belleville	35		Stratford	12	
Berlin	12		St. Catharines	12	
Brantford	12		St. Thomas	10	
Brockville	12		Toronto	105	
Chatham	7		Windsor	11	1
Cobourg	12		Woodstock	11	
Cornwall	12		Montreal	106	
Deseronto	8		Quebec	12	
Dundas	12		Sherbrooke	12	
Galt	12		Fredericton	81	2
Guelph	12		Moncton	12	1
Hamilton	12		St. John	83	
Ingersoll	11		Halifax	21	
Kingston	29		Pictou	10	
Listowel	12		Yarmouth	9	
London	30		Charlottetown	38	
Napanee	11		Winnipeg	17	
Ottawa	24		Nanaimo	12	
Owen Sound	12		New Westminster	2	
Peterborough	12		Vancouver	12	
Port Hope	12		Victoria	8	

The revenue derived from the inspection of electric light was as follows:—

Fees for inspection of meters, &c	$ 7,228 25	
Registration of companies	4,170 00	
		$ 11,398 25
The expenses of inspection (annual)		4,007 02
		$ 7,391 23
Expended on standard instruments, &c		2,625 67
Leaving a net revenue of		$ 4,675 56

It will thus be seen that the two services of gas and electric light inspection, which are conducted largely by the same staff of officers, have now reached that point at which they have ceased to be a burden upon the general taxpayer, as shown below :—

Service.	Revenue.	Expenditure.
	$ cts.	$ cts.
Gas	18,617 00	20,029 28
Electric light	11,398 25	3,407 02
Exclusive of cost of standard instruments	30,015 25	23,436 30

The kindred service of weights and measures inspection, it will be observed, has earned somewhat over two-thirds of its annual cost, the expenditure as already stated having been $63,643.31, against a revenue of $48,453.95.

In view of the fact that two-thirds of the cost is contributed directly by the trading community, it is felt by the department that the general taxpayer who is guaranteed thereby just weights and measures in all his dealings should not complain in that he is called upon to contribute the remaining one-third.

I have the honour to be, sir,
Your obedient servant,

EDWARD MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

APPENDIX A.

STATEMENT of Weights and Measures Expenditures and Receipts, for the Year ended June 30, 1899.

Divisions.	Inspectors and Assistants.	Expenditures.							Receipts.
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville...	Johnson, Wm.. Slattery, Thos.. Irwin, S..... Behan, J. J.... Errett, R. W...	3,399 92	.....	458 26	230 00	903 53	417 64	5,409 35	3,431 85
Hamilton...	Freed, A. T.... McDonald, J... Marentette, A.. Fitzgerald, E.W Laidman, R. H. Wheatley, A. E. Jarvis, H	5,599 72	.....	.....	.....	1,245 03	117 88	6,962 63	10,044 36
Ottawa.....	Macdonald, J.A. Breen, J..... Winsor, J..... Elliott, T. H.... Macfarlane, J..	3,484 94	.....	.....	250 00	826 10	198 75	4,759 79	2,186 12
Toronto ...	Piper, H..... Milligan, R. J.. Wright, R..... Murdoch, J.... Smith, J. C....	3,616 02	.....	.....	.....	1,017 67	126 43	4,760 12	4,860 82
Windsor....	Hayward, W. J. Coughlin, D.... Thomas, J. S... Hughes, R. A..	3,449 76	....	.....	.....	993 86	161 06	4,604 68	5,452 66
	Totals..	19,550 36	.....	458 26	480 00	4,986 19	1,021 76	26,496 57	25,975 81

APPENDIX A—*Continued.*

STATEMENT of Weights and Measures Expenditures and Receipts, &c.—*Continued.*

Divisions.	Inspectors and Assistants.	Expenditures.							Receipts.
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Montreal	Chalus, J. O Daoust, J. A Gervais, S. Hébert, J. A. P. Langlois, J. H. Bake, J. S. Dessert, V. Tomlinson, W W Fournier, L. A.	7,199 72	1 20	.....	.....	1,537 13	340 31	9,078 36	11,437 06
Quebec	Guay, G. N Kelley, M. J Pinhey, H Chabot, F. X Guay, A Petit, J. B Moreau, A	4,399 96	.....	.....	200 00	1,196 44	51 07	5,847 47	2,963 59
Three Rivers	Gravel, A. I Provost, J. J	1,499 92	.....	.....	.....	249 75	17 26	1,766 93	674 53
	Totals	13,099 60	1 20	.....	200 00	2,983 32	408 64	16,692 76	15,075 18
St. John	Wilmot, J. B Cowan, E Richard, D	2,500 00	.....	.....	.....	307 74	18 64	2,826 38	1,274 74
Cape Breton	Lawrence, G. C	531 06	.....	.....	.....	229 06	69 57	829 69	210 95
Halifax	Frame, A Waugh, R. J	1,599 96	.....	.....	300 00	99 74	206 13	2,205 83	814 07
Pictou	Dustan, W. M. Chisholm, J. J.	1,600 00	.....	.....	.....	459 00	104 39	2,163 39	969 90
	Totals	3,731 02	.....	.....	300 00	787 80	380 09	5,198 91	1,994 92
Charlottet'n.	Davy, E Hughes, Henry.	1,500 00	.....	.....	.....	160 69	37 06	1,697 75	397 06

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APPENDIX A—*Concluded.*

STATEMENT of Weights and Measures Expenditures and Receipts, &c.—*Concluded.*

Divisions.	Inspectors and Assistants.	Expenditures.							Receipts.
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Winnipeg...	Magness, R ... McDonald, A. W Francis, G. M.. Girdlestone, R. J. M..... Ross, H. E..... McKay, R.....	2,774 80	....	700 08	108 00	866 87	92 30	4,542 05	2,951 28
Calgary, N. W. T.	Thomas, P..... Costello, J. W..	808 02	.....	.....	.....	141 35	4 00	953 37	310 16
Victoria, B.C.	Findley, H..... McAloney, J.A.	1,149 84	.....	.....	125 00	812 60	70 00	2,157 44	474 80

RECAPITULATION.

Ontario	19,550 36	...	458 26	480 00	4,986 19	1,021 76	26,496 57	25,975 81
Quebec	13,099 60	1 20	.....	200 00	2,983 32	408 64	16,692 76	15,075 18
New Brunswick	2,500 00	.....	.....	.....	307 74	18 64	2,826 38	1,274 74
Nova Scotia	3,731 02	.....	.....	300 00	787 80	380 09	5,198 91	1,994 92
Prince Edward Island	1,500 00	.....	.....	.....	160 69	37 06	1,697 75	397 06
Manitoba	2,774 80	... ..	700 08	108 00	866 87	92 30	4,542 05	2,951 28
North-west Territories	808 02	... .	.....	.....	141 35	4 00	953 37	310 16
British Columbia	1,149 84	....	.....	125 00	812 60	70 00	2,157 44	474 80
Commissioner of Standards	800 00	.....	.....	.....	.....	.....	800 00	.....
General Contingencies	.....	....	.....	.....	112 08	1,774 21	1,886 29	.....
Printing	.....	....	.....	.....	.....	381 21	381 21	.....
Stationery	.. ..	....	.....	.....	.....	557 56	557 56	....
Lithographing	.....	...	.....	.....	.....	6 72	6 72	.....
Grand Totals	45,913 64	1 20	1,158 34	1,213 00	11,158 64	4,752 19	64,197 01	48,453 95

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province,

INSPECTION OFFICES BY PROVINCES.	WEIGHTS.								MEASURES OF CAPACITY.					
	Dominion.			Troy.		Miscellaneous.			Dominion.			Miscellaneous		
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
Ontario.														
Belleville	3,685	3,685	....	....	....	16	16	....	6,570	6,570	....	2	2	....
Hamilton	15,229	15,172	57	....	....	217	217	....	5,375	5,372	3	7	7	....
Ottawa	3,591	3,354	237	....	....	23	23	....	2,752	2,591	161	47	47	....
Toronto	4,894	4,894	....	19	19	579	579	....	16,021	16,021	....	3	3	....
Windsor	5,721	5,718	3	....	....	....	....	....	24,027	24,027	....	....	....	....
Totals	33,120	32,823	297	19	19	835	835	....	54,745	54,581	164	59	59	....
Quebec.														
Montreal	17,642	17,294	348	14	14	266	266	....	24,941	24,921	20	312	312	....
Quebec	10,703	10,693	10	....	....	587	580	7	7,112	7,109	3	15	15	....
Three Rivers	1,614	1,613	1	....	....	9	9	....	1,549	1,510	39	....	....	....
Totals	29,959	29,600	359	14	14	862	855	7	33,602	33,540	62	327	327	....
New Brunswick.														
St. John	2,104	2,104	...	...	....	19	19	....	4,098	4,098	....	2	2	....
Nova Scotia.														
Cape Breton	337	334	3	....	....	....	....	....	393	391	2	1	1	....
Halifax	1,404	1,400	4	33	33	101	101	....	1,523	1,523	....	76	76	....
Pictou	1,359	1,353	6	...	...	100	98	2	1,828	1,813	15	3	3	....
Totals	3,100	3,087	13	33	33	201	199	2	3,744	3,727	17	80	80	....
Prince Edward Island.														
Charlottetown	815	815	....	....	....	4	4	....	209	209	....	....	....	....
Manitoba.														
Winnipeg	2,374	2,374	....	1 set	1 set	....	....	...	4,214	4,214	....	124	124	....
Calgary	303	302	1	....	...	1	1	....	310	310	....	4	4	....
Totals	2,677	2,676	1	1 set	1 set	1	1	....	4,524	4,524	....	128	128	....
British Columbia.														
Victoria	355	355	....	....	...	.....	.....	....	110	110	....	....	....	....

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B.

1899, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

Measures of Length.			Balances, &c.								
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
399	399	.....	635	635	.....	224	224	.....	2,313	2,313	.....
2,130	1,968	162	3,992	3,891	101	1,834	1,796	38	8,200	7,661	539
707	677	30	594	530	64	34	27	7	1,948	1,768	180
699	699	....	895	895	.....	377	377	.....	2,340	2,340	.....
469	469	.....	1,106	1,095	11	395	395	.....	3,074	3,042	32
4,404	4,212	192	7,222	7,046	176	2,864	2,819	45	17,875	17,124	751
2,008	2,006	2	3,237	3,143	94	1,077	1,020	57	6,964	6,674	290
1,024	1,017	7	1,554	1,550	4	161	155	6	1,449	1,436	13
117	112	5	230	219	11	10	10	.....	375	365	10
3,149	3,135	14	5,021	4,912	109	1,248	1,185	63	8,788	8,475	313
146	146	.....	379	379	.....	42	42	.....	787	781	6
46	45	1	69	69	.....	13	13	.....	120	120	.....
10	10	.....	251	251	.....	43	43	.....	454	445	9
171	167	4	278	277	1	48	48	.....	691	681	10
227	222	5	598	597	1	104	104	.....	1,265	1,246	19
.....	.....	....	140	140	.....	25	25	.....	329	329	.....
188	188	.....	483	472	11	172	164	8	1,744	1,683	61
117	117	.....	56	56	.....	12	12	.....	206	205	1
305	305	.....	539	528	11	184	176	8	1,950	1,888	62
.....	.....	.....	77	77	.....	55	55	.....	382	382	.....

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province

RECAPIT

INSPECTION OFFICES BY PROVINCES.	WEIGHTS.								MEASURES OF CAPACITY.					
	Dominion.			Troy.		Miscellaneous.			Dominion.			Miscellaneous		
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
Ontario	33,120	32,823	297	19	19	835	835	....	54,745	54,581	164	59	59	....
Quebec	29,959	29,600	359	14	14	862	855	7	33,602	33,540	62	327	327	....
New Brunswick	2,104	2,104	....	....	....	19	19	....	4,098	4,098	....	2	2	....
Nova Scotia	3,100	3,087	13	33	33	201	199	2	3,744	3,727	17	80	80	....
Prince Edward Island	815	815	....	....	....	4	4	....	209	209	....	....	....	....
Manitoba	2,677	2,676	1	1 set	1 set	1	1	....	4,524	4,524	....	128	128	....
British Columbia	355	355	....	....	....	....	....	....	110	110	....	....	....	....
Grand Totals	72,130	71,460	670	66	66	1,922	1,913	9	101,032	100,789	243	596	596	....

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

B—*Concluded.*

1899, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

ULATION.

Measures of Length.			Balances, &c.								
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
4,404	4,212	192	7,222	7,046	176	2,864	2,819	45	17,875	17,124	751
3,149	3,135	14	5,021	4,912	109	1,248	1,185	63	8,788	8,475	313
146	146	.....	379	379	.....	42	42	.....	787	781	6
227	222	5	598	597	1	104	104	.....	1,265	1,246	19
.....	.....	.....	140	140	.....	25	25	.....	329	329	.....
305	305	.....	539	528	11	184	176	8	1,950	1,888	62
.....	.....	.....	77	77	.....	55	55	.....	382	382	.....
8,231	8,020	211	13,976	13,679	297	4,522	4,406	116	31,376	30,225	1,151

E. MIALL,
Commissioner.

63 VICTORIA, A. 1900

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each Fiscal Year ended

INSPECTION DIVISIONS.	DOMINION Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville	....	....	....	....	1	16	95	256	355	729	690	409	368	329
Hamilton	....	80	....	....	2	4	382	225	2,764	4,201	4,109	843	696	666
Ottawa	....	40	....	....	4	21	168	234	465	635	587	415	336	289
Toronto	32	...	1	1	7	15	91	230	452	991	975	546	456	403
Windsor	....	40	....	...	1	11	107	263	580	1,214	1,126	580	508	477
Totals	32	160	1	1	15	67	843	1,208	4,616	7,770	7,487	2,793	2,364	2,164
Quebec.														
Montreal	468	28	9	1	38	42	841	930	1,416	3,067	2,794	2,094	1,977	1,721
Quebec	...	85	26	79	180	182	773	754	952	1,507	1,477	1,412	1,232	1,095
Three Rivers	....	....	....	....	8	4	123	97	182	250	250	226	212	138
Totals	468	113	35	80	226	228	1,737	1,781	2,550	4,824	4,521	3,732	3,421	2,954
New Brunswick.														
St. John	....	...	...	....	1	2	108	139	164	526	397	238	193	165
Nova Scotia.														
Cape Breton	....	22	9	3	10	....	19	13	47	71	55	28	25	20
Halifax	....	....	....	....	..	7	86	8	143	306	270	190	159	112
Pictou	...	67	11	15	18	16	51	69	138	339	269	108	83	70
Totals	....	89	20	18	28	23	156	90	328	716	594	326	267	202
Prince Edward Island.														
Charlottetown	....	....	....	....	....	4	20	27	60	190	153	90	82	83
Manitoba.														
Winnipeg	....	..	....	....	1	6	59	23	345	530	467	205	193	177
Calgary	....	....	1	....	1	1	11	5	48	55	59	27	26	26
Totals	....	....	1	..	2	7	70	34	393	585	526	232	219	203
British Columbia.														
Victoria	....	....	....	....	....	....	3	3	48	81	77	39	39	32

INLAND REVENUE DEPARTMENT,

OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

C.

Denomination presented for Verification in each Inspection Division, during the June 30, 1899.

Weights.									Lineal Measures.										
dupois.																			
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.	Troy Weight.	Miscellaneous Weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	Miscellaneous Measures.
272	126	30	5	3	1	3,685	....	16	....	....	399	....	....	....	..	..	..	....	399	....
616	488	129	19	5	....	15,229	....	217	....	....	2,130	..	....	....	..	..	..	....	2,130	....
210	121	43	18	5	....	3,591	....	23	....	....	707	....	....	....	..	..	..	....	707	....
349	190	89	28	38	....	4,894	19	579	....	....	699	....	....	....	..	..	..	....	699	....
425	280	89	11	9	....	5,721	....	....	....	....	469	....	....	....	..	..	..	....	469	....
1,872	1,205	380	81	60	1	33,120	19	835	....	...	4,404	..	....	....	..	..	..	....	4,404	....
1,341	584	159	66	66	....	17,642	14	266	...	....	2,008	....	....	...	..	..	..	...	2,008	....
708	189	41	5	6	...	10,703	....	587	....	....	1,024	....	....	....	..	..	..	..	1,024	....
95	26	3	....	....	....	1,614	....	9	....	1	116	....	..	....	..	..	..	...	117	..
2,144	799	203	71	72	....	29,959	14	862	....	1	3,148	....	....	....	..	..	..	....	3,149	....
122	44	5	...	...	..	2,104	...	19	...	....	146	....	....	....	..	..	..	....	146	....
10	4	1	....	....	....	337	....	....	....	....	46	....	....	....	..	..	..	....	46	....
69	36	13	2	2	1	1,404	33	101	....	....	10	....	....	....	..	..	..	....	10	....
57	32	9	3	4	....	1,359	..	100	....	...	171	....	....	....	..	..	..	....	171	....
136	72	23	5	6	1	3,100	33	201	...	....	227	....	....	....	..	..	..	....	227	....
68	27	9	1	1	....	815	....	4	....	....	.....	...	....	....	.	..	..	....	.....	....
166	100	58	28	7	3	2,374	1 set	....	....	....	188	....	....	....	.	..	..	....	188	....
21	11	6	3	2	....	303	....	1	....	....	88	28	....	1	.	..	..	....	117	....
187	111	64	31	9	3	2,677	1 set	1	....	....	276	28	....	1	..	..	..	....	305	....
27	4	2	....	....	....	355	....	....	....	....	.....	..	..	....	..	..	..	....	.....	....

E. MIALL,

Commissioner.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each Year ended

INSPECTION DIVISIONS.	DOMINION Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville	....	....	....	....	1	16	95	256	355	729	690	409	368	329
Hamilton	....	80	....	....	2	4	382	224	2,758	4,188	4,097	834	691	663
Ottawa	....	40	....	....	4	21	151	198	421	588	548	396	314	285
Toronto	32	....	1	1	7	15	91	230	452	991	975	546	456	403
Windsor	....	40	....	....	1	11	107	262	580	1,213	1,125	580	508	477
Totals	32	160	1	1	15	67	826	1,170	4,566	7,709	7,435	2,765	2,337	2,157
Quebec.														
Montreal	468	28	9	1	38	40	816	902	1,384	3,008	2,737	2,048	1,931	1,692
Quebec	....	85	26	78	179	182	772	750	952	1,506	1,476	1,411	1,232	1,095
Three Rivers	....	....	....	....	8	4	123	96	182	250	250	226	212	138
Totals	468	113	35	79	225	226	1,711	1,748	2,518	4,764	4,463	3,685	3,375	2,925
New Brunswick.														
St. John	....	....	....	....	1	2	108	139	164	526	397	238	193	166
Nova Scotia.														
Cape Breton	....	22	9	3	10	...	19	13	47	71	55	27	24	19
Halifax	....	....	....	....	....	7	85	8	142	306	270	189	158	112
Pictou	....	67	11	15	18	14	51	65	138	339	269	108	83	70
Totals	....	89	20	18	28	21	155	86	327	716	594	324	265	201
Prince Edward Island.														
Charlottetown	....	....	....	....	....	4	20	27	60	190	153	90	82	83
Manitoba.														
Winnipeg	....	....	....	....	1	6	59	29	345	530	467	205	193	177
Calgary	....	....	1	....	1	1	11	5	48	55	59	27	25	26
Totals	....	....	1	....	2	7	70	34	393	585	526	232	218	203
British Columbia.														
Victoria	....	....	....	....	....	....	3	3	48	81	77	39	39	32

INLAND REVENUE DEPARTMENT,

OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

C—*Continued.*

Denomination, Inspected and Verified in each Inspection Division, during the Fiscal June 30, 1899.

Weights.									Lineal Measures.										
dupois.																			
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.	Troy weights.	Miscellaneous weights.	6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total number.	Miscellaneous Measures.
272	126	30	5	3	1	3,685	....	16	....	....	399	....	....	....	....	....	....	....	399	....
613	486	128	17	5	....	15,172	....	217	....	....	1,968	....	....	....	....	....	....	....	1,968	....
202	120	43	18	5	....	3,354	....	23	....	....	677	....	....	....	....	....	....	....	677	....
349	190	89	28	38	....	4,894	19	579	....	....	699	....	....	....	....	....	....	....	699	....
425	280	89	11	9	....	5,718	....	.	....	..	469	....	....	....	....	....	....	....	469	....
1,861	1,202	379	79	60	1	32,823	19	835	....	....	4,212	....	....	....	....	....	....	....	4,212	....
1,325	576	159	66	66	....	17,294	14	266	....	....	2,002	....	....	....	....	....	....	....	2,002	....
708	189	41	5	6	....	10,693	....	580	....	....	1,017	....	....	....	....	....	....	....	1,017	....
95	26	3	....	....	....	1,613	....	9	....	1	111	....	....	....	....	....	....	....	112	....
2,128	791	203	71	72	....	29,600	14	855	....	1	3,130	....	....	....	....	....	....	....	3,131	....
122	44	5	....	....	....	2,104	....	19	....	....	146	....	....	....	....	....	....	....	146	....
10	4	1	....	....	....	334	....	....	....	....	45	....	....	....	....	....	....	....	45	....
69	36	13	2	2	1	1,400	33	101	....	....	10	....	....	....	....	....	....	....	10	....
57	32	9	3	4	....	1,353	....	98	....	....	167	....	....	....	....	....	....	....	167	....
136	72	23	5	6	1	3,087	33	199	....	....	222	....	....	....	....	....	....	....	222	....
68	27	9	1	1	....	815	....	4	....	....	.....	....	....	....	....	....	....	....	.....	....
166	100	58	28	7	3	2,374	1 set	....	....	....	188	....	....	....	....	....	....	....	188	....
21	11	6	3	2	....	302	....	1	....	....	88	28	....	1	....	....	....	....	117	....
187	111	64	31	9	3	2,676	1 set	1	....	....	276	28	....	1	....	....	....	....	305	....
27	4	2	....	....	....	355	....	....	....	....	.....	....	....	....	....	....	....	....	.....	....

E. MIALL,

Commissioner.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures Year ended

INSPECTION DIVISIONS.	DOMINION Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Hamilton								1	6	13	12	9	5	3
Ottawa							17	36	44	47	39	19	22	4
Windsor								1		1	1			
Totals							17	38	50	61	52	28	27	7
Quebec.														
Montreal						2	25	28	32	59	57	46	46	29
Quebec				1	1		1	4		1	1	1		
Three Rivers								1						
Totals				1	1	2	26	33	32	60	58	47	46	29
Nova Scotia.														
Cape Breton												1	1	1
Halifax							1		1			1	1	
Pictou						2		4						
Totals						2	1	4	1			2	2	1
Manitoba.														
Calgary													1	

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

C—*Concluded.*

of each Denomination, Rejected in each Inspection Division during the Fiscal June 30, 1899.

Weights.									Lineal Measures.										Miscellaneous Measures.
dupois.							Troy Weights.	Miscellaneous Weights.											
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.			6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	
3	2	1	2	....	....	57	....	....	....	....	162	....	....	....	..	....	....	....	162	....
8	1	....	....	....	....	237	....	....	....	....	30	....	....	....	..	....	....	....	30	....
.....	....	....	....	....	....	3	....	....	....	....	.	....	....	....	..	....	....	....	..	....
11	3	1	2	....	....	297	....	....	....	....	192	....	...	...	..	....	....	....	192	....
16	8	....	....	....	....	348	....	....	....	....	6	....	....	....	..	....	....	....	6	....
.....	.....	....	....	....	....	10	....	7	....	....	7	....	....	....	..	....	....	....	7	....
.....	.....	....	....	....	....	1	....	....	....	....	5	....	....	....	..	....	....	....	5	....
16	8	...	....	....	....	359	....	7	....	....	18	....	....	....	..	....	....	....	18	..
.....	.....	....	....	....	....	3	....	....	....	....	1	....	....	....	..	....	....	....	1	....
....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	..	....	....	....	....	....
....	....	....	....	....	....	6	2	....	....	....	4	....	..	....	..	....	....	....	4	....
....	....	....	....	....	....	13	2	....	....	....	5	....	....	....	..	....	....	....	5	....
.....	. ...	....	....	....	....	1	....	....	....	....	....	...	....	....	..	....	....	....	.	....

E. MIALL,
Commissioner.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Inspection Division, during the Fiscal

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion.											
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.
Ontario.												
Belleville	184	813	605	948	1,179	1,486	1,150	198	7	....	6,570	2
Hamilton	287	170	292	703	859	1,650	1,282	138	4	....	5,375	7
Ottawa	1	32	81	426	686	831	531	147	16	1	2,752	47
Toronto	104	238	645	1,800	2,936	4,636	4,090	1,570	2	....	16,021	3
Windsor	680	335	266	2,387	4,314	5,358	8,373	2,308	6	....	24,027	....
Totals	1,256	1,578	1,889	6,264	9,974	13,961	15,426	4,361	35	1	54,745	59
Quebec.												
Montreal	3	674	1,161	3,103	3,957	6,679	6,038	2,749	576	1	24,941	312
Quebec	1	248	304	1,112	1,512	1,463	1,700	602	167	3	7,112	15
Three Rivers	.....	77	35	217	358	348	295	182	37	.. .	1,549	....
Totals	4	999	1,500	4,432	5,827	8,490	8,033	3,533	780	4	33,602	327
New Brunswick.												
St. John	.....	89	121	662	1,198	1,120	579	264	65	....	4,098	2
Nova Scotia.												
Cape Breton	...	2	1	54	133	147	42	13	1	...	393	1
Halifax	. ..	77	67	316	342	354	248	82	35	2	1,523	76
Pictou	.....	1	33	46	277	663	577	189	37	5	1,828	3
Totals	.. .	80	101	416	752	1,164	867	284	73	7	3,744	80
Prince Edward Island.												
Charlottetown	1	2	.....	2	36	92	61	15	....	....	209	....
Manitoba.												
Winnipeg	46	22	11	504	669	1,231	1,607	124	....	....	4,214	124
Calgary	4	.....	1	51	71	98	78	7	...	....	310	4
Totals	50	22	12	555	740	1,329	1,685	131	....	....	4,524	128
British Columbia.												
Victoria	2	.....	....	5	....	80	23	.....	....	....	110	....

INLAND REVENUE DEPARTMENT,

OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

D.

Weighing Machines of each Denomination presented for Verification, in each Year ended June 30, 1899.

BALANCES.

With Equal Arms.				Steelyards with Divided Arms.				Weigh Bridges and Platform Scales.						
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	Totals.
178	456	1	.....	217	4	3	...	869	241	823	165	66	149	3,172
2,049	1,943	. .	.....	1,799	32	3	.....	4,949	122	2,418	404	100	207	14,026
163	431	.....	.....	34	....	....	.....	827	195	707	83	48	88	2,576
295	600	.. ...	.....	360	10	3	4	890	90	872	217	59	212	3,612
403	703	... ..	.....	386	2	7	....	1,150	138	1,225	263	67	231	4,575
3,088	4,133	1	.....	2,796	48	16	4	8,685	786	6,045	1,132	340	887	27,961
936	2,290	1	10	1,047	13	.	17	2,736	1,275	2,403	173	153	224	11,278
147	1,287	14	106	147	13	.....	1	407	554	410	44	17	17	3,164
20	209	1	.....	9	.....	.....	1	111	127	124	2	5	6	615
1,103	3,786	16	116	1,203	26	.....	19	3,254	1,956	2,937	219	175	247	15,057
77	302	... .	.....	42	.....	.....	.....	365	171	188	18	13	32	1,208
22	41	2	4	10	2	1	.....	71	21	15	1	3	9	202
61	189	.... .	1	40	1	2	.....	222	55	120	16	9	32	748
54	196	.....	28	48	.... .	.....	.....	389	143	96	17	15	31	1,017
137	426	2	33	98	3	3	.....	682	219	231	34	27	72	1,967
46	93	1	.....	25	.....	.....	.....	118	52	134	11	6	8	494
148	335	.....	..	172	.....	...	.....	696	46	574	182	142	104	2,399
18	38	.....	.....	9	.....	1	2	103	7	73	2	5	16	274
66	373	.....	.....	181	.....	1	2	799	53	647	184	147	120	2,673
43	34	.. ..	.....	47	6	2	.....	227	14	107	8	5	21	514

E. MIALL,

Commissioner.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Inspection Division, during the Fiscal

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion.											
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.
Ontario.												
Belleville	184	813	605	948	1,179	1,486	1,150	198	7	....	6,570	2
Hamilton	287	160	292	703	856	1,650	1,282	138	4	....	5,372	7
Ottawa	1	27	65	369	641	803	521	147	16	1	2,591	47
Toronto	104	238	645	1,800	2,936	4,636	4,090	1,570	2	....	16,021	3
Windsor	680	335	266	2,387	4,314	5,358	8,373	2,308	6	....	24,027	....
Totals	1,256	1,573	1,873	6,207	9,926	13,933	15,416	4,361	35	1	54,581	59
Quebec.												
Montreal	3	670	1,157	3,101	3,953	6,674	6,037	2,749	576	1	24,921	312
Quebec	1	248	302	1,111	1,512	1,463	1,700	602	167	3	7,109	15
Three Rivers	.....	71	28	208	354	345	291	178	35	...	1,510	....
Totals	4	989	1,487	4,420	5,819	8,482	8,028	3,529	778	4	33,540	327
New Brunswick.												
St. John	.....	89	121	662	1,198	1,120	579	264	65	...	4,098	2
Nova Scotia.												
Cape Breton	.....	2	1	54	132	147	42	13	....	....	391	1
Halifax	.....	77	67	316	342	354	248	82	35	2	1,523	76
Pictou	1	33	45	274	661	570	188	36	5	...	1,813	3
Totals	1	112	113	644	1,135	1,071	478	131	40	2	3,727	80
Prince Edward Island.												
Charlottetown	1	2	.....	2	36	92	61	15	....	....	209	....
Manitoba.												
Winnipeg	46	22	11	504	669	1,231	1,607	124	....	....	4,214	124
Calgary	4	....	1	51	71	98	78	7	....	....	310	4
Totals	50	22	12	555	740	1,329	1,685	131	....	....	4,524	128
British Columbia.												
Victoria	2	.....	5	.....	.....	80	23	.....	.....	.....	110	.....

INLAND REVENUE DEPARTMENT,

OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

D—*Continued.*

Weighing Machines of each Denomination Inspected and Verified in each Year ended June 30, 1899.

BALANCES.

With Equal Arms.				Steelyards with Divided Arms.				Weigh Bridges or Platform Scales.						
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	Totals.
178	456	1	.....	217	4	3	.....	869	241	823	165	66	149	3,172
2,032	1,859	.....	.....	1,762	32	2	.....	4,754	88	2,196	364	89	170	13,348
133	397	.....	....	27	.....	.....	.....	778	172	645	68	38	67	2,325
295	600	.....	.....	360	10	3	4	890	90	372	217	59	212	3,612
401	694	.....	.....	386	2	7	....	1,137	137	1,212	261	67	228	4,532
3,039	4,006	1	.....	2,752	48	15	4	8,428	728	5,748	1,075	319	826	26,989
923	2,209	1	10	991	12	.....	17	2,673	1,205	2,283	165	138	210	10,837
147	1,284	14	105	141	13	.....	1	403	554	401	44	17	17	3,141
20	198	1	....	9	.....	.....	1	108	122	122	2	5	6	594
1,090	3,691	16	115	1,141	25	.....	19	3,184	1,881	2,806	211	160	233	14,572
77	302	.....	....	42	.....	.....	....	365	169	184	18	13	32	1,202
22	41	2	4	10	2	1	.....	71	21	15	1	3	9	202
61	189	.....	1	40	1	2	.....	222	54	119	16	9	25	739
54	195	.....	28	48	.....	.....	.....	384	139	95	17	15	31	1,006
137	425	2	33	98	3	3	....	677	214	229	34	27	65	1,947
46	93	1	.....	25	.....	.....	.....	118	52	134	11	6	8	494
144	328	.....	.....	164	.....	.....	.....	678	44	551	178	131	101	2,319
18	38	.....	.....	9	.....	1	2	103	7	73	2	5	15	273
162	366	.....	.....	173	.....	1	2	781	51	624	180	136	116	2,592
43	34	.....	.....	47	6	2	.....	227	14	107	8	5	21	514

E. MIALL,
Commissioner.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and during the Fiscal Year

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion.											
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.
Ontario.												
Hamilton					3						3	
Ottawa		5	16	57	45	28	10				161	
Windsor												
Totals		5	16	57	48	28	10				164	
Quebec.												
Montreal		4	4	2	4	5	1				20	
Quebec			2	1							3	
Three Rivers		6	7	9	4	3	4	4	2		39	
Totals		10	13	12	8	8	5	4	2		62	
New Brunswick.												
St. John												
Nova Scotia.												
Cape Breton					1				1		2	
Halifax												
Pictou			1	3	2	7	1	1			15	
Totals			1	3	3	7	1	1	1		17	
Manitoba.												
Winnipeg												
Calgary												
Totals												

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

D—*Concluded.*

Weighing Machines of each Denomination Rejected, in each Inspection Division, ended, June 30, 1899.

BALANCES.

With Equal Arms.				Steelyards with Divided Arms.				Weigh Bridges or Platform Scales.						
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	Totals.
17	84			37		1		195	34	222	40	11	37	678
30	34			7				49	23	62	15	10	21	251
2	9							13	1	13	2		3	43
49	127			44		1		257	58	297	57	21	61	972
13	81			56	1			63	70	120	8	15	14	441
	3		1	6				4		9				23
	11							3	5	2				21
13	95		1	62	1			70	75	131	8	15	14	485
									2	4				6
													7	9
	1							5	4	1				11
	1							5	5	2			7	20
4	7			8				18	2	23	4	11	3	80
													1	1
4	7			8				18	2	23	4	11	4	81

E. MIALL,
Commissioner.

APPENDIX E.

STATEMENT of Gas Inspection Expenditures and Receipts for the Year ended June 30, 1899.

Districts.	Inspectors.	Expenditures.						Receipts.
		Salaries.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Barrie	Shanacy, M.	100 00				1 85	101 85	63 00
Belleville	Johnson, Wm.	288 08		107 50	34 70	67 33	497 61	170 25
Berlin	Lynes, K.	100 00			17 90	9 72	127 62	119 25
Brockville	Johnston, C. W. (act)		99 96			11 58	111 54	226 00
Cobourg	Bickle, J. W.	100 00			27 65	30 10	157 75	130 00
Cornwall	Mulhern, M. M.	100 00				50 00	150 00	45 00
Guelph	Broadfoot, S.	100 00			6 90	15 95	122 85	126 75
Hamilton	McPhie, D. Dennis, W. A.	1,699 96		36 00	93 00	39 50	1,868 46	1,063 50
Kingston	Behan, J. J.	399 96		22 50		74 79	497 25	197 00
Listowell	Male, T.	99 96		75 00		15 51	190 47	55 75
London	Williams, J.	1,000 00		110 00	241 95	80 10	1,432 05	1,662 25
Napanee	Johnson, Wm. (act.)				10 45		10 45	63 75
Ottawa	Roche, H. G.	900 00	180 00	300 00		77 40	1,457 40	582 75
Owen Sound	Graharn, W. J.	200 00		125 00			325 00	61 75
Peterborough	Cahill, Thos	200 00				10 55	210 55	36 00
Sarnia	Hicks, W. H.			20 00		1 00	21 00	81 00
Stratford	Rennie, Geo.	200 00				14 50	214 50	66 75
Toronto	Johnstone, J. K. Pape, Jas.	2,199 92	7 50			40 89	2,248 31	4,925 75
	Totals	7,687 88	287 46	796 00	432 55	540 77	9,744 66	9,676 50
Montreal	Aubin, A. O'Flaherty, M. J.	2,199 84	450 00	240 00	18 95	141 80	3,050 59	6,240 75
Quebec	LeVasseur, N. Moreau, J. A. (ctr.)	1,300 00		150 00		22 76	1,472 76	258 75
Sherbrooke	Simpson, A. F.	100 00					100 00	42 50
	Totals	3,599 84	450 00	390 00	18 95	164 56	4,623 35	6,542 00
Fredericton	Fowler, J. D.	200 00					200 00	69 50
St. John	Rowan, A.	1,000 00			132 14	37 03	1,169 17	474 50
	Totals	1,200 00			132 14	37 03	1,369 17	544 00
Halifax	Miller, A.	1,300 00		309 35	355 10	113 10	2,077 55	548 25
Charlottetown	Brace, R. K.	200 00				30 40	230 40	74 00
Winnipeg	Magness, R.			108 00		37 83	145 83	309 00

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APPENDIX E—*Concluded.*

STATEMENT of Gas Inspection Expenditures and Receipts, &c.—*Concluded.*

Districts.	Inspectors.	Expenditures.						Receipts.
		Salaries.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Nanaimo	McAloney, J. A.	100 00					100 00	137 50
New Westminster	Wolfenden, Wm.	100 00					100 00	58 00
Vancouver	Miller, J. E.	100 00			8 00	60 95	168 95	270 75
Victoria	Jones, R.	200 00		125 00		187 88	512 88	457 00
	Totals	500 00		125 00	8 00	248 83	881 83	923 25

RECAPITULATION.

Ontario	7,687 88	287 46	796 00	432 55	540 77	9,744 66	9,676 50
Quebec	3,599 84	450 00	390 00	18 95	164 56	4,623 35	6,542 00
New Brunswick	1,200 00			132 14	37 03	1,369 17	544 00
Nova Scotia	1,300 00		309 35	355 10	113 10	2,077 55	548 25
Prince Edward Island	200 00				30 40	230 40	74 00
Manitoba			108 00		37 83	145 83	309 00
British Columbia	500 00		125 00	8 00	248 83	881 83	923 25
General Contingencies				56 10	855 63	911 73	
Printing					132 71	132 71	
Stationery					113 67	113 67	
Grand Totals	14,487 72	737 46	1,728 35	1,002 84	2,274 53	20,230 90	18,617 00

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Barrie—									
July			22·76		0	1			
August			20·30		0	1			
September			19·23		0	1			
October			20·54		0	1			
November									
December			20·53		0	1			
January			20·80		0	1			
February			19·70		0	1			
March			20·62		0	1			
April			21·63		0	1			
May			20·86		0	1			
June			18·41		0	1			
					0	11			
Belleville—									
July	22·07	20·21	21·14		0	2			
August	17·41	16·72	17·28		0	3			
September			17·91		0	1			
October	18·72	16·05	17·28		0	3			
November	20·06	16·98	18·27		0	3			
December	20·24	18·37	19·38		0	3			
January	21·67	19·97	20·66		0	3			
February	21·15	26·07	20·45		0	3			
March	20·23	18·44	19·26		0	3			
April	22·38	19·50	20·69		0	4			
May	21·70	19·23	20·05		0	4			
June	21·92	19·83	20·89		0	3			
					0	35			
Berlin—									
July			19·28		0	1			
August			19 08		0	1			
September			18·56		0	1			
October			18·13		0	1			
November			19·69		0	1			
December			18·90		0	1			
January			20·64		0	1			
February			17·53		0	1			
March			18·50		0	1			
April			18·43		0	1			
May			20·57		0	1			
June			18·14		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F.

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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									1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Brantford—									
July			19·44		0	1			
August			20·81		0	1			
September			22·44		0	1			
October			21·72		0	1			
November			21·49		0	1			
December			19·50		0	1			
January			19·00		0	1			
February			19·18		0	1			
March			19·75		0	1			
April			20·85		0	1			
May			21·06		0	1			
June			19·66		0	1			
					0	12			
Brockville—									
July			20·00		0	1			
August			17·80		0	1			
September			20·00		0	1			
October			19·96		0	1			
November			21·50		0	1			
December			20·00		0	1			
January			18·44		0	1			
February			19·00		0	1			
March			18·55		0	1			
April			18·80		0	1			
May			20·00		0	1			
June			20·00		0	1			
					0	12			
Chatham—									
July			16·90		0	1			
August			16·72		0	1			
September			18·68		0	1			
October			16·86		0	1			
November			17·00		0	1			
December									
January									
February									
March			16·86		0	1			
April			16·86		0	1			
May									
June									
					0	7			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Cobourg—									
July			17·61		0	1			
August			17·78		0	1			
September			17·37		0	1			
October			19·17		0	1			
November			17·04		0	1			
December			17·61		0	1			
January			18·22		0	1			
February			17·41		0	1			
March			18·65		0	1			
April			17·77		0	1			
May			17·79		0	1			
June			20·12		0	1			
					0	12			
Cornwall—									
July			18·10		0	1			
August			17·78		0	1			
September			18·79		0	1			
October			18·10		0	1			
November			18·10		0	1			
December			18·50		0	1			
January			17·90		0	1			
February			18·70		0	1			
March			18·30		0	1			
April			18·76		0	1			
May			18·10		0	1			
June			18·70		0	1			
					0	12			
Dundas—									
July			19·34		0	1			
August			19·34		0	1			
September			20·49		0	1			
October			19·98		0	1			
November			19·18		0	1			
December			19·34		0	1			
January			20·69		0	1			
February			18·84		0	1			
March			18·32		0	1			
April			19·52		0	1			
May			19·88		0	1			
June			20·37		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									1	1	2	
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									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Galt—									
July			19·00		0	1			
August			20·01		0	1			
September			19·33		0	1			
October			20·02		0	1			
November			19·02		0	1			
December			19·97		0	1			
January			19·46		0	1			
February			19·62		0	1			
March			19·21		0	1			
April			18·60		0	1			
May			20·00		0	1			
June			19·02		0	1			
					0	12			
Guelph—									
July			20·84		0	1			
August			20·25		0	1			
September			21·58		0	1			
October			20 20		0	1			
November			22·78		0	1			
December			23·43		0	1			
January			23·26		0	1			
February			22·02		0	1			
March			23·37		0	1			
April			22·44		0	1			
May			20·07		0	1			
June			19·26		0	1			
					0	12			
Hamilton—									
July			17·79		0	1			
August			18·00		0	1			
September			18·29		0	1			
October			18·00		0	1			
November			17·95		0	1			
December			18·50		0	1			
January			17·79		0	1			
February			17·35		0	1			
March			17·35		0	1			
April			17·50		0	1			
May			18·00		0	1			
June			18·19		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest.	Lowest.	Average.	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Ingersoll—									
July			20·69		0	1			
August			19·34		0	1			
September			19·34		0	1			
October			19 67		0	1			
November			20·23		0	1			
December			21·59		0	1			
January			20·00		0	1			
February			22·03		0	1			
March			19·83		0	1			
April			20·04		0	1			
May			19·50		0	1			
June									
					0	11			
Kingston—									
July	22·90	20·42	21·53		0	3			
August	24·20	20·42	23·59		0	2			
September	22·72	21·43	22·07		0	2			
October	22·71	20·57	21·52		0	3			
November	20·36	18·33	19·20		0	3			
December	20 08	19·40	19·63		0	3			
January									
February	21·90	20·33	20·89		0	3			
March			21·68		0	1			
April	21·40	20·20	20·88		0	3			
May	20·70	19·80	20·17		0	3			
June	21·14	19·30	20·21		0	3			
					0	29			
Listowel—									
July			21·65		0	1			
August			20·57		0	1			
September			19·91		0	1			
October			21·24		0	1			
November			21·40		0	1			
December			21·24		0	1			
January			20·42		0	1			
February			22·38		0	1			
March			19·62		0	1			
April			17·34		0	1			
May			22·03		0	1			
June			21·75		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
London—									
July	19·34	18·04	18·69		0	2			
August	19·66	18·84	19·25		0	2			
September	20·40	20·09	20·24		0	2			
October	20·79	20·06	20·45		0	3			
November	20·69	18·84	19·67		0	3			
December	18·40	17·85	18·20		0	3			
January	18·00	17·85	17·90		0	3			
February	20·00	19·02	19·42		0	3			
March	20 00	19·34	19·74		0	3			
April	21·91	19·73	20·67		0	3			
May	21·10	19·34	20·28		0	3			
June									
					0	30			
Napanee—									
July			26·70		0	1			
August			24·70		0	1			
September									
October			22·21		0	1			
November			21·51		0	1			
December			25·11		0	1			
January			24·95		0	1			
February			23·47		0	1			
March			22·92		0	1			
April			23·04		0	1			
May			26·33		0	1			
June			23·58		0	1			
					0	11			
Ottawa—									
July	22·01	21·55	21·78		0	2	15·45	41·71	15·08
August	22·06	21·81	21·93		0	2	15·07	14·41	14·74
September	21·88	21 25	21·56		0	2	14·99	14·70	14·84
October	22·21	21·76	21·98		0	2	15·32	14·70	15·01
November	21·77	21·69	21·73		0	2	14·97	14·37	14·67
December	22·27	21·85	22·06		0	2	14·81	14·49	14·65
January	21·95	21·57	21·76		0	2	14·99	14·70	14·84
February	22·25	21·20	21·72		0	2	15·14	14·33	14·73
March	21·81	21·53	21·67		0	2	15·61	14·73	15·17
April	21·99	20·98	21·48		0	2	14·97	14·43	14·70
May	21·15	21·54	21·84		0	2	15 04	14·29	14·66
June	22·20	22·10	22·15		0	2	15·66	14·88	15·27
					0	24			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	2	0	2	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	3	0	3	
...	...	...	...	...	...	...	...	...	...	...	...	
	...	...					...	...	30	0	30	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
...	...	...	...	...	...	...	...	...	1	0	1	
	...	...					...	...	11	0	11	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
...	0	2	...	...	...	...	0	2	2	0	2	
	0	24					0	24	24	0	24	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Owen Sound—									
July			22·40		0	1			
August			23·10		0	1			
September			22·05		0	1			
October			22·40		0	1			
November			22·19		0	1			
December			22·60		0	1			
January			23·10		0	1			
February			22·35		0	1			
March			22·20		0	1			
April			20·09		0	1			
May			22·40		0	1			
June			22·20		0	1			
					0	12			
Peterborough—									
July			21·28		0	1			
August			21·67		0	1			
September			23·02		0	1			
October			24·67		0	1			
November			22·56		0	1			
December			19·67		0	1			
January			18·35		0	1			
February			18·30		0	1			
March			19·60		0	1			
April			20·70		0	1			
May			21·28		0	1			
June			21·84		0	1			
					0	12			
Port Hope—									
July			17·81		0	1			
August			17·55		0	1			
September			18·44		0	1			
October			17·19		0	1			
November			16·74		0	1			
December			17·15		0	1			
January			16·47		0	1			
February			17·10		0	1			
March			17·09		0	1			
April			18·52		0	1			
May			17·45		0	1			
June			17·44		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									0	1	1	
									1	0	1	
									1	0	1	
									11	1	12	
									1	0	1	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									23	0	23	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Test.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Sarnia—									
July			19·78		0	1			
August			19·65		0	1			
September									
October			20·23		0	1			
November			18·00		0	1			
December			18·52		0	1			
January			18·53		0	1			
February			18·56		0	1			
March			20·90		0	1			
April			20·67		0	1			
May			20·56		0	1			
June			21·05		0	1			
					0	11			
Stratford—									
July			16·20		0	1			
August			16·23		0	1			
September			16·87		0	1			
October			17·08		0	1			
November			16·69		0	1			
December			16·27		0	1			
January			16·06		0	1			
February			16·76		0	1			
March			16·16		0	1			
April			16·56		0	1			
May			16·39		0	1			
June			16·51		0	1			
					0	12			
St. Catharines—									
July			19·50		0	1			
August			20·30		0	1			
September			22·80		0	1			
October			20·16		0	1			
November			22·37		0	1			
December			19·00		0	1			
January			20·02		0	1			
February			18·12		0	1			
March			19·57		0	1			
April			19·18		0	1			
May			20·02		0	1			
June			20·80		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F.—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									11	0	11	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									0	1	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									11	1	12	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
St. Thomas—									
July			18·84		0	1			
August			20·10		0	1			
September			19·12		0	1			
October			18·35		0	1			
November			18·84		0	1			
December			18·20		0	1			
January			18·06		0	1			
February									
March			19·80		0	1			
April			20·00		0	1			
May			18·15		0	1			
June									
					0	10			
Toronto—									
July	22·50	20·36	21·10		0	9	15·69	11·38	13·53
August	21·84	20·69	21·31		0	9	16·83	14·11	15·47
September	21·47	20·03	20·84		0	8	17·01	14·33	15·67
October	22·41	19·69	20·79		0	9	15·66	11·79	13·72
November	20·77	19·37	20·26		0	9	16·98	14·16	15·57
December	21·43	18·49	19·82		0	9	18·83	15·69	17·26
January	20·94	19·13	20·33		0	9	18·71	16·09	17·40
February	20·51	18·84	19·49		0	8	21·24	20·93	21·08
March	20·32	18·58	19·31		0	8	17·62	15·22	16·42
April	19·89	18·73	19·31		0	9	16·99	14·88	15·93
May	20·95	19·50	20·43		0	9	14·05	8·44	11·24
June	21·23	20·08	20·68		0	9	17·08	11·29	14·18
					0	105			
Windsor—									
July			16·36		0	1			
August			17·00		0	1			
September			16·86		0	1			
October			16·22		0	1			
November			16·36		0	1			
December			16·86		0	1			
January			13·88		1	1			
February			16·56		0	1			
March			16·98		0	1			
April			16·86		0	1			
May			16·86		0	1			
June									
					1	11			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									11	0	11	
	0	2	0·03	0·00	0·01		0	2	9	0	9	
	0	2	0·25	0·10	0·17½		0	2	9	0	9	
	0	2	3·52	1·02	2·27		0	2	7	1	8	
	0	2	2·56	1·54	2·05		0	2	9	0	9	
	0	2	2·06	1·26	1·66		0	2	9	0	9	
	0	2	2·79	1·44	2·11		0	2	9	0	9	
	0	2	2·03	1·63	1·83		0	2	9	0	9	
	0	2	3·04	1·95	2·49		0	2	8	0	8	
	0	2	1·84	1·16	1·50		0	2	8	0	8	
	0	2	2·32	1·85	2·08		0	2	9	0	9	
	0	2	0·76	0·20	0·48		0	2	9	0	9	
	0	2	1·30	1·03	1·16		0	2	9	0	9	
	0	24					0	24	104	1	105	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									11	0	11	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Woodstock—									
July			20·88		0	1			
August			18·68		0	1			
September			19·50		0	1			
October			20·00		0	1			
November			20·63		0	1			
December			21·91		0	1			
January			22·44		0	1			
February			24·00		0	1			
March			28·00		0	1			
April			24·30		0	1			
May			22·00		0	1			
June									
					0	11			
Montreal—									
July	20·31	18·38	19·46		0	8	26·55	21·90	24·22
August	20·95	17·14	17·19		0	9	32·29	23·60	27·94
September	20·20	18·55	19·42		0	8	21·72	16·62	19·17
October	21·06	18·00	19·65		0	9	22·76	13·45	18·10
November	20·01	17·49	18·86		0	9	24·26	18·74	21·50
December	20·73	17·59	19·00		0	9	27·93	25·49	26·71
January	18·38	17·13	17·67		0	10	27·99	20·33	24·16
February	18·79	17·01	17·58		0	8	27·82	25·60	26·71
March	18·83	16·92	17·74		0	9	27·75	25·78	26·70
April	19·67	18·01	18·75		0	9	32·83	18·22	25·52
May	19·75	17·26	18·72		0	9	25·34	17·85	21·59
June	20·70	17·01	18·52		0	9	20·00	18·50	19·25
					0	106			
Quebec—									
July			17·82		0	1	16·75	11·82	14·23
August			18·27		0	1	19·77	18·87	19·32
September			18·56		0	1	20·10	18·31	19 20
October			18·25		0	1	25·48	15·18	20·33
November			18·11		0	1	19·62	16·53	18·07
December			18·08		0	1	19·18	13·12	16·15
January			18·37		0	1	20·62	19·51	20·06
February			18·27		0	1	20·45	15·17	17·81
March			18·51		0	1	20·70	18·79	19·74
April			18·18		0	1	22·40	17·10	19·75
May			18·38		0	1	20·47	19·07	19 77
June			18·09		0	1	17·89	14 41	16·15
					0	12			

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	..	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	..	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	1	0	1	
....	....	....	....	....	....	....	....	..	....	....	....	
	....	....					....	..	11	0	11	
....	0	2	1·56	0·09	0·82	....	0	2	11	0	11	
....	0	2	1·56	0·51	1·03	....	0	2	12	0	12	
....	0	2	1·01	0·50	0·75	....	0	2	11	0	11	
....	0	2	0·90	0·25	0·57	....	0	2	12	0	12	
....	0	2	0·75	0·00	0·37	....	0	2	12	0	12	
....	0	2	0·26	0·00	0·13	....	0	2	12	0	12	
....	0	2	0·24	0·00	0·12	....	0	2	13	0	13	
....	0	2	1·27	0·00	0·63	....	0	2	8	0	8	
....	0	2	1·26	1·01	1·13	....	0	2	12	0	12	
....	0	2	0·50	0·49	0·49	....	0	2	12	0	12	
....	0	2	1·25	0·50	0·87	....	0	2	12	0	12	
....	0	2	0·51	0·38	0·44	....	0	2	12	0	12	
	0	24					0	24	139	0	139	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
....	0	2	....	....	....	....	0	2	2	0	2	
	0	24					0	24	24	0	24	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Sherbrooke—									
July			19·43		0	1			
August			18·98		0	1			
September			18·89		0	1			
October			16·68		0	1			
November			17·15		0	1			
December			16·30		0	1			
January			19·43		0	1			
February			16·95		0	1			
March			19·41		0	1			
April			18·38		0	1			
May			18·57		0	1			
June			18·67		0	1			
					0	12			
Fredericton—									
July	18·07	17·78	17·89		0	6			
August	18·95	17·58	18·28		0	7			
September	18·67	17·41	17·77		0	5			
October	17·86	16·67	17·52		0	8			
November	17·39	16·19	16·73		0	5			
December	16·92	15·87	16·50		1	5			
January	18·39	16·43	17·38		0	7			
February	18·48	15·96	17·38		1	8			
March	19·19	16·94	17·86		0	7			
April	19·20	16·15	17·63		0	7			
May	19·04	17·02	18·06		0	8			
June	18·66	17·97	18·25		0	8			
					2	81			
Moncton—									
July			17·59		0	1			
August			17·10		0	1			
September			17·58		0	1			
October			18·06		0	1			
November			18·89		0	1			
December			15·36		1	1			
January			17·16		0	1			
February			20·18		0	1			
March			16·16		0	1			
April			19·43		0	1			
May			17·52		0	1			
June			17·70		0	1			
					1	12			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 18 9.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									6	0	6	
									7	0	7	
									5	0	5	
									8	0	8	
									3	2	5	
									4	1	5	
									7	0	7	
									7	1	8	
									7	0	7	
									7	0	7	
									8	0	8	
									8	0	8	
									77	4	81	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
St. John—									
July	18·59	16·24	17·14		0	7	19·27	16·84	18·31
August	17·35	16·95	17·19		0	7	19·05	16·63	17·92
September	19·12	17·01	18·14		0	8	20·45	18·92	19·62
October	18·34	16·20	17·04		0	7	21·46	19·31	20·31
November	17·65	16·34	17·12		0	7	20·48	18·99	19·87
December	19·74	16·53	17·72		0	7	23·09	20·03	22·02
January	17·75	16·23	16·93		0	8	23·10	21·35	22·06
February	18·28	16·11	16·97		0	8	22·71	19·75	21·34
March	17·10	16·63	18·84		0	5	23·08	19·87	21·59
April	18·02	16·19	16·94		0	7	22·62	18·58	20·92
May	18·02	16·74	17·34		0	7	22·96	19·53	21·20
June	17·74	16·31	17·06		0	5	19·73	17·54	18·70
					0	83			
Halifax—									
July	17·78	17·62	17·70		0	2	12·31	11·47	11·89
August	16·68	16·46	16·57		0	2	11·32	10·16	10·74
September			16·30		0	1			10·41
October			16 25		0	1			9·88
November	16·56	16·35	16 45		0	2	11·46	10·28	10·87
December	17·76	17 40	17·58		0	2	10·77	8·62	9·69
January			17·24		0	1			
February	17·62	17·40	17·51		0	2	11·54	9·74	10·64
March	17·11	16·35	16·73		0	2	11·38	6·68	9·03
April	17·64	17·28	17·46		0	2	11·65	7·69	9·67
May	17·21	16·30	16·75		0	2	12·04	11·20	11·17
June	17·86	17·64	17·75		0	2	10·47	7·72	9·09
					0	21			
Pictou—									
July			18·62		0	1			
August			19·08		0	1			
September									
October			16·72		0	1			
November			18·54		0	1			
December			19·25		0	1			
January									
February			18·63		0	1			
March			17·69		0	1			
April			18·04		0	1			
May			17·90		0	1			
June			18·25		0	1			
					0	10			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
	0	3					0	3	7	0	7	
	0	4					0	4	7	0	7	
	0	4	1·38	0·00	0·62		0	4	8	0	8	
	0	4	2·12	1·00	1·62		0	4	7	0	7	
	0	4	1·15	0·00	0·29		0	4	7	0	7	
	0	4					0	4	7	0	7	
	0	5					0	5	8	0	8	
	0	4	1·71	1·41	1·54		0	4	8	0	8	
	0	3	2·10	1·32	1·72		0	3	5	0	5	
	0	4	3·16	1·21	2·08		0	4	7	0	7	
	0	4	3·25	2·10	2·71		0	4	7	0	7	
	0	4	3·33	2·58	2·91		0	4	5	0	5	
	0	47					0	47	83	0	83	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	1					0	1	1	0	1	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	21					0	21	21	0	21	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									10	0	10	

63 VICTORIA, A. 1900

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Yarmouth—									
July			17·33		0	1			
August			17·05		0	1			
September			16·42		0	1			
October									
November			18·47		0	1			
December			17·41		0	1			
January									
February			17·26		0	1			
March			17·40		0	1			
April			17·44		0	1			
May									
June			18·00		0	1			
					0	9			
Charlottetown—									
July	19·50	18·25	18·75		0	3			
August	19·81	17·66	18·66		0	4			
September	19·81	17·69	18·51		0	4			
October	18·44	17·37	18·08		0	3			
November	18·89	18·14	18·39		0	3			
December	21·14	17·13	18·88		0	3			
January	19·72	18·04	18·81		0	3			
February	18·06	16·69	17·53		0	3			
March	19·00	18·05	18·54		0	3			
April	19·55	18·36	18·90		0	3			
May	19·45	19·06	19·22		0	3			
June	20·69	18·82	19·88		0	3			
					0	38			
Winnipeg—									
July									
August			20·77		0	1			
September			19·71		0	2			
October			20·01		0	1			
November			21·17		0	5			
December			22·40		0	2			
January			21·84		0	1			
February			22·34		0	1			
March			20·07		0	1			
April			20·14		0	1			
May			19·72		0	1			
June			20·26		0	1			
					0	17			

SESSIONAL PAPER No. 7a

F.

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									9	0	9	
									3	0	3	
									4	0	4	
									4	0	4	
									0	3	3	
									0	3	3	
									0	3	3	
									0	3	3	
									0	3	3	
									0	3	3	
									1	2	3	
									2	1	3	
									3	0	3	
									17	21	38	
									2	0	2	
									1	0	1	
									1	0	1	
									4	0	4	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Nanaimo—									
July			19·03		0	1			
August			20·09		0	1			
September			19·37		0	1			
October			17·93		0	1			
November			19·69		0	1			
December			21·46		0	1			
January			16·77		0	1			
February			17·18		0	1			
March			19·98		0	1			
April			18·82		0	1			
May			18·45		0	1			
June			19·09		0	1			
					0	12			
New Westminster—									
July			17·92		0	1			
August			17·72		0	1			
September									
October									
November									
December									
January									
February									
March									
April									
May									
June									
					0	2			
Vancouver—									
July			17·89		0	1			
August			17·35		0	1			
September			17·89		0	1			
October			19·04		0	1			
November			17·06		0	1			
December			17·16		0	1			
January			17·15		0	1			
February			17·61		0	1			
March			17·89		0	1			
April			18·42		0	1			
May			17·89		0	1			
June			18·55		0	1			
					0	12			

SESSIONAL PAPER No. 7a

F—*Continued.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									2	0	2	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Victoria—									
July			18·02		0	1			
August			18·10		0	1			
September									
October			18·21		0	1			
November									
December									
January									
February			18·17		0	1			
March			18·11		0	1			
April			18·57		0	1			
May			18·24		0	1			
June			18·12		0	1			
					0	8			

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

SESSIONAL PAPER No. 7a

F —*Concluded.*

Inspected during the Year ended June 30, 1899.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of Times absent.	No. of Times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									8	0	8	

E. MIALL,
Commissioner.

APPENDIX G.

STATEMENT of Gas Meters presented for Verification, Verified, Verified after first Rejection and Rejected during the Year ended June 30, 1899.

INSPECTION OFFICES.	Presented for Verification	Kind.		Verified as coming within the Error tolerated by Law.			Verified after First Rejection.			Rejected.			Totals Verified and Rejected.	
		Wet.	Dry.	Correct.	Fast.	Slow.	Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Verified.	Rejected.
Barrie	29	....	29	1	4	21	....	1	2	....	....	....	29	....
Belleville	122	....	122	22	12	75	....	....	....	3	1	9	109	13
Berlin	81	....	81	1	12	63	....	....	....	....	3	2	76	5
Brantford	54	....	54	12	2	40	....	....	....	....	....	....	54	....
Brockville	188	....	188	57	66	58	3	....	....	1	3	....	184	4
Chatham	20	....	20	11	5	4	....	....	....	....	....	....	20	....
Cobourg	52	....	52	2	32	17	....	....	....	....	....	1	51	1
Cornwall	6	....	6	2	1	3	....	....	....	....	....	....	6	....
Dundas	2	....	2	....	....	2	....	....	....	....	....	....	2	....
Galt	83	....	83	5	12	66	....	....	....	....	....	....	83	....
Guelph	105	....	105	....	6	98	....	....	....	....	....	1	104	1
Hamilton	683	....	683	176	28	479	....	....	....	....	....	....	683	....
Ingersoll	71	....	71	17	24	29	....	....	....	1	....	....	71	....
Kingston	115	....	115	26	30	59	....	....	....	....	....	....	115	....
Listowel	23	....	23	20	1	2	....	....	....	....	....	....	23	....
London	417	....	417	123	104	188	2	....	....	....	2	....	415	2
Napanee	11	....	11	....	3	4	....	....	....	2	....	2	7	4
Ottawa	477	....	477	37	53	377	....	....	....	....	7	3	467	10
Owen Sound	26	....	26	25	....	1	....	....	....	....	....	....	26	....
Peterborough	36	....	36	7	1	28	....	....	....	....	....	....	36	....
Sarnia	54	....	54	53	....	1	....	....	....	....	....	....	54	....
Stratford	31	....	31	9	4	14	....	....	....	....	....	4	27	4
St. Catharines	201	....	201	35	10	156	....	....	....	....	....	....	201	....
St. Thomas	113	....	113	39	24	50	....	....	....	....	....	....	113	....
Toronto	5,125	....	5,125	1,051	1,464	2,578	....	....	....	7	8	17	5,093	32
Windsor	92	....	92	6	7	78	....	....	....	....	1	....	91	1
" Natural Gas Co.	410	....	410	28	48	330	....	3	....	1	....	....	409	1
Woodstock	95	....	95	27	24	44	....	....	....	....	....	....	95	....
Montreal	6,483	....	6,483	1,161	1,501	3,736	....	....	....	2	68	15	6,398	85
Quebec	117	....	117	54	33	28	....	....	....	....	2	....	115	2
Sherbrooke	6	5	1	1	3	2	....	....	....	....	....	....	6	....
Fredericton	25	....	25	2	3	6	1	....	....	....	5	8	12	13
St. John	244	....	244	87	44	106	....	....	....	2	3	2	237	7
Halifax	297	277	20	244	15	38	....	....	....	....	....	....	297	....
Pictou	17	....	17	2	9	5	....	....	....	1	....	....	16	1
Yarmouth	94	....	94	37	12	43	....	....	1	....	....	1	93	1
Charlottetown	38	....	38	3	14	16	....	....	....	....	2	3	33	5
Winnipeg	252	....	252	26	22	204	....	....	....	....	....	....	252	....
Nanaimo	105	....	105	18	16	71	....	....	....	....	....	....	105	....
Vancouver	191	....	191	25	66	100	....	....	....	....	....	....	191	....
Victoria	396	....	396	85	115	196	....	....	....	....	....	....	396	....
Totals	16,987	282	16,705	3,537	3,830	9,416	6	4	3	20	105	68	16,795	192

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

APPENDIX H.

STATEMENT of Electric Light Inspection Expenditures and Receipts for the Year ended June 30, 1899.

Districts.	Inspectors.	Expenditures.				Receipts.		
		Special Assistance	Travelling Expenses.	Sundries.	Totals.	Registration Fees.	Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Johnson, Wm.		52 85	41 51	94 36	425 00	153 25	578 25
Hamilton	McPhie, D.		19 10	1 30	20 40	340 00	327 00	667 00
London	Williams, J.		17 00	6 65	23 65	560 00	195 25	755 25
Ottawa	Roche, H. G.					350 00	1,032 75	1,382 75
Toronto	Johnstone, J. K.		197 10	7 20	204 30	795 00	947 25	1,742 25
	Ontario		286 05	56 66	342 71	2,470 00	2,655 50	5,125 50
Montreal	Aubin, A.	282 00	11 00	16 22	309 22	280 00	2,233 50	2,513 50
Quebec	Le Vasseur, N.			12 25	12 25	45 00	281 50	326 50
Sherbrooke	Simpson, A. F.		63 45	9 39	72 84	325 00	233 00	558 00
	Quebec	282 00	74 45	37 86	394 31	650 00	2,748 00	3,398 00
St. John	Rowan, A		112 64	29 00	141 64	175 00	318 25	493 25
Halifax	Miller, A.		65 76	1 00	66 76	380 00	318 00	698 00
Winnipeg	Magness, R.					285 00	408 50	693 50
Vancouver	Miller, J. E			43 96	43 96	150 00	415 50	565 50
Victoria	Jones, R		20 35	79 02	99 37	60 00	364 50	424 50
	British Columbia		20 35	122 98	143 33	210 00	780 00	990 00

RECAPITULATION.

	Salaries.							
Ontario			286 05	56 66	342 71	2,470 00	2,655 50	5,125 50
Quebec		282 00	74 45	37 86	394 31	650 00	2,748 00	3,398 00
New Brunswick			112 64	29 00	141 64	175 00	318 25	493 25
Nova Scotia & P.E.I.			65 76	1 00	66 76	380 00	318 00	698 00
Manitoba						285 00	408 50	693 50
British Columbia			20 35	122 98	143 33	210 00	780 00	990 00
Chief Electrical Engr	2,000 00		135 55	142 49	2,278 04			
Gen. Contingencies				2,625 67	2,625 67			
Printing				34 26	34 26			
Stationery				5 97	5 97			
	2,000 00	282 00	694 80	3,055 89	6,032 69	4,170 00	7,228 25	11,398 25

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

APPENDIX I.

STATEMENT showing the number of Electric Light Meters verified, rejected and verified after first rejection, in each Inspection Division, for the fiscal year ended June 30, 1899.

DIVISIONS.	Number presented.	Verified as coming within the Error tolerated by Law.			Rejected.			Verified after first rejection as coming within the Error tolerated by Law.		
		Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Correct.	Fast.	Slow.
Belleville	123	72	21	30						
Hamilton	356	220	33	98		5				
London	177	78	29	69	1					
Ottawa	835	146	313	372	4					
Toronto	628	70	388	170						
Montreal	1,562	439	552	405	8	143	15	25	83	17
Quebec	339	34	238	61	4				2	
Sherbrooke	199	14	81	101	1		1			1
St. John	244	47	79	117		1				
Halifax	254	125	114	5	1	3		3	3	
Winnipeg	201	50	40	111						
Vancouver	507	55	151	301						
Victoria	337	38	248	51						
Totals	5,762	1,388	2,287	1,891	19	152	16	28	88	18

E. MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

APPENDIX J.

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act during the Year ended June 30, 1899.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Total.		
								$ cts.	$ cts.
Belleville	R. R. Casement & Co., Madoc	1	C.I.R. Belleville	1898-99.	....	400	400	10 00	
	Belleville Gas Company	2	" "	"	55	400	950	10 00	
	Trenton Electric Company (Limited)	3	" "	"	35	1,000	1,350	25 00	
	Municipal Corporation of the Village of Alexandria	1	" Cornwall	"	.....	500	500	10 00	
	Vankleek Hill Electric Company (Limited)	2	" "	"	....	533	533	10 00	
	Stormont Electric Light and Power Company (Limited)	3	" "	"	....	1,400	1,400	25 00	
	Kingston Light, Heat and Power Company	1	" Kingston	"	111	2,000	3,110	25 00	
	Napanee Water, Light and Electric Light Company (Limited)	2	" "	"	33	33	423	10 00	
	John R. Scott Co., Napanee	3	" "	"	....	800	800	10 00	
	Peterborough Light, Heat and Power Company (Limited)	1	" Peterborough	"	120	7,000	8,200	25 00	
	Light, Heat and Power Company of Lindsay (Limited)	2	" "	"	70	5,000	5,700	25 00	
	Fenelon Falls Electric Light Company (Limited)	3	" "	"	.....	450	450	10 00	
	H. W. Foulds & Co., Hastings	4	" "	"	12	252	372	10 00	
	Corporation of the Village of Campbellford	5	" "	"	22	450	670	10 00	
	W. C. Harrison, Norwood	6	" "	"	23	153	383	10 00	
	Lakefield Electric Light Company	7	" "	"	20	.....	200	10 00	
	Millbrook Electric Light Company (Limited)	8	" "	"	10	600	700	10 00	
	Bowmanville Electric Light Company (Limited)	9	" "	"	34	485	825	10 00	
	Port Hope Electric Light and Power Company Limited)	10	" "	"	36	900	1,260	25 00	
	Plewes & Spence, Colborne	11	" "	"	20	355	555	10 00	
	Cobourg Electric Light and Power Company (Limited)	12	" "	"	40	1,100	1,500	25 00	
	Samuel Wilmot, Newcastle	13	" "	"	.....	250	250	10 00	
	Brockville Light and Power Company (Limited)	1	" Prescott	"	35	2,000	2,350	25 00	
	Cardinal Electric Light Company	2	" "	"	.....	700	700	10 00	
	A. H. Merkley, Morrisburg	3	" "	"	.....	550	550	10 00	
	Kemptville Electric Light Company	4	" "	"	....	350	350	10 00	
	Prescott Electric Light Company	5	" "	"	16	820	980	10 00	
	Gananoque Electric Light and Water Supply Company (Limited)	6	" "	"	20	800	1,000	25 00	
	Merrickville Electric Company	7	" "	"	.....	400	400	10 00	425 00
Hamilton	R. Brooks & Son, Port Dover	1	" Brantford	"	10	330	430	10 00	
	Brantford Street Railway Company	2	" "	"	25	2,059	2,309	25 00	
	James Munro, Embro	3	" "	"	....	194	194	10 00	

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act during the Year ended June 30, 1899.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Total.	Registration Fees.	Totals.
								$ cts.	$ cts.
Hamilton—*Con.*	Woodstock Electric Light, Power and Street Railway Co. (Ltd)	4	C.I.R., Brantford	1898-99.	70	1,000	1,700	25 00	
	Paris Electric Light Company	5	" "	"	45	400	850	10 00	
	Port Rowan Electric Light Supply	6	" "	"	21	100	310	10 00	
	Brantford Electric and Operating Company (Limited)	7	" "	"	80	3,000	3,800	25 00	
	Tilsonburg Electric Light Works	8	" "	"	16	535	695	10 00	
	Ingersoll Electric Power and Light Company (Limited)	9	" "	"	36	659	1,019	25 00	
	Simcoe Gas and Water Company	10	" "	"	30	.....	300	10 00	
	Herbert Webster, Norwich	11	" "	"	.....	200	200	10 00	
	Hamilton Electric Light and Power Company (Limited)	1	" Hamilton	"	467	12,000	16,670	25 00	
	Electrical Power and Manufacturing Co. of Hamilton (Ltd.)	2	" "	"	.....	400	400	10 00	
	Dunnville Electric Light Company (Limited)	1	" St. Catharines	"	19	916	1,106	25 00	
	Welland Electric Light Company	2	" "	"	.....	340	340	10 00	
	Corporation of the Town of Thorold	3	" "	"	30	290	590	10 00	
	St. Catharines Electric Light and Power Company	4	" "	"	80	1,200	2,000	25 00	
	Corporation of the Town of Niagara	5	" "	"	.....	780	780	10 00	
	J. W. Van Dyck, Grimsby	6	" "	"	.....	600	600	10 00	
	Niagara Falls Electric Light and Power Company	7	" "	"	46	2,000	2,460	25 00	
	L. M. Burns, Caledonia	8	" "	"	6	100	160	10 00	
	Cayuga Electric Light and Power Company	9	" "	"	9	325	415	10 00	
									340 00
London	St. Thomas Gas Company	1	" London	"	98	400	1,380	25 00	
	Petrolia Light, Heat and Power Company	2	" "	"	39	1,800	2,190	25 00	
	Sarnia Gas and Electric Light Company	3	" "	"	61	500	1,110	25 00	
	Strathroy Electric Company	4	" "	"	27	500	770	10 00	
	Hamilton & Prout, Forest	5	" "	"	11	400	510	10 00	
	John Morwood, Alvinston	6	" "	"	13	170	300	10 00	
	Aylmer Electric and Manufacturing Company	7	" "	"	12	800	920	10 00	
	Fitzgerald & Sauermann, Watford	8	" "	"	12	300	420	10 00	
	London Electric Company (Limited)	9	" "	"	350	15,000	18,500	25 00	
	H. C. Baird & Son, Parkhill	10	" "	"	30	.....	300	10 00	
	W. W. Gordon, Glencoe	11	" "	"	18	250	430	10 00	
	John C. Hay, Listowel	1	" Stratford	"	23	.....	230	10 00	
	Seaforth Electric Light, Heat and Power Company	2	" "	"	52	1,100	1,620	25 00	

	Clinton Electric Light Company	3	"	"	"	21	680	890	10 00		
	Palmerston Electric Light Company	4	"	"	"	16	500	660	10 00		
	Stratford Gas Company	5	"	"	"	110	1,200	1,310	25 00		
	J. L. Eidt, Auburn	6	"	"	"	.....	175	175	10 00		
	Town of Goderich	7	"	"	"	32	1,300	1,620	25 00		
	James Donaldson, Bayfield	8	"	"	"	.....	95	95	10 00		
	Brussels Electric Light Company	9	"	"	"	9	325	415	10 00		
	St. Mary's Electric Light Company	10	"	"	"	16	480	640	10 00		
	J. G. Fields, Tavistock	11	"	"	"	.....	320	320	10 00		
	Exeter Electric Light and Power Company	12	"	"	"	10	600	700	10 00		
	Wingham Electric Light Company	13	"	"	"	40	800	1,240	25 00		
	Corporation of the Town of Mitchell	14	"	"	"	35	351	701	10 00		
	Cook Bros., Hensall	15	"	"	"	.....	250	250	10 00		
	Blyth Electric Light Plant	16	"	"	"	20	240	440	10 00		
	Leamington Electric Light Company (Limited)	1	"	Windsor	"	2	619	739	10 00		
	George Munro, Thamesville	2	"	"	"	7	400	470	10 00		
	People's Electric Company (Limited)	3	"	"	"	.....	4,350	4,350	25 00		
	Wallaceburg Electric Light Company (Limited)	4	"	"	"	45	7	457	10 00		
	Hiram Walker & Sons, (Limited	5	"	"	"	1	1,800	1,810	25 00		
	Smith & Henderson, Blenheim	6	"	"	"	11	56	166	10 00		
	Amherstburg Electric Light, Heat and Power Company	7	"	"	"	.....	900	900	10 00		
	John E. Gordon, Dresden	8	"	"	"	.....	300	300	10 00		
	Wm. Laing, Essex	9	"	"	"	30	10	310	10 00		
	R. M. Saxley, Kingsville	10	"	"	"	11	106	216	10 00		
	Louis Goodchild, Harrow	11	"	"	"	.....	240	240	10 00		
	Wm. McMaster, Ridgetown	12	"	"	"	17	523	693	10 00		
	Chatham Gas Company	13	"	"	"	.....	987	987	10 00		
	R. H. Smith, Tilbury	14	"	"	"	12	350	470	10 00		
										560 00	
Ottawa	Ottawa Electric Company	1	"	Ottawa	"	599	63,500	69,490	25 00		
	Hull Electric Company	2	"	"	"	12	2,000	2,120	25 00		
	Deschênes Electric Company	3	"	"	"	8	1,700	1,780	25 00		
	Albert Maclaren, Buckingham	4	"	"	"	.....	997	997	10 00		
	Carleton Place Electric Light Company	1	"	Perth	"	32	1,800	2,120	25 00		
	Corporation of the Town of Sudbury	2	"	"	"	15	700	850	10 00		
	John Bourke, North Bay	3	"	"	"	.....	880	880	10 00		
	Mattawa Electric Light and Power Company	4	"	"	"	.....	919	919	10 00		
	Wm. A. MacKay, Renfrew	5	"	"	"	.....	800	800	10 00		
	A. A. Wright & Co., Renfrew	6	"	"	"	10	500	600	10 00		
	Almonte Electric Light Company (Limited)	7	"	"	"	22	1,500	1,720	25 00		
	Canadian Electric Water and Power Company (Limited), Perth	8	"	"	"	.....	2,000	2,000	25 00		
	Perth Electric Light Company (Limited)	9	"	"	"	46	15	475	10 00		
	Pembroke Electric Light Company	10	"	"	"	20	2,800	3,000	25 00		
	Citizen's Electric Light Company, Smith's Falls	11	"	"	"	.....	1,500	1,500	25 00		
	Smith's Falls Electric Light Company	12	"	"	"	24	2,000	2,240	25 00		
	Star Electric Light Company, Eganville	13	"	"	"	.....	400	400	10 00		
	Eganville Electric Light Company	14	"	"	"	.....	450	450	10 00		
	Pakenham Electric Light Company	15	"	"	"	.....	400	400	10 00		
	Arnprior Electric Light and Power Company (Limited)	16	"	"	"	24	2,000	2,240	25 00		
										350 00	

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1899.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fee.	Totals.
					Arc.	Incandescent.	Total.		
								$ cts.	$ cts.
Toronto	J. S. Shantz, Hespeler	1	C.I.R., Guelph	1898-99.	27	31	301	15 00	
	Galt Gas Light Company (Limited)	2	" "	"	59	250	840	10 00	
	Berlin Gas Company	3	" "	"	50	709	1,209	25 00	
	Howes & Leighton, Harriston	4	" "	"	18	25	205	10 00	
	Waterloo Electric Light and Power Company	5	" "	"	20	800	1,000	10 00	
	Guelph Light and Power Company	6	" "	"	100	2,365	3,365	25 00	
	John Shearer, Preston	7	" "	"	...	400	400	10 00	
	James Fenwick, Preston	8	" "	"	30	8	308	10 00	
	Jacob Morley, New Hamburg	9	" "	"	21	160	370	10 00	
	A. Groves, Fergus	10	" "	"	17	700	870	10 00	
	Corley & Collins, Mount Forest	11	" "	"	14	52	192	10 00	
	Pollock & Co., Drayton	12	" "	"	5	195	245	10 00	
	Owen Sound Electric Illuminating and Manufacturing Company	1	" Owen Sound	"	55	250	800	10 00	
	Town of Kincardine	2	" "	"	17	530	700	10 00	
	Minnis Bros., Markdale	3	" "	"	.....	600	600	10 00	
	Robertson, Rowland & Co., Walkerton	4	" "	"	30	1,000	1,300	25 00	
	Saugeen Electric Light Company, Southampton	5	" "	"	.....	978	978	10 00	
	D. Knechtel, Hanover	6	" "	"	16	1,255	1,415	25 00	
	Thos. Andrews, Thornbury	7	" "	"	6	350	350	10 00	
	Town of Collingwood	8	" "	"	35	2,000	2,350	25 00	
	Kilmer, Crawford & McIntyre, Durham	9	" "	"	.....	800	800	10 00	
	W. Moore & Sons, Meaford	10	" "	"	18	600	780	10 00	
	Teeswater Light and Power Company	11	" "	"	...	300	300	10 00	
	Walter Stewart & Son, Lucknow	12	" "	"	12	230	350	10 00	
	Ramage Bros., Chesley	13	" "	"	.....	400	400	10 00	
	Wiarton Electric Light Company	14	" "	"	20	500	700	10 00	
	R. P. Bearman, Chesley	15	" "	"	27	300	570	10 00	
	E. C. Kilmer, Paisley	16	" "	"	.....	420	420	10 00	
	Carnegie & Currie, Port Perry	1	" Toronto	"	10	290	390	10 00	
	Alex. Dobson, Beaverton	2	" "	"	.....	400	400	10 00	
	J. G. Gould, Uxbridge	3	" "	"	14	413	553	10 00	
	Lakefield and Whitby Electric Light Company	4	" "	"	27	240	510	10 00	

	Stayner Electric Light Company	5	"	"	"		575	575	10 00		
	Town of Orillia	6	"	"	"	48	2,695	3,175	25 00		
	Town of Bracebridge	7	"	"	"		1,700	1,700	25 00		
	Town of Newmarket	8	"	"	"		820	820	10 00		
	Nicholas Egan, Tottenham	9	"	"	"		209	209	10 00		
	W. H. Summerfelt & Sons, West Sutton	10	"	"	"		260	260	10 00		
	Hutton Electric Company, Brampton	11	"	"	"	26	600	860	10 00		
	Tagoma Water and Light Company, Sault Ste. Marie	12	"	"	"	52	1,065	1,585	25 00		
	R. D. George, Stouffville	13	"	"	"		850	850	10 00		
	Penetanguishene and Midland Electric Street Railway, Light and Power Company (Limited), Penetanguishene	14	"	"	"	13	800	930	10 00		
	Water, Light and Power Company, Burk's Falls	15	"	"	"		500	500	10 00		
	Midland Electric Company (Limited)	16	"	"	"	20	700	900	10 00		
	Plewes & Spence, Creemore	17	"	"	"		348	348	10 00		
	Corporation Village of Huntsville	18	"	"	"		900	900	10 00		
	Cannington Electric Light Company	19	"	"	"	11	391	511	10 00		
	Shelburne Electric Light Company	20	"	"	"	34	70	410	10 00		
	Glenwilliams Electric Light Company	21	"	"	"	17	400	570	10 00		
	Barrie Electric Light Company	22	"	"	"	38	1,640	2,020	25 00		
	Oakville Electric Light Company	23	"	"	"	25	700	950	10 00		
	Oshawa Electric Light and Power Company	24	"	"	"	22	600	820	10 00		
	John Philips, Grand Valley	25	"	"	"		250	250	10 00		
	Gravenhurst Electric Light and Power Company	26	"	"	"	11	800	910	10 00		
	W. J. Fletcher, Alliston	27	"	"	"	11	550	660	10 00		
	W. J. Fletcher, Markham	28	"	"	"		380	380	10 00		
	Aurora Electric Light Company	29	"	"	"		352	352	10 00		
	Toronto Electric Light Company	30	"	"	"	1,500	45,000	60,000	25 00		
	Milton Electric Light and Power Company	31	"	"	"	20	430	630	10 00		
	Orangeville Electric Light and Power Company	32	"	"	"	29	800	1,090	25 00		
	Parry Sound Electric Light Company	33	"	"	"		1,020	1,020	25 00		
											795 00
Montreal	Corporation de la ville de Joliette	1	"	Joliette	"	33	1,250	1,580	25 00		
	La Compagnie de Lumière Electrique de Terrebonne	1	"	Montreal	"		300	300	10 00		
	The Royal Electric Company, Montreal	2	"	"	"	1,842	71,000	89,420	25 00		
	St. Jérôme Power and Electric Light Company	3	"	"	"		600	600	10 00		
	Imperial Electric Light Company, Montreal	4	"	"	"	3	6,759	6,789	25 00		
	Gazette Printing Company, Montreal	5	"	"	"		500	500	10 00		
	Jean Roux, Ste. Thérèse	6	"	"	"		150	150	10 00		
	Corporation of the Village of Huntingdon	7	"	"	"		626	626	10 00		
	J. B. Robert, Beauharnois	8	"	"	"		100	100	10 00		
	Corporation of the Town of Lachine	9	"	"	"	43	925	1,355	25 00		
	Lachute Electric Light Company	10	"	"	"		300	300	10 00		
	Lachine Rapids Hydraulic and Land Company, Montreal	11	"	"	"	300	25,000	28,000	25 00		
	La Compagnie Electrique de Valleyfield	12	"	"	"	53	1,000	1,530	25 00		
	Standard Light and Power Company, Montreal	13	"	"	"	37	2,000	2,370	25 00		
	R. Préfontaine, Ste. Agathe	14	"	"	"		400	400	10 00		
	North Shore Power Company, Three Rivers	1	"	Three Rivers	"	70	2,500	3,200	25 00		
											280 00

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1899.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fee.	Totals.
					Arc.	Incandescent.	Total.		
								$ cts.	$ cts.
Quebec	Fraserville Company (Limited)	1	C. I. R. Quebec	1898-99.	8	900	980	10 00	
	La Compagnie Electrique de Chicoutimi	2	" "	"	2	934	954	10 00	
	Montmorency Electric Power Company, Quebec	3	" "	"	448	19,695	24,175	25 00	
									45 00
Sherbrooke	Knowlton Electric Light Company	1	" Sherbrooke	"		350	350	10 00	
	Sherbrooke Gas and Water Company	2	" "	"	55	5,000	5,550	25 00	
	French Bros., Sawyerville	3	" "	"		90	90	10 00	
	Richmond County Electric Company, Richmond	4	" "	"		1,136	1,136	25 00	
	A. E. Frost, Waterloo	5	" "	"		863	863	10 00	
	Corporation of the Town of Magog	6	" "	"		993	993	10 00	
	Farnham Electric Light Company	7	" "	"		850	850	10 00	
	Napoléon Lemay, St. Camille	8	" "	"		70	70	10 00	
	G. K. Nesbitt, Cowansville	9	" "	"		350	350	10 00	
	Parker & Howe, Dixville	10	" "	"		125	125	10 00	
	Coaticook Electric Light and Power Company	11	" "	"	25	1,000	1,250	25 00	
	Stanstead Electric Light Company	12	" "	"	21	700	910	10 00	
	Eastern Townships Light, Power and Carbide Company	13	" "	"		500	500	10 00	
	St. John's Electric Light Company	14	" "	"	30	1,400	1,700	25 00	
	D. Champoux & Bro., Disraëli	15	" "	"		450	450	10 00	
	Corporation of the Village of Granby	16	" "	"	38	1,200	1,580	25 00	
	Megantic Electric Light Company	17	" "	"		520	520	10 00	
	La Compagnie de Pouvoirs Hydrauliques de St. Hyacinthe	1	" St. Hyacinthe	"	2	4,600	4,620	25 00	
	St. Hyacinthe Gas Company	2	" "	"	30	300	600	10 00	
	Boas Manufacturing Company, St. Hyacinthe	3	" "	"		26	26	10 00	
	Achille Gagnon et Cie, Victoriaville	1	" Victoriaville	"		2,500	2,500	25 00	
	Corporation of the Town of Drummondville	2	" "	"		355	355	10 00	
									325 00
St. John	The Saint John Railway Company	1	" St. John	"	200	8,300	10,300	25 00	
	Carleton Electric Light Company	2	" "	"	28	450	730	10 00	
	St. Stephen Electric Light Company	3	" "	"	52	711	1,231	25 00	
	Woodstock Electric Light Company	4	" "	"		900	900	10 00	
	Fredericton Gas Light Company	5	" "	"	78	250	1,130	25 00	

	City of Moncton Light and Water Department	6	"	"	"	81	865	1,675	25 00		
	Sackville Electric Light and Telephone Company	7	"	"	"		600	600	10 00		
	Chatham Electric Light Company	8	"	"	"	20	2,000	2,200	25 00		
	Sussex Water and Electric Light Company	9	"	"	"		525	525	10 00		
	Small & Fisher, Woodstock	10	"	"	"		500	500	10 00		
											175 00
Halifax	Sydney Gas and Electric Light Company	1	"	Cape Breton	"		1,400	1,400	25 00		
	North Sydney Electric Light Company	2	"	"	"		1,100	1,100	25 00		
	Prince Edward Island Electric Company, Charlottetown	1	"	Charlottetown	"	80	4,200	5,000	25 00		
	Summerside Electric Company (Limited)	2	"	"	"		995	995	10 00		
	Full Electric Company, Charlottetown	3	"	"	"	7	1,130	1,200	25 00		
	Halifax Tramway Company	1	"	Halifax	"	283	12,500	15,330	25 00		
	John Daley, Digby	2	"	"	"		400	400	10 00		
	Chambers Electric Light and Power Company, Truro	3	"	"	"		3,500	3,500	25 00		
	Dartmouth Electric Light Company	4	"	"	"		960	960	10 00		
	Kentville Electric Light and Power Company	5	"	"	"		700	700	10 00		
	Acadia Edison Electric Company, Wolfville	6	"	"	"		750	750	10 00		
	R. C. Erwin, Shubenacadie	7	"	"	"		300	300	10 00		
	Bridgetown Electric Light Company	8	"	"	"		250	250	10 00		
	Yarmouth Gas Light Company	9	"	"	"	36		360	10 00		
	Lunenburg Gas Company (Limited)	10	"	"	"		965	965	10 00		
	Oxford Electric Light Company	11	"	"	"		175	175	10 00		
	Springhill Electric Light and Power Company	12	"	"	"		500	500	10 00		
	Bear River Electric Heating and Power Company	13	"	"	"		425	425	10 00		
	Windsor Electric Light and Power Company	14	"	"	"		979	979	10 00		
	Town of Parrsborough	15	"	"	"	24	505	745	10 00		
	Canada Electric Company, Amherst	16	"	"	"	31	2,000	2,310	25 00		
	Yarmouth Street Railway Company	17	"	"	"		200	200	10 00		
	Bridgewater Electric Light and Power Company	18	"	"	"		700	700	10 00		
	C. O'Dell Electric Light Company, Annapolis Royal	19	"	"	"		500	500	10 00		
	New Glasgow Electric Light Company	1	"	Pictou	"	27	3,500	3,770	25 00		
	Antigonish Electric Light and Power Company	2	"	"	"		800	800	10 00		
											380 00
Winnipeg	Edmonton Electric Lighting and Power Company	1	"	Calgary	"		1,050	1,050	25 00		
	Calgary Water Power Company	2	"	"	"	25	1,765	2,015	25 00		
	Lethbridge Water Works and Electric Light Company	3	"	"	"		860	860	10 00		
	Corporation of the Town of Port Arthur	1	"	Port Arthur	"		857	857	10 00		
	Board of Water and Light Commissioners, Fort William	2	"	"	1897-98.	33	980	1,310	25 00		
	do do do	3	"	"	1898-99.	32	1,000	1,320	25 00		
	Prince Albert Electric Light and Power Company	1	"	Winnipeg	"		450	450	10 00		
	Citizen's Telephone and Electric Company, Rat Portage	2	"	"	"	20	7,000	7,200	25 00		
	Central Electric Company, Portage la Prairie	3	"	"	"	10	1,990	2,090	25 00		
	Brandon Electric Light Company	4	"	"	"		3,000	3,000	25 00		
	Selkirk Electric Company	5	"	"	"		600	600	10 00		
	Winnipeg Electric Street Railway Company	6	"	"	"	130	3,000	4,300	25 00		
	North-West Electric Light Company, Winnipeg	7	"	"	"	15	4,000	4,150	25 00		
	Regina Electric Light and Power Works	8	"	"	"	1	980	990	10 00		
	John B. Maul, Morden	9	"	"	"		600	600	10 00		
											285 00

APPENDIX J—*Concluded.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act during the year ended June 30, 1809.

District.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fee.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Vancouver	Sandon Water Works and Light Company	1	C. I. R. Vancouver	1898-99.	7	734	804	10 00	
	Rossland Water and Light Company	2	" "	"	6	1,800	1,860	25 00	
	Kootenay Electric Company	3	" "	"		886	886	10 00	
	Trail Smelter, Trail	4	" "	"		450	450	10 00	
	British Columbia Electric Railway Company, Vancouver	5	" "	"	274	15,167	17,907	25 00	
	City of New Westminster	6	" "	"	100	7,000	8,000	25 00	
	Revelstoke Water, Light and Power Company	7	" "	"		700	700	10 00	
	Grand Forks Electric Light Company	8	" "	"	5	195	245	10 00	
	City of Kamloops	9	" "	"		1,100	1,100	25 00	
									150 00
Victoria	Victoria Electric Company	1	" Victoria	"		380	380	10 00	
	British Columbia Electric Railway Company, Victoria	2	" "	"	23	10,366	10,596	25 00	
	Nanaimo Electric Light, Power and Heating Company	3	" "	"	62	800	1,420	25 00	
									60 00
									4,170 00

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

E. MIALL,
Commissioner.

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1899

PART III

ADULTERATION OF FOOD

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1899

No. 7*b*—1900.]

CONTENTS.

REPORT

OF THE

COMMISSIONER OF INLAND REVENUE.

INSPECTION OF FOODS, DRUGS AND FERTILIZERS.

To the Honourable
The Minister of Inland Revenue.

SIR,—I have the honour herewith to submit the report of the official analysts of the Dominion for the fiscal year ended June 30, 1899.

The following is a summary statement of the whole number of samples analysed by them :—

Description of Sample.	Genuine.	Adulterated.	Doubtful.	Sold as Compound	Not Classed.	Below Guarantee	Total.
Cheese	55	2					57
Canned fish	86	10	6		4		106
Sugar	32						32
Malt liquors	84	2			1		87
Wheat					16		16
Non-alcoholic liquors	12	1			1		14
Molasses and Golden syrup	16						16
Coffee	46	13	1	7			67
Condensed milk			10				10
Black pepper	8	2					10
Water					8		8
Flour	28						28
Oatmeal	15						15
Canned tomatoes	4						4
Tincture of opium	10	5					15
Citrate of iron and quinine	3	4					7
Milk	79	5	19				103
Quinine wine	3	5					8
Tincture of cinchona	4	4					8
Beef extracts	20						20
Fertilizers	107	14	1		7	20	149
Belladonna plasters		22					22
Ginger beer	3						3
Total	615	89	37	7	37	20	805

There does not appear to be any feature calling for special comment, beyond the remarks made by individual analysts and the Chief Analyst.

I have the honour to be, sir,
Your obedient servant,
EDWARD MIALL,
Commissioner.

INLAND REVENUE DEPARTMENT,
OTTAWA, September 25, 1899.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, October 30, 1899.

E. MIALL, Esq.
Commissioner of Inland Revenue.

SIR,—In submitting the appendices to accompany the Annual Report concerning the adulteration of food for the year ending June 30, 1899, I have to call your attention to the new arrangement which is now established regarding these. In the cases of food samples which have been submitted to the analysts for examination in the course of the year, and regarding which special bulletins have been published, it has not been deemed necessary to publish as appendices tabular statements concerning them. Consequently the latter are only given in the following cases:—Cheese, canned fish, sugar, malt liquors, wheat, non-alcoholic liquors, molasses and syrups, coffee, condensed milk, black pepper, water, flour, oatmeal, and canned tomatoes. The bulletins regarding the other articles examined, namely:—Tincture of opium, citrate of iron and quinine, milk, quinine wine, tincture of cinchona, beef extracts, fertilizers and belladonna plasters, are reprinted, as in former reports, in the shape of appendices following the tabular statements above mentioned.

These statements and bulletins do not include all the work attended to by this branch during the year. The following list shows the number of examinations or analyses made besides for the various departments:

Inland Revenue	553
Customs	129
Marine and Fisheries	5
Public Works	1
Militia and Defence	1
Stationery Branch	2
Police Branch	3
Total	694

With regard to the work done for the Inland Revenue Department it may be remarked that this includes 316 tests of vinegar for its acidity, besides supplying the standard soda solution required for such testing in the outside offices of the department, and expressing it to them, in greater quantity or less, every week. There were, further, 111 examinations made of fluid extracts for their alcohol contents, forty-two samples of beer examined to ascertain the quantities of malt used in their manufacture, and seventeen samples of strong acetic acid analysed, chiefly with the object of indicating their origin. The work for the Customs Department ceased towards the end of the year 1898, when Mr. F. W. Babington was transferred from this branch to take charge of the Customs Laboratory. It may nevertheless be useful to put on record here some figures regarding the amount of this work in previous years. There were about fifty analyses made

annually for the Customs Department previous to 1889. This gradually increased until 1893 and subsequent years, when the number of samples examined was as follows :—

	No. of Samples analysed
In year ending June 30, 1893	98
do do 1894	184
do do 1895	253
do do 1896	172
do do 1897	125
do do 1898	336

The work done for the Police Department included not only the analysis of counterfeit coin but also attendance in court during the trials of the offenders.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

REPORTS OF PUBLIC ANALYSTS.

LABORATORY OF THE OFFICIAL ANALYST FOR
NOVA SCOTIA AND PRINCE EDWARD ISLAND,
66 BEDFORD ROW,
HALIFAX, N.S., October 2, 1899.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit my annual report on the samples of food, &c., analysed by me under the Adulteration Act, during the year ending June 30, 1899. Of the ninety-one samples analysed, I have reported eighty as genuine, four adulterated and seven as being sold as compounds.

Samples.	Genuine.	Adulterated.	Sold as Compounds.	Total.
Potted meats	15	1	...	16
Sugars, raw	16	...	...	16
Sugars as sold	16	...	...	16
Molasses and syrups	16	...	...	16
Coffee	10	...	7	17
Fertilizers	7	3	...	10
	80	4	7	91

Of the seventeen samples of coffee nine were collected in Nova Scotia, of which two were genuine and seven sold as compounds, which prevented their being returned as adulterated as they otherwise would have been. The remaining eight samples were collected in New Brunswick and were all genuine.

I have the honour to be, sir,
Your obedient servant,

MAYNARD BOWMAN.

SAMPLES analysed at Quebec. July 1, 1898—June 30, 1899.

Samples.	No.	Genuine.	Doubtful.	Adulterated.	Sold as Compound.
Cheese— (July, 1898)	10	10	0	0	0
Canned fish— (August, 1898)	16	9	2	5	0
Meat Extracts— (September and October, 1898)	10	10	0	0	0
Meat Extracts— (November and December, 1898)	10	10	0	0	0
Fertilizers— (April, 1899)	10	9	0	1	0
Fertilizers— (May, 1899)	10	10	0	0	0
Coffee— (June, 1899)	8	6	0	2	0
Totals	74	64	2	8	0

The September samples were re-analysed in October, 1898.

The work done in December, 1898, was a further analysis of the November samples.

In January, February and March, 1899, the analyses made were of Standard Fertilizers.

Your obedient servant,

DR. M. FISET, M.D.L.,
Public Analyst.

LABORATORY OF INLAND REVENUE,
MONTREAL, October 4, 1899.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour of herewith submitting my report on the analysis of samples of Food, Drink and Fertilizers for the year ending June 30, 1899. This includes 170 samples, the results of analysis being tabulated as follows:—

11	samples	of cheese—wholesome 9; 1 adulterated; 1 unfit for food by decay.
18	"	canned fish—16 genuine; 2 doubtful.
3	"	ginger beer—wholesome.
51	"	malt liquors—49 genuine; 2 adulterated.
29	"	milk—25 genuine; 2 adulterated; 2 doubtful.
9	"	coffee—6 genuine; 3 adulterated.
4	"	canned fruits—4 genuine.
45	"	fertilizers—25 equal to standard; 20 below guarantee.

Total 170. Summarized—137 genuine; 8 adulterated; 5 doubtful; below guarantee, 20.

I have the honour to be,
Your obedient servant,

J. BAKER EDWARDS,
Official Analyst.

OFFICE OF PUBLIC ANALYST,
OTTAWA, September 29, 1899.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement of the results of the analysis of samples submitted to me by the department during the year ended June 30, 1899.

Article.	Genuine.	Adulterated.	Not Classed.	Total.
Cheese	9			9
Canned goods	7	3	4	14
Malt liquor	35		1	36
Temperance liquor	12	1	1	14
Fertilizers	25	3		28
Flour	7			7
Oatmeal	7			7
Coffee	3	4		7
	105	11	6	122

I have the honour to be, sir,
Your obelient servant,

F. X. VALADE, M.D.,
Public Analyst.

SCHOOL OF PRACTICAL SCIENCE,
TORONTO, September 30, 1899.

To the Honourable
The Minister of Inland Revenue.

SIR,—I have the honour to enclose the Annual Report of the work done in my laboratory under the Adulteration Act for the year ending June 30, 1899.

Of 166 samples analysed, 125 were reported genuine, and 12 adulterated.

The only item that calls for special remark is that of 10 samples of condensed milk, which were reported "doubtful" on the ground of deficiency of cream. The samples were reported as prepared from milk "partly skimmed or abnormally low in fat." Later investigation has shown that the official method did not completely extract the fat from these condemned milks, on account of the large amount of added sugar. Making allowance for this, however, the milks show a percentage of cream which would still be classed, according to the definition of Bulletin No. 53, as "under average in cream."

I have the honour to be, sir,
Your obedient servant,

W. H. ELLIS.

Sample.	Total.	Genuine.	Adulterated.	Doubtful.
Cheese	10	10		
Canned fish	16	16		
Tincture opii	8	6	2	
Milk	74	54	3	17
Fertilizers	30	26	3	1
Condensed milk	10			10
Black pepper	10	8	2	
Coffee	8	5	2	1
Total	166	125	12	29

OFFICE OF PUBLIC ANALYST,
LONDON, July 1, 1899.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit to you the yearly report of work done in my laboratory under the Adulteration of Food Act.

As bulletins have been already issued dealing with the greater part—and the most important part of my work—I shall simply submit a tabulated statement:—

Sample.	Genuine.	Adulterated.	Doubtful.	Total.
Cheese	9			9
Canned fish	11	1	2	14
Tincture of opium	4	3		7
Citrate of iron and quinine	3	4		7
Quinine wine	3	5		8
Tincture of cinchona	4	4		8
Belladonna plasters		22		22
Flour and oatmeal	17			17
Total	51	39	2	92

In addition to the above, I have had submitted to me 32 standard samples of agricultural fertilizers on which I have reported. Also, one sample of preservaline.

With reference to the sample of belladonna plasters, I wish to say that all came much below 0·5 per cent, the standard of the British Pharmacopœia, which is the recognized standard among physicians and pharmacists in this country.

If we take 0·3 per cent as the apparent standard of the U. S. P., 17 out of the 22 fall below this standard, while half the number analysed contained less than 0·2 per cent.

I would respectfully draw your attention to the number of samples of pharmaceutical preparations which do not conform to the required standard.

I have the honour to be, sir,
Your obedient servant,

FRANKLIN T. HARRISON,
Official Analyst.

WINNIPEG, CANADA, July 5, 1899.

The Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement showing the general results of the analyses of the samples submitted to me by the department during the year ending 30th June, 1899.

—	Not Classed.	Genuine.	Adulterated.	Total.
Cheese		8		8
Canned fish		12		12
Wheat	16			16
Fertilizers	7	5	4	16
Water	8			8
Coffee		5	1	6
Totals	31	30	5	66

I have the honour to be, sir,
Your obedient servant,
EDGAR B. KENRICK.

PUBLIC ANALYST'S OFFICE,
NEW WESTMINSTER, B.C., November 8, 1899.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to submit report for year ending June 30, 1899. I did not begin work for the department till towards the end of the past fiscal year, hence the light results shown :—

—	Genuine.	Adulterated.	Total.
Coffee	11	1	12
Flour	12		12
Cream (tin)	1		1
Whisky	1		1
Totals	25	1	26

The single sample of cream and whisky were sent to me by Mr. Miller, Collector of Inland Revenue, in Vancouver, B.C., because of complaint as to quality of cream, and suspected adulteration of the whisky I found the cream to be of very poor quality and not up to the standard claimed, but it was not adulterated. The whisky was free from adulteration.

I have the honour to be, sir,
Your obedient servant,
C. J. FAGAN.

APPENDIX A.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Moisture.	Butter Fat.	Substance extracted by Water.	Caseine.	Ash.	Nitrogen.	Chlorine.
1898.	*Official Analyst, M. Fiset, Quebec.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
July 14	.....	13521	18846	35·20	32·43	.....	28·30	4·07	4·48	0·78
" 14	Laporte, Martin & Co., Montreal.	13522	18847	31·45	37·50	.....	27·97	3·08	4·18	0·42
" 14	Mount Carmel Factory.....	13523	18848	26·90	37·38	....	31·67	4·05	4·46	0·87
" 14	J. Fortier, St. Henri, Lévis, Que.	13524	18849	31·38	34·90	...	30·64	3·08	4·40	0·40
" 14	J. Beaudoin	13525	18850	30·95	32·63	.....	32·84	3·58	4·89	0·51
" 14	.....	13526	18851	30·80	37·03	.....	28·32	3·85	4·62	0·65
" 14	.....	13527	18853	30·20	36·55	.....	29·87	3·38	4·52	0·51
" 15	A. Fortier, Lévis Co.	13528	18854	31·77	36·83	.....	28·12	3·28	5·03	0·57
" 15	.....	13529	18855	30·45	35·50	.....	30·62	3·43	4·54	0·48
" 15	.....	13530	18886	27·25	36·18	.....	32·65	3·92	5·00	0·80
	Official Analyst, Dr. J. B. Edwards, Montreal.									
" 12	St. Arnauld & Clément, Montreal.	11821	18835	27·69	31·03	.....	.....	3·85	.....	0·58
" 12	" " ..	11822	18836	30·52	35·93	.....	.....	3·75	.....	0·20
" 12	" " ..	11823	18837	28·10	35·93	.....	.....	3·80	..	0·44
" 12	.....	11824	18838	31·27	32·06	.....	.....	4·35	.....	0·76
" 12	.....	11825	18839	33·94	31·01	.....	.....	3·75	.....	0·35
" 20	.....	11826	18840	30·92	28·73	.....	.....	4·50	.....	0·71
" 20	Z. Pellerin, Brompton, Que. ...	11827	18841	33·88	25·68	.....	.....	4·35	.....	0·68
" 20	.....	11828	18842	32·77	35·00	.....	.....	4·95	.....	1·10
" 20	J. Martel, Brompton, Que.....	11829	18843	32·67	27·75	.....	.....	4·00	..	0·63
" 20	.....	11830	18844	35·10	22·71	.....	.....	3·90	..	0·54
" 20	.....	11831	18845	32·90	27·91	.....	.....	3·60	...	0·49
	Official Analyst, Dr. F. X. Valade, Ottawa.									
" 16	Ottawa Cheese Board	10980	18302	33·13	33·74	13·93	19·20	4·01	4·30	.....
" 16	Lalonde, near Papineauville, Que.	10981	18303	29·41	32·49	13·50	24·60	4·69	5.31	.....
" 16	.....	10982	18304	33·01	29·23	18·28	19·48	4·00	4·44	.....
" 16	J. Haig, Market Square, Ottawa..	10983	18305	29·53	29·07	11·76	29·64	3·49	5·49	.....
" 16	S. J. Major, Ottawa.....	10984	18306	33·49	29·78	13·36	23·37	3·63	5·38	.....
" 13	Bate & Sons, Ottawa	10985	18307	31·42	32·02	12·28	24·28	3·29	5·65	.....
" 13	"	10986	18308	30·69	28·93	12·56	27·82	3·43	6·43	.....
" 13	S. Hunt & Co., Ottawa	10987	18309	31·82	28·31	12·83	27·04	3·49	6·23	.....
" 13	S. J. Major, Ottawa.....	10988	18310	29·62	31·70	14·89	23·79	3·51	5·29	.....
	Official Analyst, Dr. W. H. Ellis, Toronto.									
" 14	S. L. Tilley, Queen's Co., N.B....	12181	17587	26·18	33·14	.....	29·56	3·34	4·73	.....
" 14	V. S. White, St. John, N.B.	12182	17588	24·32	33·28	.....	30·18	3·11	4·83	.....
" 14	Hampstead Cheese Factory, N.B..	12183	17589	27·42	31·14	.....	31·45	3·71	5·03	.....
" 14	Corn Hill Cheese Factory.....	12184	17590	27·03	31·78	.....	31·78	2·98	4·59	.....
" 19	N. W. Eveleigh, Sussex, N.B.....	12185	17594	30·48	33·67	.....	27·43	2·68	4·39	.....
" 19	Yarmouth Creamery, N.B.....	12186	17595	29·93	33·06	.....	30·43	3·05	4·87	.....

SESSIONAL PAPER No. 7b

CHEESE—Tabulated Statement.

Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
Specific Gravity of Fat at 99°.	Reichert No. of Fat on 5 grms.	Saponification Equivalent.	Salt.		
			p. c.		
.....	29·9	.....	.....	Fresh and yellow in colour; genuine.	B. B. Brunelle, Des Forges St., Three Rivers.
.....	30·5	.....	.....	" " ..	L. T. Dénéchaud, 132½ Notre Dame St., Three Rivers.
.....	27·0	.....	.....	Light yellow in colour; rather sharp in taste; genuine.	P. Rheault "
.....	26·6	.....	.....	Cheese beginning to mould; brownish yellow in colour; genuine.	Goulet Frères, St. Louis St., Lévis.
.....	29·1	.....	.....	Yellow in colour and fresh; genuine.	A. Charrier, Water St., Lévis.
.....	29·4	.....	.....	Yellow in colour; beginning to mould; genuine.	A. G. Lambert, Commercial St., Lévis.
.....	29·6	.....	.....	Yellow in colour and fresh; genuine.	E. Turcotte, 94 Desfossés St., Québec.
.....	28·5	.....	.....	" " ..	A. Convey, 97 Sault au Matelot, Quebec.
.....	28·7	.....	.....	" " ..	A. Parent, 114 Crown St., Québec.
.....	26·6	.....	.....	Light yellow; beginning to mould; genuine.	H. A. Paré, Bridge St. "
.....	30·36	.....	.....	Genuine and of good quality..	Martin & Rivet, Montreal.
.....	31·02	.....	.....	"	P. Mascotte "
.....	26·29	.....	.....	Genuine	" "
.....	33·00	.....	.....	"	J. N. Caron "
.....	32·56	.....	.....	Full of maggots, badly manufactured; unadulterated, but unfit for food.	T. Bergeron "
.....	32·45	.....	.....	Normal: genuine.	T. A. Bourque, Sherbrooke, Que.
.....	31·90	.....	.....	"	T. R. Darche "
.....	25·08	.....	.....	"	D. W. Stenson "
.....	31·02	.....	.....	"	E. M. Blanchard "
.....	31·13	.....	.....	"	N. Lacroix "
.....	15·60	.....	.....	Adulterated with mixed fats, approximating 50 p.c.	R. Martel "
.....	24·6	247	2·05	Genuine	P. Brankin, Ottawa.
.....	25·9	243	3·07	"	N. P. Labrose "
.....	26·9	241	2·18	"	A. L. Pinard "
.....	25·2	250	1·81	"	P. O'Toole "
.....	25·7	240	1·79	"	L. Landry "
.....	26·3	245	1·63	"	A. D. Trudel, Hull, Que.
.....	24·8	240	1·33	"	W. H. Lyons "
.....	24·6	239	1·39	"	C. Devlin, Aylmer, Que.
.....	27·1	250	0·88	"	M. Mathe "
0·8668	26·78	222·5	1·24	Unadulterated	Macpherson Bros., St. John, N.B.
0·8648	27·11	222·0	1·04	"	J. V. Vanwart "
0·8652	26·64	223·4	1·34	"	D. H. Nase "
0·8665	26·10	227·3	1·42	"	Mathison & Power "
0·8670	23·72	226·4	0·47	"	D. MacLachlan, Chatham, N.B.
0·8668	30·58	226·80	0·80	"	W. S. Loggie & Co. "

APPENDIX A.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Moisture.	Butter Fat	Substance extracted by Water.	Caseine.	Ash.	Nitrogen.	Chlorine.
1898.	*Official Analyst, Dr. W. H. Ellis. Toronto.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
July 20	Baird & Peters, St. John, N.B....	12187	17599	25·37	36·86	...	29·31	2·93	4·69	.....
" 20	Hall & Fairweather, St. John, N.B.	12188	17600	28·98	....	....	28·18	2·83	4·51	.....
" 20	Dearborn & Co., St. John.....	12189	17604	27·54	34·19	.....	28·62	2·83	4·58	.....
" 20	P. Wilson	12190	17605	24·28	35·92	...	25·00	2·98	4·08	.....
	Official Analyst, F. T. Harrison, London, Ont.									
" 14	E. Adams, Chatham, Ont.....	9222	19096	30·80	33·00	13·80	22·40	4·38	4·40	0·90
" 14	.....	9223	19097	28·80	34·10	18·20	18·90	3·88	4·30	0·78
" 15	Stoney Point Butter and Cheese Co.	9224	19098	31·7	34·1	15·7	18·5	3·51	4·33	0·54
" 15	Mrs. Patello, Sandwich, Ont	9225	19099	36·3	31·2	16·4	16·1	4·39	3·63	0·73
" 16	J. Tanton, London, Ont.....	9226	19103	34·9	31·8	13·7	19·6	3·55	3·96	0·66
" 16	.....	9227	19104	32·5	32·8	14·8	19·9	3·67	4·29	0·62
" 16	Mrs. Stevens, London, Ont..	9228	19105	32·6	30·6	15·8	21·0	4·60	4·44	0·59
" 18	W. Milne, Guelph, Ont.....	9229	10109	33·0	30·6	16·1	20·3	3·80	4·24	0·57
" 18	Wm. Taylor, Guelph, Ont	9230	19110	31·5	31·9	17·8	18·8	3·73	4·18	0·71
	Official Analyst, E. B. Kenrick, Winnipeg.									
" 27	Not known.....	11239	17130	35·12	33·88	...	23·44	3·85	3·75	0·41
" 27	"	11240	17131	35·27	29·30	.....	24·13	3·72	.....	0·61
" 28	G. F. & J. Galt, Winnipeg	11241	17135	32·81	30·02	....	24·19	3·93	.....	0·81
" 30	Bentley & Co., Lethbridge, Man..	11242	17137	35·62	32·22	.....	22·75	3·86	....	0·51
Aug. 1	A. Macdonald, Winnipeg.....	11243	17139	27·32	35·98	...	25·88	4·15	....	0·82
" 1	Parson, Proctor & Co., Winnipeg..	11244	17141	37·32	25·61	..	23·44	3·93	...	0·43
" 1	Sutherland & Campbell " ..	11245	17142	32·45	30·04	.....	24·06	4·91	....	0.72
" 1	Pason Produce Co. " ..	11246	17143	34·21	31·49	.....	24·13	4·25	.....	0·34

SESSIONAL PAPER No. 7b

CHEESE—Tabulated Statement—*Concluded.*

Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
Specific Gravity of Fat at 99°.	Reichert No. of Fat on 5 grms.	Saponification Equivalent.	Salt.		
			p. c.		
0·8658	32·94	229·60	0·92	Unadulterated	R. O'Leary, Richibucto, N.B.
0·8633	30·56	231·0	1·07	"	H. Ferguson & Co. "
0·8684	31·18	227·70	1·07	"	T. S. Ryan, Moncton, N.B.
0·8667	28·83	223·4	1·07	"	J. M. Wallace "
0·8667	30·3	240·85	....	Not adulterated	G. S. Hayward, Chatham, Ont.
0·8670	28·6	241·35	.....	"	Taylor & Williamson "
0·8665	28·8	240·0	.....	"	G. H. Nairne, Windsor, Ont.
0·8672	27·8	243·71	.....	"	F. H. Mann "
0·8651	30·8	245·5	....	"	Scandrett Bros., London, Ont.
0·8677	28·2	246·48	....	"	Hayne, Son & Co. "
0·8672	30·2	243·66	.....	"	Turrill Bros. "
0·8670	30·0	242·36	.....	"	A. J. Fitzsimmon, Guelph, Ont.
0·8658	28·5	239·05	.....	"	Millman & Co. "
.....	28·8	.....	0·68	Genuine	Smith & Burton, Brandon, Man.
....	29·6	.....	0·99	"	C. A. Bower "
.....	28·9	.....	1·33	"	W. M. Crawford "
.....	30·1	.....	0·84	"	Tweed & Ewart "
....	31·0	....	1·35	"	Hurtley & Co., Winnipeg.
.....	30·9	.....	0·71	"	T. E. Williams "
.....	29·8	.....	1·18	"	A. R. Christie "
.....	30·8	.....	0·56	"	T. G. Hargrave "

APPENDIX B.—INSPECTION OF CANNED FISH—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Results of Analysis.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Moisture.	Lead.		
1898.	*Official Analyst, M. Bowman, Halifax.*			p. c.	p. c.		
July 19..	Canned Salmon, Ewan & Co., New Westminster, B.C	12618	16649	.....	.....	Fresh and well put up ; no metals.....	A. F. Ross, Truro, N.S.
" 19..	" Lobster, S. Bishop, Bathnrst, N.B..	12619	16651	.....	.....	Meat much broken and discoloured ; in bad condition, too much corroded.	Angus & Pollick "
" 20..	" " Cape Mull Pkg. Co.....	12620	16653	.....	.....	Meat very good ; tin paper-lined.....	Patterson & Treen, New Glasgow, N.S.
" 20..	" Salmon, Canadian Pacific Pkg. Co..	12621	16654	.....	.....	In good order ; trace of tin.....	J. F. Morrow "
" 21..	" Finnan Haddies, J. Sealy, St. John, N.B.....	12622	16655	.....	.....	" "	A. Martin, Sydney, C.B.
" 21..	" Sardines, H. Martigny, France.....	12623	16656	.....	.....	Contents of tin satisfactory	C. H. Harrington "
" 21..	" Mackerel, J. Stanford, Chester, N.S.	12624	16657	.....	.....	Fish very small but fresh ; traces of tin.....	A. Martin "
" 22..	" Salmon, Imperial Canning Co., Vancouver, B.C.	12625	16658	.....	.....	Good fish, in good condition	Somers & Co., Antigonish, N.S.
" 22..	" Mackerel	12626	16659	.....	.....	Large fish, in good order.....	T. J. Bonner "
" 27..	" Shrimps, Biloxa Canning Co., Biloxa, Miss., U.S.A.	12627	16660	.....	.....	Quite fresh and well put up ; tin wood-lined.	J. Scott & Co., Halifax, N.S.
" 27..	" Finnan Haddie, Centreville Canning Co., Digby, N.S.	12628	16661	.....	.....	Fish satisfactory but can much corroded ; traces tin.	J. Guss & Son "
" 27..	" Fresh Herrings, Maconochie Bros., London, E.	12629	16662	.....	.....	In good condition.....	W. C. Anderson "
" 27..	" Shrimps, G. W. Dunbar & Sons, New Orleans.	12630	16663	.....	.....	Tin lined with cotton ; fish fairly fresh.....	Dillon Bros. "
" 27..	" Kippered Herrings, Boutilier & Moorhousie, Digby, N.S.	12631	16664	.....	.....	Can much corroded ; fish fairly good quality	W. J. Hopgood "
" 27..	" Lobster, Ritchie & Cobb, Boston....	12632	16665	.....	.....	Flesh very good and fresh ; can paper-lined..	R. T. Forristall "
" 27..	" Curried Prawns, E. Lazenby & Son, London, E.	12633	16666	.....	.....	Can much corroded ; flavour of contents excellent.	B. J. Hubley "
	Official Analyst, Dr. M. Fiset, Quebec.						
" 13..	Canned Kippered Herrings, J. Sealy, St. John, N.B.	13531	18852	66·50	Traces..	Tin in slight quantity, also iron ; sample well preserved and firm ; genuine.	J. McCone, Quebec.

"	13..	"	Salmon, Empress Brand	13532	18874	68·3	0·0008	" "	B. B. Brunelle, L. T. Denéchaud } Three Rivers, Q.
"	13..	"	" Flag Ship Brand	13533	18875	75·56	Traces.	" "	
"	13..	"	Finnan Haddie, Centreville Canning Co.	13534	18876	73·30	" ..	Some tin and iron found; sample firm and sound; good taste, colour and smell.	M. Lafontaine "
"	13..	"	Mackerel, Peerless Brand	13535	18877	....	0·0018	Tin and iron found; sample was slightly stale when opened.	L. Brunelle et Frères "
"	14.	"	" Port Elgin Pkg. Co	13536	18878	.....	Traces.	Tin found, also iron; sample firm and sound, good colour, taste and smell.	Goulet Frères, Lévis, Que.
"	14..	"	Salmon, Signal Brand	13537	18879	.....	" ..	" "	A. Charrier "
"	14 .	"	Finnan Haddie, J. Sealy, St. John, N.B.	13538	18880	.....	.....	Tin present, also a trace of iron; sample well preserved; taste, smell and colour good.	A. C. Lambert "
"	14..	"	Shrimps, Barataria Canning Co.	13539	18881	....	.....	Contains a considerable quantity of tin and some iron; tin was lined with paper, the fish was well preserved and firm.	J. Savard "
"	14..	"	Mackerel, Neptune Brand	13540	18882	.....	Traces.	Some tin present, also iron; sample well preserved, with a good taste and smell.	" "
"	14..	"	Lobster, "Eureka"	13541	18883	77·09	" ..	" "	E. Turcotte "
"	15..	"	" "Old Salt"	13542	18884	.....	0·0017	A good deal of tin present, also much iron; sample sound and firm, with a good taste and smell.	A. Parent "
"	15..	"	Sardines	13543	18885	.....	.....	Contains some tin, also iron; sample well preserved and firm, taste and smell good.	H. A. Paré "
"	20..	"	Lobster, "Deep Sea"	13544	18887	.....	0·0007	Much tin and iron present; tin lined with paper; both paper and fish somewhat blackened; fair smell.	Tourigny & Beaudet, Victoriaville, Q.
"	20..	"	Salmon, "Severeign"	13545	18888	.....	0·0006	A little tin found, also iron; sample sound and firm, good colour, taste and smell.	S. Lemay, Victoriaville, Q.
"	20..	"	Sardines	13546	18889	.....	0·0009	Some tin present, also iron; sample sound and firm, good taste and smell.	Tourigny & Beaudet, Victoriaville, Q.
		Official Analyst, J. B. Edwards, Montreal.							
"	12..	Fresh Herring, Marshall & Co., Aberdeen, Scotland.		11832	18856	.....	.....	Fish firm and in good condition; can slightly blackened; traces of tin.	T. Bergeron, Montreal.
"	20..	Canned Salmon, Victoria Brand		11833	18857	.....	.....	Flesh sweet and firm, in good condition, deep in colour; traces of tin and iron in the fluid; good and wholesome.	T. A. Bourque, Sherbrooke. Que.
"	20..	"	" Horse Shoe Brand	11834	18858	.....	.....	Flesh firm and in good condition; trace of iron; good and wholesome.	A. L. Lachance "
"	20..	"	" S. & S. Brand	11835	18859	.....	.....	Flesh firm and in good condition; no discoloration of can, no metallic impurities.	a "
"	22..	"	Shrimps, Barataria Canning Co.	11836	18860	.....	.....	Fresh and in good condition; no discoloration or metallic impurity; can parchment-lined.	J. O. Levesque, Montreal.
"	22..	"	Lobster, Ice Castle Brand	11837	18861	.....	.....	Flesh much broken, colour and odour good; can parchment-lined but discoloured; no metallic contamination.	" "
"	25..	"	Mackerel, Port Elgin Pkg. Co	11838	18862	.....	.....	In good condition, small whole fish; tin blackened; traces of iron and tin in fluid.	P. Brennan "

APPENDIX B.—INSPECTION OF CANNED FISH—Tabulated Statement—*Continued.*

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Results of Analysis.		Remarks by Analyst.	Name and Address of Vendor of Sample.
				Moisture.	Lead.		
1898.	*Official Analyst, J. B. Edwards, Montreal.*			p. c.	p. c.		
July 25.	Kippered Herring, Marshall & Co., Aberdeen, S.	11839	18863	.....	.....	In good condition; no metallic contamination.	P. Brennan.
" 25.	Golden Haddies, Centreville Canning Co....	11840	18864	.....	.....	" "	P. Daoust, Montreal.
" 25.	Fresh Mackerel.....	11841	18865	.....	.....	In good condition; can parchment-lined, no discoloration, no metals.	Tison & Guillet "
" 26.	Canned Prawns, Barataria Canning Co.....	11842	18866	.....	.....	" "	F. Marchand, St. Johns, Q.
" 26.	" Lobster.....	11843	18867	.....	.....	Flesh slightly darkened in colour and much broken, odour sweet; paper-lined, fluid contains traces of tin.	" "
" 26.	" Sardines, A. A. Wetmore, Deer Isl'd	11844	18868	.....	.....	Fish in good condition; no metals	G. D. Huot "
" 27.	" Salmon	11845	18869	.....	.....	In good condition, much oil; traces of iron and tin.	Kyle Bros., Huntingdon, Q.
" 27.	" Lobster.....	11846	18870	.....	.....	Flesh much broken and of deep colour, odour prominent; traces of tin in fluid.	A. Chalmers "
" 27.	" Salmon, Harlock Pkg. Co.....	11847	18871	.....	.....	Flesh firm and in good condition; traces of tin and iron in fluid only.	J. Hunter "
" 27.	" Halibut.....	11848	18872	.....	.....	Flesh blackened when in contact with can, interior of can generally blackened; traces of lead, tin and iron.	R. McShane, Montreal.
" 27.	" Mackerel, R. Bell, Alberton.....	11849	18873	.....	.....	Flesh in good condition; no corrosion of tin, no metals; good and wholesome.	F. Willoughby & Co., Montreal.

APPENDIX B.—INSPECTION OF CANNED FISH—Tabulated Statement—*Continued.*

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Results of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Ash.	Lead.	Tin.	Iron.	Total Contents of Can.		
1898.	*Official Analyst, F. X. Valade, Ottawa.*			p. c.				grams		
Aug. 2	Kippered Herring, J. T. Morton, London, Eng.	10989	18311	2·92	...	.....	...	477	Flesh firm and good, odour pleasant	R. McGregor, Ottawa.
" 2	Clover Leaf Salmon, Delafield, McGovern & Co., New York.	10990	18312	1·72	Trace.	.....	Trace.	503	Very good; piece of tin under the solder spot in centre of lid.	" "
" 2	Ocean Haddies, J. Sealy, St. John, N.B.	10991	18313	2·525	.....	.....	.....	454	Fresh and good	" "
" 2	Preserved Bloaters, Marshall & Co., Aberdeen, Scotland.	10992	18314	3·28	Trace.	Trace.	.....	524	Of very doubtful quality, odour and taste good; tin much blackened.	" "
" 2	Fraser River Salmon, Canadian Pacific Pkg. Co.	10993	18315	1·36	.....	"	.....	475	In fine condition; piece of tin under the lid.	G. J. Millar "
" 2	Fresh Rock Lobster, L. M. & Co., Aspy Bay, C.B.	10994	18316	2·55	.....	"	.....	468	Not fit for food; strong metallic odour when opened; flesh green to blue.	" "
" 2	Ontario's Delight Haddies, Connor Bros., Black Harbour, N.B.	10995	18317	1·66	.....	.....	...	386	In good condition.....	" "
" 2	Ice Castle Brand Lobster, J. W. Winsor, Cape Cove.	10996	18318	1·375	.....	Trace.	Trace.	455	Not fit for food; smell metallic when opened; flesh partly turned green, tin lined with paper.	Goodall Bros. "
" 2	Canned Salmon, L. Chaput Fils & Cie, Montreal.	10997	18319	2·25	....	.....	.....	454	Doubtful state, flesh shrunk from side of tin and pale on the outside, evidently very old.	" "
" 2	Canned Sardines, Albert & Cie, Lorient, France.	10998	18320	4·103	Trace.	Trace	.....	168	Doubtful; small fish, sweet and clean	" "
" 2	Herrings in Tomato Sauce, Marshall & Co., Aberdeen, Scotland.	10999	18321	2·115	"	"	Trace.	490	Not in good condition; tin is corroded; the liquid portion has a metallic taste, the flesh is bitter but long in the can.	" "
" 3	Crescent Brand Lobster, Red Point Pkg. Co., Souris, P.E.I.	11000	18322	2·61	....	"	.....	453	Good and fresh; tin lined with paper.....	D. McLeod "
" 3	Canned Sardines, Louis Le Grand ..	7495	18323	5·66	Trace.	Trace.	.....	149	Doubtful, fish firm, large and good.....	" "
" 3	" Salmon, B. C. Canning Co..	7496	18324	1·925	.....	.....	Trace.	501	Good, in fine condition; piece of tin under the solder spot in the center of lid.	" "

APPENDIX B.—INSPECTION OF CANNED FISH—Tabulated Statement—*Continued.*

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Total Contents of Can.	Solid Contents of Can.	Loss on drying.	Ash.	Tin.		
1898.	*Official Analyst, W. H. Ellis, Toronto.*			grams	grams	p. c.	p. c.			
July 13	Canned Salmon, Canadian Pacific Canning Co., Victoria, B.C.	12191	17580	....	.....	.....	.. ..	.....	Condition good; can slightly discoloured, traces of tin, iron and lead; unadulterated.	Northrop & Co., St. John, N.B.
" 13	" Lobster, R. H. Jennings, Janeville, N.B.	12192	17581	.....	. . .	.....	.....	....	Condition good; can lined with paper, traces of tin and iron.	Alston & McBeath "
" 13	" Shrimps, G. W. Dunbar & Sons, New Orleans, U.S.	12193	17582	.....	.....	.....	.....	..	Condition good; can lined with paper, not discoloured, no poisonous metals.	F. E. Williams "
" 13	" Prawns, E. Lazenby & Son, London, Eng.	12194	17583	.....	...	.....	.....	...	Condition good; can discoloured, traces of tin, lead and iron.	Puddington & Merritt "
" 13	" Shrimps, G. W. Dunbar & Sons, New Orleans.	12195	17584	.....	.....	.....	.....	..	Condition good; can lined with paper which is discoloured at the edges; traces of tin and iron.	W. A. Porter "
" 14	" Herrings, M. Guptill, Grand Manan, N.B.	12196	17585	.....	.....	.....	.....	.....	Condition good; slight trace of tin..	W. A. Magee "
" 14	" Herrings, H. C. & L. Guptill, Grand Manan, N.B.	12197	17586	....	..	.....	.. ..	.....	" "	F. G. Williams "
" 19	" Salmon, E. Filiegar, Chatham, N.B.	12198	17591	...	.....	...	.....	..	Condition good; can somewhat discoloured, traces of tin, lead and iron.	M. S. Hocken, Chatham, N.B.
" 19	" Lobster, P. A. Williston & Co.	12199	17592	...	.....	.....	.. ..	.....	Condition good; can lined with paper, not discoloured, no poisouous metals.	G. Watt "
" 19	" Mackerel, Miramichi Pkg. Co., Chatham, N.B.	12200	17593	.....	.....	.....	.....	. .	Condition good; can not discoloured, no poisonous metals; unadulterated.	E. A. Strang "
" 20	" Salmon, Pacific Pkg. Co., B.C.	12201	17596	.....	....	....	.....	...	Condition good; can discoloured, traces of tin and lead.	H. Ferguson & Co., Richibucto, N.B.
" 20	" Lobster, H. O'Leary, Richibucto, N.B.	12202	17597	.....	.....	... ..	....	.....	Condition good; can lined with paper, traces of copper.	R. O'Leary "
" 20	" Mackerel, H. O'Leary, Richibucto, N.B.	12203	17598	.....	....	....	.....	.....	Condition good; can not discoloured, traces of tin and lead.	" "
" 22	" Finnan Haddie, Baird & Peters, St. John, N.B.	12204	17601	....	.....	.....	....	.....	Condition good; can somewhat corroded, traces of tin.	G. S. Magee, Moncton, N.B.

"	22	"	Sardines, Connors Bros., Black's Harbour, N.B.	12205	17602	....	.....	...	.....	.....	Condition good; can not discoloured, no poisonous metals.	J. N. Boudreau	"
"	22	"	Sardines, L. Chaput Fils & Co., Monteal.	12206	17603	....	.....	..	....	..	Condition good; can slightly discoloured, no poisonous metals.	W. G. Bell	"
			Official Analyst, F. T. Harrison.										
May	13	Canned Shrimps, Barataria Canning Co.		9231	19088	297	157	82·9	2·87	Trace.	Can is parchment-lined and is not blackened inside; shrimps firm and in good condition.	J. Wilson, London, Ont.	
"	13	"	Lobster, E. Adams & Co., London.	9232	19089	218	187	76·1	3·22	None.	Can is parchment-lined; flesh firm, can not blackened; in good condition.	"	"
"	13	"	Salmon, R. P. Rithet & Co., Victoria, B.C.	9233	19090	470	397	67·7	2·95	Trace.	Flesh light coloured, but firm; can not corroded.	J. Garvey	"
"	13	"	Sardines, J. H. Todd & Co., Victoria, B.C.	9234	19091	166	129	41·3	3·50	None.	In oil; can only very slightly discoloured, apparently fresh; in good condition.	"	"
"	13	"	Salmon, J. H. Todd & Co., Victoria, B.C.	9235	19092	458	392	66·5	1·00	Trace.	Apparently fresh, colour good; can only slightly discoloured.	"	"
"	14	"	Mackerel, R. A. Clark, P.E.I.	9236	19093	455	401	58·7	0·75	"	Can not corroded; flesh rather soft, not spoiled.	H. Malcomber, Chatham, Ont.	
"	14	"	Shrimps, G. W. Dunbar, New Orleans.	9237	19094	139	139	66·2	3·15	"	Parchment-lined can; flesh in fair condition.	"	"
"	14	"	Golden Haddies, Canning Company, Digby, N.S.	9238	19095	463	406	78·1	2·32	"	Flesh firm and odour good; can considerably blackened.	G. Young	"
"	15	"	Lobster, Red Point Packing Co., P.E.I.	9239	19100	455	410	74·0	2·15	"	Parchment-lined; flesh firm.....	W. J. Cherney, Windsor, Ont.	
"	15	"	Finnan Haddies, Thistle Canning Co., N.S.	9240	19101	374	344	73·2	3·76	0·120	Flesh firm, but so badly blackened as to be unfit for use.	Smith & Duck	"
"	15	"	Mackerel, H. O'Leary, Richibucto, N.B.	9241	19102	439	416	68·4	2·79	None.	Flesh rather soft, odour good and can not corroded; in good condition.	D. L. McKay	"
"	18	"	Salmon, Maud Canning Factory, B.C.	9242	19106	498	407	70·5	2·89	"	Flesh is firm and apparently fresh; can very little darkened inside; in good condition.	Jackson & Son, Guelph, Ont.	
"	18	"	Fresh Herring, J. T. Morton, London, E.	9243	19107	466	419	60·1	3·80	0·073	Apparently in good condition, but contains considerable tin.	R. Mitchell	"
"	18	"	Lobster, D. Davis, Murray Harbour, P.E.I.	9244	19108	446	406	76·9	2·27	Trace.	Parchment-lined, flesh firm; can somewhat blackened at seams.	J. A. McCrea	"
			Official Analyst, Edgar B. Kenrick, Winnipeg, Man.										
July	25	"	Finnan Haddies, Boutilier & Morehouse.	11247	17124	.....	....	.....	.....	Trace.	Genuine	F. E. Weldon, Winnipeg.	
"	25	"	Herrings, Maconochie Bros..	11248	17125	"	...	.....	.....	.....	"	W. R. Johnson	"
"	25	"	Mackerel, R. A. C. Lark....	11249	17126	"	....	... ..	.....	... ..	"	Hudson Bay Co.	"
"	25	"	Shrimps, G. W. Dunbar & Sons.	11250	17127	"	....	.....	.....	.....	"	"	"
"	26	"	Salmon, Brunswick Canning Co.	11251	17128	"	.....	.....	....	...	"	D. W. McLean	"

APPENDIX B.—INSPECTION OF CANNED FISH—Tabulated Statement—*Concluded.*

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Total Contents of Can.	Solid Contents of Can.	Loss on drying.	Ash.	Tin.		
1898.	*Official Analyst, Edgar B. Kenrick, Winnipeg, Man.*			grams	grams	p. c.	p. c.	grams		
July 26	Canned Lobster, S. Bishop, Bathurst, N.B.	11252	17129	.....	.....	.....	.....	.....	Genuine.....	D. W. McLean, Winnipeg.
" 27	" Lobster, R. B. Noble, Toronto.	11253	17132	"	.....	.....	.....	.....	"	W. Dowling & Co., Brandon, Man.
" 28	" Lobster, Matthew & McLean, Souris.	11254	17133	"	.....	.....	.....	.....	"	E. J. Brooks & Co., Indian Head, Man.
" 28	" Salmon, North Coast Packing Co.	11255	17134	"	.....	.....	.....	.....	"	" "
" 30	" Salmon, Richmond Canning Co.	11256	17136	"	.....	.....	.....	.....	"	L. B. Cochrane, Medicine Hat.
" 30	" Sardines, Connor Bros., Black Harbour.	11257	17138	"	.....	.....	.....	.....	"	" "
" 30	" Finnan Haddies, J. Sealy, St. John, N.B.	11258	17140	"	.....	.....	.....	.....	"	Hartley & Co., Winnipeg.

APPENDIX C.—INSPECTION OF SUGAR—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No of Sample.	Result of Analysis.							Remarks by Analyst.	Name and Address of Vendor of Sample.
				Cane Sugar.				Reducing Sugar.	Moisture.	Ash.		
				By Polariscope.	Clerget.	Fehling.	Average.					
1898.	*Official Analyst, M. Bowman, Halifax.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Sept. 28	Raw sugar imported from Trinidad.	12634	16675	93·52	92·98	94·75	93·04	1·27	4·71	0·97	Under 16 Dutch Standard. . .	Acadia Sugar Refining Co., Dartmouth, N.S.
" 28	Raw sugar imported from Antigua, W.I.	12635	16676	87·00	86·91	86·56	86·82	2·83	5·56	1·75	"	" "
" 28	" " . .	12636	16677	83·66	84·32	86·08	84·68	5·95	5·88	2·43	"	" "
" 28	Raw sugar imported from St. Kitts, W.I.	12637	16678	85·63	86·17	84·62	85·47	3·56	6·64	1·56	"	" "
" 28	Beet root raw sugar imported from Germany.	12638	16679	94·26	93·59	93·42	93·76	0·31	3·02	1·34	"	" "
" 28	Raw sugar imported from Java.	12639	16680	95·26	95·51	94·37	95·05	1·33	1·67	0·84	"	" "
" 28	" " . .	12640	16681	96·86	96·66	95·60	96·37	1·44	1·33	0·52	"	" "
" 28	Raw sugar imported from St. Croix, W.I.	12641	16682	97·76	97·71	96·08	97·18	1·18	0·97	0·42	"	" "
" 28	Raw sugar imported from Demerara.	12642	16683	97·04	96·58	95·98	96·53	0·81	0·97	0·57	"	" "
" 28	Raw sugar imported from Barbados.	12643	. . . .	95·56	94·77	93·47	94·60	1·56	2·46	0·44	"	
" 28	Raw sugar imported from Trinidad.	12644	. . . . .	95·52	95·43	95·21	95·39	0·79	2·10	0·60	Centrifugal Muscovado; under 16 Dutch Standard.	
" 28	Raw sugar imported from Jamaica.	12645	. . . . .	93·88	93·02	92·00	92·97	2·85	3·07	0·51		
" 28	Raw sugar crystals	12646	. .	92·80	92·32	91·85	92·32	1·30	4·23	0·72	Centrifugal dried Muscovada, under 16 Dutch Standard.	
" 28	Molasses sugar imported from Porto Rico.	12647	. . . . .	85·64	84·84	83·75	84.74	5·72	4·90	1·66	Molasses sugar, low grade; under 16 Dutch Standard . . .	
" 28	Raw sugar imported from Porto Rico.	12648	. . . . .	87·46	86·80	87·27	87·18	5·20	4·92	1·27	Muscovado; under 16 Dutch Standard.	
" 28	" " . .	12649	. . . . .	90·50	90·41	90·42	90·44	4·30	3·13	0·76	Centrifugal; under 16 Dutch Standard.	

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.							Remarks by Analyst.	Name and Address of Vendor of Sample.
				Cane Sugar.				Reducing Sugar.	Moisture.	Ash.		
				By Polariscope.	Clerget.	Fehling.	Average.					
1898.	*Official Analyst, M. Bowman, Halifax.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Nov. 16	Bright Yellow, St. Lawrence Sugar Refining Co., Montreal.	12650	17606	93·60	94·35	94·03	93·99	3·41	1·10	0·68	Genuine	W. F. Hatheway, St. John, N.B.
" 16	Extra Standard Granulated, Woodside Refinery, Dartmouth, N.S.	12651	17607	99·53	99·56	99·71	99·60	0·20	0·03	0·04	"	" "
" 17	Barbados, W. P. Leacock & Co., Barbados, W.I.	12652	17608	96·11	96·77	95·04	95·99	2·24	0·65	0·47	"	Merritt Bros. "
" 17	American Granulated, American Sugar Ref'g. Co., New York.	12653	17609	99·62	99·58	99·10	99·43	0·48	0·03	0·04	"	Baird & Peters "
" 17	"Cream Sugar" Scotch Yellow, Greenock Sugar Refinery, Scotland.	12654	17610	91·86	91·45	90·96	91·42	0·97	3·03	1·99	"	G. S. De Forest "
" 18	Paris Lumps, Redpath's Sugar Refinery, Montreal.	12655	17611	99·60	99·82	98·80	99·41	0 43	0·03	0·02	"	Puddington & Merritt "
" 18	Dutch granulated.....	12656	17612	99·34	99·15	99·65	99·05	0.48	0·10	0·08	"	G. M. & A. A. Barker "
" 21	Granulated, Jones & Schofield, St. John. N.B.	12657	17613	99·48	99·87	99·69	99·68	0·26	0·07	Trace.	"	W. H. Culbert, Sussex, N.B.
" 21	Extra Yellow, Acadia Sugar Refining Co.	12658	17614	90·26	90·57	91·07	90·63	2·85	3·75	1·30	"	Humphries & Teakles "
" 21	Bright Yellow Scotch, G. S. De Forest & Sons, St. John, N.B.	12659	17615	90·52	90·06	89·04	89·87	0·67	3·81	2·60	"	T. H. White & Co. "
" 23	Extra Standard Dutch Granulated ***, G. E. Boak & Co., Halifax, N.S.	12660	17616	99·40	99·40	100·10	99·63	0·31	0·06	0·05	"	A. E. Strang, Chatham, N.B.
" 23	Yellow Extra "C," Acadia Sugar Refinery, N.S.	12661	17617	90·20	89·82	90·46	90·16	1·81	4·96	1·54	"	A. J. Loggie "
" 23	Standard "C," Acadia Sugar Refinery.	12662	17618	89·52	89·07	89·82	89·47	2·21	3·62	2·27	"	D. MacLachlan "

"	25	Extra "C," Acadia Sugar Refinery.	12663	17619	87·64	87·69	86·97	87·43	3·51	5·53	1·33	"	.....	K. A. McLean & Co., Moncton, N.B.
"	25	Standard Granulated, Redpath's Refinery, Montreal.	12664	17620	99·66	99·49	99·26	99·80	0·54	0·03	0·01	"	.. ..	W. G. Bell "
"	25	Paris Lumps, Redpath's Refinery, Montreal.	12665	17621	99·45	99·42	99·59	99·49	0·37	0·07	0·06	"	....	J. M. Wallace & Co. "

APPENDIX D.—INSPECTION OF WHEAT—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.								Name and Address of Vendor of Sample.
				Moisture.	Albuminoids.	Carbohydrates and fat.	Crude fibre.	Ash.	Nitrogen.	Nitrogen dissolved out by dilute alkali.	Nitrogen dissolved out by dilute alcohol.	
1898.	*Official Analyst, E. B. Kenrick, Winnipeg, Man.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
Oct. 7	Manitoba No. 1, Hard	11259	17144	8·93	13·87	73·42	2·24	1·54	2·22	2·10	0·69	Standard Samples sent by David Hone, Winnipeg.
" 7	" No. 2 "	11260	17145	8 95	13·60	73·52	2·30	1·63	2·18	2·05	0·69	
" 7	" No. 3 "	11261	17146	9·04	14·22	72·98	2·31	1·65	2·28	2·13	0·71	
" 7	" Extra "	11262	17147	9·07	15·27	71·65	2·38	1·63	2·44	2 29	0·78	
" 7	One Northern	11263	17148	9 33	12·25	74·68	2·12	1·62	1·96	1·84	0·62	
" 7	Two "	11264	17149	9·24	12·46	74 44	2·22	1·64	1·99	1·88	0·65	
" 7	One Frosted	11265	17150	8·90	14·31	72·97	2·27	1·55	2·29	2·17	0 72	
" 7	No. 2 White Winter (East of Port Arthur)	11266	.....	9·58	10·73	75·94	2.20	1·55	1·72	1·55	0·53	Grown east of Port Arthur ; sent by the Department.
" 7	Extra "	11267	....	9·62	9·43	77·23	2.24	1·48	1·51	1·40	0·48	
" 7	No. 2 Red Winter (East of Port Arthur)	11268	....	9·57	10·52	76·04	2·29	1·58	1·68	1·53	0·53	
" 7	No. 1 " "	11269	..	9·65	11·15	75·27	2·31	1·62	1·78	1·60	0·59	
" 7	No. 1 Spring "	11270	.....	9·63	11·02	75·47	2·27	1·61	1·76	1·62	0·55	
" 7	No. 1 Goose	11271	....	9·53	12·34	74·20	2·30	1·63	1·97	1·85	0·62	
" 7	No. 2 Spring	11272	....	9·70	12·78	73·64	2·30	1·58	2·04	1·90	0·64	
" 7	No. 2 Goose	11273	....	9·42	12·19	74·51	2·28	1·60	1·95	1·81	0·63	
" 7	No. 1 White Winter	11274	....	9·60	10·45	76·18	2·24	1·53	1·67	1·64	0·53	

APPENDIX E.—INSPECTION OF MALT LIQUORS—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.									Remarks by Analyst.	Name and Address of Vendor of Sample.
				Sp. Gr. at 15·5 C.			Per cent of Total Solids.	Alcohol by Wt.	Alcohol by Vol.	Maltose.	Proteids, N x 6·25.	Nitrogen.		
				Beer.	Distillate.	Dealcoholised Beer.								
1898.	*Official Analyst, J. B. Edwards, Montreal.*							p. c.	p. c.	p. c.	p. c.	p. c.		
Aug. 30	Dow's India Pale Ale, W. Dow & Co., Montreal.	11850	18890	1·0066	0·9885	1·0171	4·31	6·93	8·63	1·010	0·781	0·125	Genuine	P. Desormiers, Montreal.
" 30	Dow's Double Stout	11851	18891	1·0144	0·9892	1·0273	6·780	6·43	8·63	1·040	0·887	0·142	"	" "
" 30	Labatt's India Pale Ale, Labatt, London, O.	11852	18892	1·0095	0·9945	1·0173	4·31	3·12	3·90	0·85	0·437	0·70	"	R. Martel "
" 30	Dawes' Pale Ale, Dawes & Co., Lachine.	11853	18893	1·0034	0·9896	1·0134	3·31	6·14	7·66	1·100	0·718	0·115	"	Gravel Frères "
" 30	Dawes' Extra Stout	11854	18894	1·0153	0·9904	1·0243	6·05	5·62	7·01	1·020	0·837	0·134	"	" "
Sept. 2	India Pale Ale, National Brewery, Montreal.	11855	18895	1·0075	0·9909	1·0161	4·06	5·31	6·63	0·585	0·693	0·111	"	L. P. Forest "
" 9	Cream Porter, S. C. Nutter, Sherbrooke, P.Q.	11856	18896	1·0151	0·9912	1·0235	5·80	5 12	6·40	0·727	0 743	0·119	"	W. Murray & Co., Sherbrooke, P.Q.
" 9	Pale Ale, Silver Spring Brewery, S. C. Nutter	11857	18897	1 0125	0·9916	1·0203	....	4·87	6·10	0·687	0·762	0·122	"	P. Olivier "
" 9	India Pale Ale. S. C. Nutter....	11858	18898	1·0191	..	....	....	5·94	7·40	0·644	0·918	0·147	"	" "
" 12	" J. H. R. Molson & Bros., Montreal.	11859	18899	1·0118	0·9921	1·0196	....	4·56	5·71	0·782	0·887	0·142	"	P. Desormiers, Montreal.
" 12	XXX Porter, J. H. Molson & Bros., Montreal.	11860	18900	1·0082	0·9913	1·0176	....	5·06	6·32	0·592	0·812	0·130	"	" "
" 26	India Pale Ale, Union Brewery Co., Montreal.	11861	18711	1·0154	0·9940	1·0209	5·06	3·41	4·27	0·928	0·613	0·098	"	C. E. E. Anthier "
" 26	XXX Pale Ale, Canadian Brewery Co., Montreal.	11862	18712	1·0105	0·9920	1·0180	4·56	4·62	5·78	0·687	0·793	0·127	"	" "
" 26	Lager Beer, H. A. Ekers, Montreal.	11863	18713	1·0160	0·9946	1·0210	5·31	3·06	3·83	0·994	0·852	0·126	"	" "
" 26	Lager Beer, Reinhardt, Montreal	11864	18714	1·0082	0·9928	1·0148	3·81	4·12	5 16	0·636	0·852	0·136	"	M. Choquette "
" 26	Porter, Canadian Brewery Co., Montreal.	11865	18715	1·0067	0·9917	1·0147	3·56	4·81	6·02	0·348	0·862	0·138	"	Daoust Bros. "
" 27	Mild Ale, W. Dow & Co,	11866	18716	1·0062	0·9887	1·0169	4·06	6·78	8·45	0·724	0·894	0·143	"	H. Poirier "

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis. Sp. Gr. at 15 5 C. Beer.	Distillate.	Dealcoholised Beer.	Per cent of Total Solids.	Alcohol by Wt.	Alcohol by Vol.	Maltose.	Proteids, N x 6·25.	Nitrogen.	Remarks by Analyst.	Name and Address of Vendor of Sample.
1898.	*Official Analyst, J. B. Edwards, Montreal.*							p. c.	d. c.	p. c.	p. c.	p. c.		
Sept. 27	India Pale Ale, H. A. Ekers, Montreal.	11867	18717	1·0107	0·9927	1·0177	4·31	4·19	5·24	0·680	0·668	0·107	Adulterated by addition of Salicylic Acid.	H. Poirier.
Oct. 3	Export Ale, Montreal Brewing Co.	11868	18718	1·0110	0·9926	1·0187	4·81	4·25	5·32	0·636	0·631	0·101	Adulterated by the addition of Salicylic Acid as a preservative.	M. Scanlan, Montreal.
" 3	Porter, H. A. Ekers, Montreal.	11869	18719	1·0140	0·9932	1·0211	5·31	3·88	4·85	1·04	0·775	0·124	Genuine	" "
" 3	India Pale Ale, Reinhardt	11870	18720	1·0052	0·9926	1·0125	3·060	4·25	5·32	0·468	0·587	0·094	"	" "
" 5	Porter, National Brewery Co., Montreal.	11871	18721	1·0108	0·9919	1·0190	4·81	4 69	5·86	0·815	0·815	0·130	"	L. P. Forest "
" 7	Pale Bitter Ale, Dawes, Lachine	11872	18722	1·0056	0·9915	1·0161	4 06	4·95	6·17	0·625	4·38	0·100	"	H. Belisle "
" 7	Pale Ale, W. Dow & Co.	11873	18723	1·0060	0·9888	1·0167	4 06	6·71	8·36	0·868	0·402	0·139	"	Strong & Strong "
" 7	India Pale Ale, Prescott Brewing and Malting Co.	11874	18724	1·0064	0·9903	1·0117	2·80	5 69	7·09	0·323	0·575	0 092	"	" "
" 7	Best Stout Porter, Odell & Co., Sherbrooke, P. Q.	11875	18725	1·0036	0·9971	1·0061	1·53	1·62	2·04	0·161	0·262	0·042	Adulterated under Act, being deficient in all essentials and impregnated with iron, unfit for consumption, having a styptic iron flavour.	N. Lacroix, Sherbrooke. P.Q.
" 7	Amber Beer, Odell & Co.	11876	18726	1·0028	0·9941	1·0082	2·04	3·35	4·20	0·226	0·400	0·064	Genuine	" "
" 7	Select Export Ale, S. C. Nutter, Sherbrooke, P.Q.	11877	18727	1·0088	0·9916	1·0167	4·06	4·87	6·10	0·483	0·810	0·129	"	D. W. Stenson "
" 7	Pale Ale, "Fox Head," Amyot & Gauvin, Quebec.	11878	18728	1·0130	0·9913	1·0212	5·31	5·06	6·32	0·534	0·981	0·157	"	" "
" 7	Porter, "Fox Head"	11879	18729	1·0054	0·9904	1·0145	3·56	5·62	7·01	0·402	0·812	0·139	"	" "
" 15	Ale, Boswell Bros., Quebec.	11880	18730	1·0070	0·9900	1·0165	4·06	5·87	7·32	0·636	0·837	0·134	"	W. W. Coleman, Quebec.
" 15	Cream Porter, Boswell Bros., Cuebec.	11881	18731	1·0120	0·9917	1·0199	5·06	4·81	6·02	0·278	1·025	0·164	"	" "
" 15	India Pale Ale, Beauport Brewing Co.	11882	18732	1·0054	0·9900	1·0149	3·81	5·87	7·32	0·439	0·750	0·120	"	E. Clarke "

"	15	India Pale Ale, Proteau & Carignan, Quebec.	11883	18733	1·0102	0·9916	1·0184	4·56	4·87	6·10	0·680	0·644	0·103	"	J. Turcotte	"
"	15	Porter, Proteau & Carignan. . .	11884	18734	1·0142	0·9913	1·0224	5·55	5·06	6·32	0·548	0·712	0·114	"	"	"
"	15	" Beauport Brewing Co. .	11885	18735	1·0080	0·9908	1·0166	4 06	5·37	6·71	4·06	0·768	0·123	"	M. Thibodeau	"
"	17	Pale Ale, Prescott Brewing and Malting Co.	11886	18746	1·0064	0·9904	1·0145	4·56	5·62	7·01	0·409	0·681	0·109	"	Strong & Strong,	Montreal.
"	17	Pale Bitter Ale, Dawes & Co, Lachine.	11887	18747	1·0078	0·9916	1·0156	3·81	4·87	6·10	0·482	0·644	0·103	"	H. Poirier	"
"	21	Odell Stout Porter, Odell & Co., Sherbrooke, P.Q.	11888	18748	1·0041	0·9928	1·0109	2·80	4·12	5·16	0·424	0·546	0·089	"	D. W. Stenson,	Sherbrooke, P.Q.
"	28	Labatt's India Pale Ale, J. Labatt, London.	11902	17622	1·0089	0·9919	1·0169	4·31	4·69	5·86	0·563	0·575	0·092	"	J. R. Miller, St. John,	N.B.
"	28	Labatt's XXX Stout, J. Labatt, London, Ont.	11903	17623	1·0179	0·9906	1·0269	6·78	5·50	6·86	0·951	0·818	0·131	"	"	"
"	28	Carling's Export I. Ale, The Carling Brewing and Malting Co., London, Ont.	11904	17624	1·0128	0·9909	1·0214	5·31	5·31	6·63	0·782	0·862	0·138	"	A. W. Woodward	"
"	28	Carling's XXX Porter, "Red Cross," The Carling Brewing and Malting Co.	11905	17625	1·0142	0·9914	1·0223	5·55	5·00	6·24	0·768	0·831	0·133	"	"	"
"	29	Beauport Lager, Beauport Brewing Co., Quebec.	11906	17626	1·0123	0·9928	1·0192	4·81	4·12	5·16	0·930	0·669	0·107	Genuine	McIntyre & Comeau,	St. John, N.B.
"	29	Amber Ale, Toronto M. & B. Co	11907	17627	1·0125	0·9908	1·0212	5·31	5·37	6·71	0·804	0·925	0·148	"	"	"
Dec.	6	Pale Ale, J. P. May, Halifax. N.S.	11908	16684	1·0105	0·9916	1·0185	4·56	4·87	6·10	·482	1 17	0·188	"	J. P. May, Halifax, N.S.	
"	6	Porter, J. P. May, Halifax, N.S.	11909	16685	1·0122	0·9923	1·0194	4·81	4·44	5·55	0·731	0·928	0·147	"	"	"
"	7	"Keith's XX Ale," A. Keith & Son, Halifax.	11910	16687	1·0121	0·9920	1·0199	5·06	4·62	5·78	0·687	0·70	0·112	"	A Keith & Son	"
"	7	"Keith's XXX Ale," A. Keith & Son.	11911	16688	1·0118	0·9919	1·0195	4·81	4·69	5·86	0·680	0·736	0·117	"	"	"
"	7	Stout, Halifax Brewery Co.	11912	16689	1·0165	0·9913	1·0249	6·29	5·06	6·32	0·563	1·10	0·176	"	Halifax Brewery Co.	
"	7	India Pale Ale, Dawes & Co. . . .	11913	16690	1·0081	0·9901	1·0175	4·31	5·81	7·25	0·402	0·806	0·129	"	Dawes & Co.'s Agent,	Halifax.

APPENDIX E.—INSPECTION OF MALT

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of					
				Specific Gravity at 15·5 c.			Alcohol.		
				Beer.	Distillate.	Dealcoholized Residue.	By Wt.	By Volume.	Proof Spirit.
1898.	*Official Analyst, F. X. Valade, Ottawa.*						p. c.	p. c.	p. c.
Sept. 2	XXX Porter, W. H. Berry, March, Ont.	14502	18325	1·0148	0·9904	1·0245	5·62	7·01	12·30
" 2	Pale Ale, W. H. Berry	14503	18326	1·0155	0·9907	1·0249	5·44	6·78	11·89
" 2	Porter, McCarthy & Sons, Prescott, Ont.	14504	18327	1·0194	0·9969	1·0226	1·75	2·20	3·85
" 2	Amber Ale, H. Brading, Ottawa...	14505	18328	1·0100	0·9907	1·0192	5·44	6·78	11·89
" 2	Imperial Ale, The O'Keefe Brewery Co., Toronto.	14506	18329	1·0081	0·9899	1·0181	5·94	7·40	12·97
" 9	India Pale Ale, Victoria Brewery, Ottawa.	14507	18330	1·0096	0·9924	1·0172	4·37	5·47	9·58
" 9	Brown Stout, Victoria Brewery, Ottawa.	14508	18331	1·0104	0·9918	1·0187	4·75	5·94	10·40
" 9	Fox Head Brand Pale Ale, Amyot & Gauvin, Quebec.	14509	18332	1·0051	0·9910	1·0141	5·25	6·55	11·49
" 9	India Pale Ale, Dominion Brewery Co., Toronto.	14510	18333	1·0115	0·9913	1·0201	5·06	6·32	11·08
Oct. 6	Carling's XXX Porter, Carling & Co., London, Ont.	14511	18342	1·0145	0·9903	1·0243	5·69	7·09	12·43
" 6	Carling's Amber Ale, Carling & Co., London, Ont.	14512	18343	1·0125	0·9885	1·0139	6·93	8·63	15·12
" 6	Imperial Club Lager, Carling & Co., London, Ont.	14513	18344	1·0110	0·9911	1·0197	5·19	6·48	11·35
" 6	Export India Pale Ale, Carling & Co., London, Ont.	14514	18345	1·0080	0·9884	1·0195	7·00	8·72	15·27
" 8	XXX Porter, Bowie & Co., Brockville, Ont.	14515	18346	1·0070	0·9893	1·0188	6·36	7·92	13·88
" 8	Our Bass Ale, Bowie & Co., Brockville, Ont.	14516	18347	1·0059	0·9889	1·0172	6·64	8·27	14·50
" 8	Budweiser Lager Beer, Copland Brewing Co., Toronto.	14517	18348	1·0083	0·9923	1·0159	4·44	5·55	9·72
" 8	Extra Stout "Revolver Brand," G. Younger & Sons, Alloa, Ont.	14518	18349	1·0071	0·9882	1·0188	7·13	8·88	15·56
" 8	India Pale Ale, Dawes & Co., Lachine.	14519	18350	1·0062	1·0173	0·9888	6·71	8·36	14·66
Nov. 4	XXX Stout, Macpherson, Downs & Co., Cobourg, Ont.	14520	18351	1·0135	0·9922	1·0209	4·50	5·63	9·86
" 4	Ale, Macpherson, Downs & Co., Cobourg, Ont.	14521	18352	1·0118	0·9926	1·0189	4·25	5·32	9·31
" 4	XXX Stout, Bickle & Healey, Cobourg, Ont.	14522	18353	1·0103	0·9889	1·0210	6·64	8·27	14·50
" 4	Pale Ale, Bickle & Healey.....	14523	18354	1·0096	0·9906	1·0189	5·50	6·86	12·03
" 5	Extra Stout, Port Hope Brewing and Malting Co.	14524	18355	1·0112	0·9893	1·0218	6·36	7·92	13·88
" 5	"Half and Half," Port Hope Brewing and Malting Co.	14525	18356	1·0062	0·9887	1·0172	6·78	8·45	14·81
" 5	Pale Ale, Port Hope Brewing and Malting Co.	14526	18357	1·0100	0·9889	1·0210	6·64	8·27	14·50
" 5	Draught Ale, Port Hope Brewing and Malting Co.	14527	18358	1·0093	0·9890	1·0199	6·57	8·18	14·35
" 7	Imperial Ale, The O'Keefe Brewing Co., Toronto.	14528	18359	1·0057	0·9895	1·0162	6·21	7·74	13·57
" 25	Pale Ale, The Walkerville Brewing Co.	14529	17151	1·0043	0·9902	1·0139	5·75	7·11	12·57
" 25	Export Beer, The Walkerville Brewing Co.	14530	17152	1·0102	0·9941	1·0161	3·25	4·20	7·36
" 25	Extra Stout, E. S. Drewry, Winnipeg, Man.	14531	17153	1·0062	0·9901	1·0161	5·81	7·25	12·70

SESSIONAL PAPER No. 7b

LIQUORS—Tabulated Statement—*Continued.*

Analysis.									
Nitrogen.	Proteids N × 6·25.	Maltose.	Specific Gravity of Original Wort.	Total Solids in Original Wort.	Total Solids in Beer.	Degree of Fermentation.	Preservatives.	Remarks by Analyst.	Name and Address of Vendor of Sample.
p. c.	p. c.	p. c.		p. c.	p. c.				
0·128	0·784	0·502	1·0667	16·18	5.78	64·2	None...	Genuine.....	P. O'Connor, Ottawa.
0·062	0·380	0·150	1·0656	15·93	4·97	68·8	" ...	"	" "
0·103	0·632	0·189	1·0337	8·42	5·31	36·9	Salicylic acid.	"	" "
0·199	1·218	0·263	1·0599	14·62	4·26	70·8	None...	"	J. Egan "
0·168	1·029	0·575	1·0628	15·28	4·07	73·3	" ...	"	" "
0·137	0·839	0·303	1·0489	12·05	3·99	66·9	" ...	"	D. Provost "
0·172	1·053	0·469	1·0535	13·13	4·45	66·1	" ...	"	" "
0·089	0·545	0·104	1·0532	13·06	3·40	73·9	Salicylic acid.	"	" "
0·131	0·802	0·103	1·0576	14·09	4·78	66·0	None...	"	" "
0·105	0·643	0·495	1·0670	16·30	6·31	61·29	" ...	"	Kennedy & Co., "
0·091	0·557	0·325	1·0656	15·98	3·996	74·99	" ...	"	" "
0·168	1·029	0·703	1·0583	14·26	5·13	64·01	" ...	"	Snider Bros. "
0·119	0·729	0·582	1·0717	17·39	5·33	69·34	" ...	"	Carling & Co. "
0·063	0·386	0·446	1·0663	16·14	5·67	64·87	" ...	"	Browne & Co., Brockville, Ont.
0·161	0·986	0·348	1·0668	16·26	4·26	73·82	" ...	"	" "
0·098	0·600	0·490	1·0481	11·83	4·59	61·21	" ...	"	J. McGlade "
0·126	0·772	0·398	1·0721	17·48	5·16	70·47	" ...	"	Station Refreshment Room Kingston.
0·084	0·514	0·431	1·0673	16·37	4·40	73·04	" ...	"	" "
0·112	0·686	1·965	1·0536	13·142	5·42	58·75	" ...	"	Macpherson, Downs & Co., Cobourg.
0·042	0·257	0·257	1·0496	12·190	4·95	59·39	" ...	"	" "
0·063	0·386	0·537	1·0706	17·136	5·066	70·44	" ...	"	Bickle & Healey "
0·112	0·686	0·531	1·0601	14·69	4·70	68·00	" ...	"	" "
0·070	0·429	0·095	1·0693	16·83	5·69	66·20	" ...	"	Port Hope Brewing and Malting Co., Port Hope, Ont.
0·102	0·625	0·083	1·0678	16·48	4·26	74·11	Salicylic acid.	"	" "
0·091	0·557	0·174	1·0706	17·13	5·604	67·29	None...	"	" "
0·098	0·60	0·089	1·0689	16·74	5·11	69·48	" ...	"	" "
0·140	0·85	0·039	1·0627	15·302	4·81	68·56	" ...	"	T. Snider, Ottawa.
0·153	0·956	0·680	1·0571	13·976	3·896	72·1	" ...	"	Richard & Co., Winnipeg.
0·112	0·695	0·04	1·0397	9·828	4·22	57·0	" ...	"	" "
0·161	1·006	0·741	1·0598	14·61	4·456	69·5	" ...	"	P. Sala "

APPENDIX E.—INSPECTION OF MALT

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of					
				Specific Gravity at 15·5 c.			Alcohol.		
				Beer.	Distillate.	Dealcoholized Residue.	By Wt.	By Volume.	Proof Spirit.
1898.	*Official Analyst, F. X. Valade, Ottawa.*						p. c.	p. c.	p. c.
Nov. 25	Sultana Lager, Lake of the Woods Brewery, Rat Portage, Man.	14532	17154	1·0086	0·9904	1.0179	5·62	7·01	12·32
" 25	Mikado Pale Ale, Lake of the Woods Brewery.	14533	17155	1·0072	0·9884	1·0185	6·86	8·54	14·96
" 25	Golden Amber Ale, E. S. Drewry, Winnipeg.	14534	17156	1·0125	0·9895	1·0230	6·21	7·74	13·57
" 25	Bonds Brown Stout, Blackwood Bros., Winnipeg.	14535	17157	1·0095	0·9899	1·0196	5·94	7·40	12·97
" 25	Lager Beer, McDonagh & Shea, Winnipeg.	14536	17158	1·0115	0·9918	1·0198	4·75	5·94	10·40
" 25	Porter, McDonagh & Shea, Winnipeg.	14537	17159	1·0131	0·9883	1·0237	7·07	8·80	15·42

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LIQUORS—Tabulated Statement—*Concluded.*

Analysis.								Remarks by Analyst.	Name and Address of Vendor of Sample.
Nitrogen.	Proteids N × 6·25.	Maltose.	Specific Gravity of Original Wort.	Total Solids in Original Wort.	Total Solids in Beer.	Degree of Fermentation.	Preservatives.		
p. c.	p. c.	p. c.		p. c.	p. c.				
0·162	1·012	0·303	1·0601	14·69	3.87	73·6	None...	Genuine.....	Stran & Co., Winnipeg.
0·109	0·681	0·499	1·0697	16·93	4·43	73·8	" ..	"	" "
0·114	0·712	0·605	1·0695	16·88	5·448	67·9	" ...	"	E. S. Drewry "
0·099	0·619	0·393	1·0638	15·55	4·926	68·3	Salicylic acid.	"	Blackwood Bros. "
0·142	0·887	0·627	1·0541	13·26	5·18	60·9	None...	"	McDonagh & Shea "
0·107	0·669	0·242	1·0712	17·27	6·516	62·2	" ...	"	" "

APPENDIX F.—INSPECTION OF NON

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Sp. Gr. of Liquid.	Total Solids.	Ash.	Reducing Sugar.	Nitrogen.	Proteids.	Alcohol by Weight
1899.	*Official Analyst, Dr. F. X. Valade, Ottawa.*				p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Jan. 3	"Cafesante," Cafesante Co., Montreal.	18101	14551	1·0665	17·09	0·41	1·46	0·69	4·29	.....
" 3	"Pabst's Malt and Hop Extract."	18102	14550	1·0303	10·03	0·30	...	0·714	4·46	1·75
" 3	"Ginger Beer," W. Pipe, Kingston, Ont.	18103	14538	.....	7·75	·006	4·49	...	.....	0·98
" 3	"Birch Beer," J. P. Hinds, Kingston.	18104	14539	....	3·71	0·02	Mere traces	.....	.....	0·44
" 3	"Ginger Beer," J. P. Hinds, Kingston.	18105	14540	.....	8·94	0·06	5·43	....	....	0·86
" 3	"Orange Wine," Turner & Co., Toronto.	18106	14541	....	26·18	0·03	22·07	... ..	....	1·75
" 3	"Birch Beer," E. M. Pilgrim, Brockville.	18108	14542	.....	5·90	0·010	Traces	.....	.....	0·21
" 3	"Ginger Beer," M. Drolet, Ottawa	18110	14543	.....	4·39	0·09	2·24	....	....	0·33
" 12	" R. Allan, Montreal.	18752	14544	....	5·67	0·04	3·09	.....	. ...	. ..
" 12	" C. Gurd & Co., Montreal.	18753	14545	.....	8·58	0·02	3·04	.....	.....	0·84
" 12	" Rowan Bros., Montreal.	18754	14546	.....	6·49	0·05	4·50	.....	.....	.....
" 12	" J. Christin & Co., Montreal.	18755	14547	. . .	7·99	0·06	1·95	.....	....	... .
" 12	" Joseph Brothers, Montreal.	18756	14548	...	11·17	0·07	3·04	.....	.....	....
" 12	" P. A. Milloy, Montreal.	18757	14549	....	2·64	0·10	2·75	.....	.. . .	Trace.

SESSIONAL PAPER No. 7b

ALCOHOLIC LIQUORS—Tabulated Statement.

Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
Maltose.	Alkalies and Alkaline Earths.	Metallic Impurities.	Free CO_2. Grammes in 100 C.C.	Free CO_2. Cubic centimeters per 100 C.C.		
p. c.	p. c.					
.. ...	.....	...	.....	....	Presence of dextrin; starch granules in small quantity; caffeine doubtful, contains nothing injurious to health	J. McLeod, druggist, Kingston
1·331	.... ..	. .	.....	....	Not equal to the best preparation of the kind but contains nothing harmful.	F. W. Sills "
.....	.....	...	0·44	224	Genuine; sodium and calcium.....	W. Pipe "
.....	Ca., Na. & K.	Iron..	..	. ...	Genuine; owing to the bad quality of the cork the gas had almost all escaped.	J. P. Hinds "
. ..	Na.& Ca	..	0·46	232	Genuine..	" "
. ...	K.& Ca.	.. ...	. ...	. ...	Chiefly a solution of glucose flavoured with orange; it is not a wine and should be classed among the syrups.	Mrs. B. R. Woods, Brockville.
.... .	Ca., Na. & K.	Iron..	....	. ..	Genuine.....	E. M. Pilgrim "
... ..	Na.& Ca	. . .	0·26	131	"	G. Gravel, Hull.
.....	K., Na. & Ca.	.. .	0·30	152	"	M. Durand, Montreal.
.....	K., Na. & Ca.	.. ..	0·30	155	"	J. Tobin "
.. .	K. & Na	...	0·32	161	"	R. Coogan "
...	"	.... .	0·33	165	"	A. Yon "
.... .	"	... ..	0·28	144	"	Joseph Bros. "
.....	"	.....	0·27	135	"	J. Johnston "

APPENDIX G.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Moisture.	Caffeine.	Ash.			Sp. Gr. 10 per cent Dec^{n}.	Iodine Reaction.
						Total.	Soluble.	Insoluble.		
1899.	*Official Analyst, M. Bowman, Halifax.*			p. c.	p. c.	p. c.	p. c.	p. c.		
Feb. 24	Coffee Compound "Jamaica," W. H. Schwartz & Sons, Halifax.	12682	16699	3·80	0·68	4·38	3·10	1·28	1·0138	Blue..
" 24	Coffee Compound "Batavian," W. H. Schwartz & Sons, Halifax.	12683	16700	3·10	0·59	4·19	2·96	1·23	1·0130	"
" 24	Coffee, "Jamaica," Davidson Bros., Halifax.	12684	16701	4·58	0·37	5·01	3·02	1·99	1·0186	"
" 24	" "Java," A. P. Torrens, Halifax..	12685	16702	4·26	0·59	4·78	3·22	1·56	1·0166	"
" 27	" "Thistle," Bauld & Gibson, Halifax.	12686	16703	4·12	0·40	4·85	2·71	2·14	1·0134	"
" 27	" "I. X. L.," Tobin & Co., Halifax	12687	16704	3·76	1·03	4·78	3·71	1·07	1·0135	.....
" 27	" "German Breakfast," Schwartz & Sons, Halifax.	12688	16705	3·09	0·44	3·82	2·68	1·14	1·0123	Blue..
Mar. 8	" W. E. Crowe & Co., Halifax....	12689	16706	2·67	1·15	4·49	3·56	0·93	1·0113	.....
" 8	" Tobin & Co. "	12690	16707	1·80	1·28	4·68	3·79	0·89	1·0107	.....
June 6	Mocha and Java, imported by vendors...	12701	17653	5·58	1·25	4·53	3·72	0·81	1·0102	.....
" 6	"Java," Chase & Sanborn, Montreal....	12702	17654	5·93	1·42	4·19	3·42	0·77	1·0102	.....
" 6	"Java, Mocha and Macaraibo," imported	12703	17655	6·03	1·26	4·34	3·48	0·86	1·0103	.....
" 7	" "	12704	17 56	7·70	1·14	4·14	3·38	0·76	1·0103	.....
" 13	"Java," Ewing, Montreal	12705	17657	5·96	1·17	4·46	3·40	1·06	1·0101	....
" 13	" Dearborn & Co..	12706	17658	4·08	1·12	4·13	3·33	0·80	1·0103	....
" 15	"Java and Macaraibo," Ewing, Montreal	12707	17659	4·61	1·15	4·21	3·41	0·83	1·0102	.....
" 15	"Imperial Java," Chase & Sanborn.....	12708	17660	4·63	1·12	4·46	3·69	0·77	1·0107	...
	Official Analyst, Dr. M. Fiset, Quebec.									
June 6	Coffee....	10139	19505	2·88	...	4·49	3·67	0·82	1·0100	.....
" 6	" ground by vendor.....	10140	19506	3·43	....	4·55	3·50	1·05	1·0099	.....
" 6	" "	10141	19507	8·33	.....	5·18	3·45	1·63	1·0156	.....
" 6	" "	10142	19508	6·98	.....	4·38	2·99	1·39	1·0177	.....
" 6	" "	10143	19509	4·55	.....	4·97	3·17	1·80	1·0097	.....
" 7	" J. B. Letellier, Quebec.....	10144	19519	4·43	.....	4·86	3·98	0·88	1·0098	...
" 7	" Forbes Bros., Montreal	10145	19511	5·00	.....	4·81	3·95	0·86	1·0101	...
" 7	" Hudon & Hébert, Montreal..	10146	19512	5·05	....	5·91	3·70	2·21	1·0101	.....
	Official Analyst, Dr. J. B. Edwards, Montreal.									
June 1	Coffee....	11996	19501	3·69	0·37	5·05	4·04	1·01	1·0075	.....
" 2	"	11997	19502	4·10	0·35	4·98	3·90	1·08	1·0091	... .
" 5	" Chase & Sanborn, Montreal.....	11998	19503	2·98	0·33	5·16	4·32	0·84	1·0089	....
" 5	"	11999	19504	3·43	0·21	4·72	3·77	0·95	1·0104	....
" 10	" Carter, Galbraith & Co., Montreal.	15605	19513	2·49	.....	4·79	3·79	1·00	1·0094	... .
" 10	"	15606	19514	2·84	.....	5·29	4·24	1·05	1·0120	.....
" 10	"	15607	19515	2·49	.....	4·91	4·08	0·83	1·0093	.....
" 16	" S. H. & A. S. Ewing, Montreal....	15608	19516	6·84	....	5·71	4·36	1·35	1·0104	.....
" 16	" " "	15609	19517	5·34	. . .	4·46	3·12	1·34	1·0160	.....

SESSIONAL PAPER No. 7b

COFFEE—Tabulated Statement.

Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
Fat.	Aqueous Extract.	Al. Extract.	Sand.	Sugar.		
p. c.	p. c.	p. c.	p. c.	p. c.		
6·35	....	.....	....	.....	Contains a large amount of farinaceous matter and chicory.	J. Dence, Halifax.
5·42	.....	....	....	.....	" "	J. Davison & Sons, Halifax.
3·91	.....	....	....	.....	" "	A. D. Palmer "
5·18	.....	.....	....	.....	" "	A. P. Torrens "
3·70	.....	....	....	.....	" "	G. Orman, Dartmouth, N.S.
11·13	....	..	....	....	Contains a small amount of chicory	T. Gentles & Sons "
4·75	.....	....	....	....	Largely farinaceous matter and chicory.	E. M. Walker "
11·32	.....	.....	....	....	Genuine	W. E. Crowe & Co., Halifax.
12·23	....	....	....	.....	"	T. Major & Sons "
10·99	....	.....	....	.....	"	Bowman & Augcoine, St. John, N.B.
11·55	.....	.....	....	.....	"	Puddington & Merritt "
11·70	.....	....	....	....	"	W. A. Porter "
10·10	....	.....	....	....	"	Philips & Watson "
11·11	.....	.....	....	.....	"	C. F. McKendrick, Fredericton.
11·51	.....	....	....	.....	"	Burt & Coburn "
10·97	.....	.....	....	.....	"	Wallace & Co., Moncton.
12·27	....	....	....	.....	"	John O'Neill "
12·44	21·20	.....	0·03	.....	Genuine	François Laliberté, Lévis, P.Q.
11·67	21·76	....	0·03	.....	"	S. Paradis "
9·40	34·40	.....	0·51	....	About 20 to 30 per cent chicory; adulterated with chicory.	J. B. M. Dion, Quebec.
7·48	40·28	....	0·37	.....	About 35 to 40 per cent chicory; adulterated with chicory.	Z. Moussette "
11·92	22·88	....	0·49	.....	Genuine, but the per cent of sand is high.	N. Rhéaume "
11·68	22·96	....	0·14	.....	Genuine	L. Faucher "
12·16	24·12	.....	0·07	.....	"	Gibson Bros., Danville, P.Q.
11·35	24·00	....	0·75	.....	Genuine, contains far too much sand, denoting carelessness in cleaning.	Joseph Masson "
11·70	.....	12·10	....	.....	Genuine, but roasted with excess of fat	P. M. Théoret, Montreal.
9·95	....	11·41	....	.....	"	A. Sarazin "
8·80	....	15·03	....	.....	"	L. W. Soucy "
6·50	....	14·16	....	.....	Chicory present at 30 to 35 per cent; adulterated under Act.	J. N. Archambault "
14·76	.....	15·60	....	....	Genuine	E. C. Atkinson, Melbourne, P,Q.
11·12	.....	19·19	....	....	Containing about 10 per cent chicory, adulterated under Act.	E. J. Jamieson "
10·15	....	17·17	....	.	Genuine	E. J. Pearson, Richmond, P.Q.
13·21	....	13·63	....	....	"	T. E. Kingsland & Co., Montreal.
5·79	.	25·05	....	.....	Contains chicory and roasted maize, peas and corn starches to the extent of 30 to 40 per cent; adulterated under Act.	A. R. McDonald "

APPENDIX G.—INSPECTION OF

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Moisture.	Caffeine.	Ash.			Sp. Gr. 10 per cent decoction.	Iodine Reaction.
						Total.	Soluble.	Insoluble.		
1899.	*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.	p. c.	p. c.	p. c.		
June 7	Coffee, S. H. & A. S. Ewing, Montreal	14594	18180	6·51	1·10	4·39	3·50	0·89	1·0094	.....
" 7	" " "	14595	18181	6·97	0·73	4·65	3·72	0·93	1·0171	.....
" 7	" " "	14596	18182	6·52	0·73	4·75	3·63	1·12	1·0113	.....
" 7	" Chase & Sanborn "	14597	18183	6·99	0·64	4·22	2·98	1·24	1·0154	.....
" 7	" Forbes Bros. "	14598	18184	5·55	1·11	4·08	3·37	0·71	1·0099	.....
" 7	" F. Dally & Co. "	14599	18185	6·04	1·05	4·68	3·78	0·90	1·0093	.....
" 7	" Cochrane & Castle, Ottawa	14600	18186	6·62	0·47	4·28	3·23	0·85	1·0173	.....
	Official Analyst, Dr. W. H. Ellis, Toronto.									
" 16	Coffee	12342	18187	5·00	1·32	4·40		0·90	1·0107	.....
" 16	" "Java," Dominion Mills, Toronto.	12343	18188	6·50	1·23	4·30		1·10	1·0127	....
" 16	" "Compound" "	12344	18189	6·55	0·50	4·05		1·50	1·0092	.....
" 16	" "Mocha and Java," Dalton Bros., Toronto.	12345	18190	5·32	1·10	4·50		0·85	1.0107	.....
" 16	" Lumsden Bros., Hamilton	12346	18191	6·10	1·10	4·00		0·95	1·0102	.....
" 16	" "Stuart's Royal Blend No. 1," J. Stuart & Co., Hamilton.	12347	18192	5·45	1·25	4·18		1·00	1·0114	.....
" 16	" J. Turner & Co. "	12348	18193	5·25	1·32	3·95		0·80	1·0106	.....
" 16	" Hamilton Coffee and Spice Co.	12349	18194	5·60	1·30	4·10		0·75	1·0104	.....
	Official Analyst, Professor E. B. Kenrick, Winnipeg.									
" 16	Coffee, Dyson Gibson Co., Winnipeg	11292	17161	5·47	1·28	4·34	3·32	1·02	1·0081	.....
" 16	" Codville & Co. "	11293	17162	1·93	1·35	4·52	3·41	1·11	1·0082	.....
" 16	" Dyson Gibson Co. "	11294	17163	3·80	0·95	4·24	2·82	1·42	1·0136	.....
" 20	" G. F. & J. Galt "	11295	17164	1·26	1·39	4·37	3·44	0·93	1·0080	.....
" 20	" Chase & Sanborn, Montreal	11296	17165	2·12	1·26	4·44	3·34	1·10	1·0086	.....
" 20	" Dyson Gibson Co.	11297	17166	3·25	1·33	4·56	3·66	0·90	1·0081	.....
	Official Analyst, Dr. C. J. Fagan, New Westminster, B.C.									
Feb. 7	Coffee, put up by vendor	15001	20101	3·48	1·36	4·44	3·53	0·91	1·0099	.....
" 7	" "	15002	20102	3·70	1·28	4·38	3·49	0·89	1·0088	.....
" 7	" "	15003	20103	5·87	0·75	3·67	2·24	1·43	1·0172	Blue.
" 8	" "	15004	20104	5·42	1·10	4·23	3·32	0·91	1·0088	.....
" 8	" "	15005	20105	3·65	1·33	4·48	3·55	0·93	1·0089	.....
" 8	" "	15006	20106	3·52	1·34	4·35	3·47	0·88	1·0090	.
June 26	" Arbuckles & Pillsbury, New York	15019	20119	6·20	1·02	4·19	3·40	0·79	1·0074	.....
" 26	" Blue Ribbon Co., Winnipeg	15020	20120	6·59	1·00	4·31	3·35	0·96	1·0080	.....
" 26	"	15021	20121	6·59	0·78	4·31	3·84	0·69	1·0077	.....
" 26	"	15022	20122	6·56	1·45	4·56	3·72	0·84	1·0068	.....
" 26	"	15023	20123	6·47	1·44	4·46	3·39	1·07	1·0057	.....
" 26	"	15024	20124	6·48	1·68	3·88	3·01	0·87	1·0053	...

SESSIONAL PAPER No. 7b

COFFEE—Tabulated Statement—*Concluded.*

Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
Fat.	Aqueous Extract.	Al. Extract.	Sand.	Sugar.		
p. c.	p. c.	p. c.	p. c.	p. c.		
12·37	.. ..	....	....	Trace.	Pure.....	W. Mooney, Ottawa.
7·75	... .	....	....	3·05	About 10 per cent chicory and a few starch granules ; adulterated.	F. H. Cluff "
8·78	.. .	.....	....	1·29	From 8 to 10 per cent of chicory and occasional leguminous starch granules ; adulterated.	W. Beardsley "
8·76	....	.....	...	2·27	Wheat starch and chicory, about 15 per cent ; adulterated.	J. O. McArthur, Manager, Importers Tea Co., Ottawa.
12·01	.....	...	....	0·50	Pure	E. Derousie, Cornwall.
10·78	.....	.....	...	....	Pure ; a few starch granules.....	LeBlanc & Co. "
8·74	...	...	...	3·48	Wheat starch and chicory, about 15 per cent ; adulterated.	F. J. Harding "
.....	.....	....	....	2·00	Genuine.....	W. Moyer & Son, Toronto.
....	.....	.....	....	....	Adulterated by admixture with roasted peas in small quantity.	Mrs. Davis "
.....	. ..	....	....	2·00	Sold as compound ; adulterated by admixture with roasted peas and chicory	Given Bros. "
. ....	....	. .	....	2·00	No foreign matter, genuine	A. W. Carrick "
.. ...	....	....	....	2·00	Adulterated with a small quantity of chicory.	C. Philip, Hamilton.
... .	....	.....	....	2 00	Adulterated by admixture with chicory.	K. M. Young "
.... .	....	.....	..	2·00	No foreign substance, genuine..	Hy. Taylor "
.....	.....	.....	....	.....	" "	Battram & Co "
.. ...	.....	....	...	....	Genuine....	W. H. McLean, Winnipeg.
....	.....	.....	..	.....	"	C. R. Johns "
. ....	....	....	....	. .	Adulterated with starch and chicory.	W. J. Smith "
.....	...	.....	....	....	Genuine.....	A. Hendry "
.....	....	.. ...	..	....	"	R. Burns "
.... .	....	. ..	...	.....	"	Hardy & Buchanan "
12·10	....	.....	....	.....	Genuine....	F. Filion, Vancouver, B.C.
12·23	.....	.....	....	..	"	Labelle & Co. "
6·55	.....	...	....	....	Adulterated....	C. Uchida "
11·88	.....	.. .	....	.....	Genuine.....	Geo. Adams, New Westminster.
12·07	.....	....	....	. ..	"	Parnell & Gunn "
11·53	.....	.....	....	....	"	T. S. Annandale "
10·46	... .	.....	....	.....	"	Kirkpatrick & Wilson, Nelson, B.C.
12·54	. ..	.....	....	.....	"	Simpson & Donnelly "
9·45	... .	.....	....	.. ...	"	Marshall & Todd, Kamploops, B.C.
9·14	....	.....	....	.....	"	Pacific Tea Store, Rossland.
8·62	.....	...	....	.....	"	F. Carne, Jr. "
7·43	...	.....	....	....	"	Watson & Hall, Victoria.

APPENDIX H.—INSPECTION OF MOLASSES AND GOLDEN SYRUP—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.							Remarks by Analyst.	Name and Address of Vendor of Sample.
				Cane Sugar.				Reducing Sugar.	Moisture.	Ash.		
				Direct.	Clerget.	Fehling.	Average.					
1899.	*Official Analyst, M. Bowman, Halifax.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Jan. 5	Molasses "Porto Rico," L. M. Cuitron, Porto Rico.	12674	17628	45·84	47·24	45·18	46·09	21·82	28·07	1·74	Genuine.....	Alston & McBeath, St. John, N.B.
" 5	"Barbados," G. L. Barbour, St. John, N.B.	12675	17629	48·96	48·00	46·55	47·84	17·47	30·86	2·88	"	G. W. & A. A. Barker "
" 5	"Porto Rico," G. S. De Forest & Sons, St. John.	12676	17630	52·00	51·08	49·19	50·76	15·90	29·56	3·21	"	Davidson & Worden "
" 5	"Porto Rico," Baird & Peters, St. John.	12677	17631	43·96	43·16	42·14	43·09	23·10	29·92	2·84	"	P. Chisholm "
" 6	"St. Croix," imported from West Indies.	12678	17632	43·06	47·14	41·79	43·99	25·54	27·56	3·34	"	A. Malcolm "
" 6	"Barbados," Baird & Peters, St. John.	12679	17633	54·00	53·32	52·88	53·40	12·51	31·64	1·62	"	T. A. Dunlop "
" 7	"Porto Rico," T. Gorman, St. John..	12680	17634	50·00	49·25	48·16	49·14	18·85	29·79	1·65	"	C. F. Francis & Co. "
" 7	"Golden Syrup," The Canada Sugar Refining Co., Montreal.	12681	17635	36·64	36·66	37·08	36·79	26·04	21·77	8·22	"	Puddington & Merritt "
" 7	" " ..	12682	16691	37·08	38·16	36·13	37·12	30·48	23·13	6·45	"	J. L. Archibald & Son, Halifax.
" 7	" " ..	12667	16692	24·80	25·28	25·00	25·03	36·12	26·85	7·94	"	Jas. Scott & Co. "
" 9	Molasses "St. Croix," imported by Mitchell & Sons, Halifax.	12668	16693	51·32	49·57	48·93	49·94	14·68	32·79	2·73	"	J. P. Buckley "
" 9	"Porto Rico," imported by Book & Bennett, Halifax.	12669	16694	46·40	47·28	45·36	46·35	22·54	30·49	1·48	"	A. Payne "
" 9	"Demerara," unknown.....	12670	16695	48·12	48·54	49·12	48·93	16·46	31·41	2·46	"	B. J. Hubley & Co. "
" 11	"Trinidad," imported by L. Hart, Halifax.	12671	16696	44·81	47·85	46·42	46·36	21·54	30·46	1·73	"	W. E. Crowe & Co. "
" 11	"Demerara," imported by Mitchell & Sons.	12672	16697	42·30	45·51	44·78	44·19	20·89	29·84	3·84	"	A. M. Boutilier & Co. "
" 11	"Porto Rico," Hartman & Co., Porto Rico.	12673	16698	46·48	47·68	45·97	46·71	20·08	30·62	2·75	"	J. A. Leaman & Co. "

APPENDIX I.—INSPECTION OF CONDENSED MILK—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.								Remarks by Analyst.	Name and Address of Vendor of Sample.
				Water.	Albuminoids and salts after extraction with alcohol.	Fat.	Lactose.	Cane sugar by extraction with alcohol.	Cane sugar by polariscope.	Casein (N × 6·25).	Ash.		
1899.	*Official Analyst, Dr. W. H. Ellis, Toronto.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
March 6	"Eagle" Brand, New York Condensed Milk Co.	12312	18133	27·30	10·86	6·30	12·59	42·95	40·04	8·56	1·71	Prepared from milk either partly skimmed or abnormally poor in fat.	W. H. Snider, Ottawa.
" 6	" " ..	12313	18134	27·25	11·55	6·55	13·50	41·15	43·76	8·54	1·77	" ..	W. H. Roger "
" 7	" " ..	12314	18135	27·25	9·84	6·10	12·32	44·59	38·55	8·88	1·89	" ..	Dr. McCallum, Smith's Falls, Ont.
" 7	"Nestlé's," H. Vevey, Switzerland.	12315	18136	23·62	12·45	6·47	14·98	42·48	41·81	9·48	1·94	" ..	W. Johnston "
" 7	"Eagle," New York Condensed Milk Co.	12316	18137	26·54	10·63	8·09	9·44	45·30	42·72	9·16	1·85	" ..	H. H. Roche, Kingston, Ont.
" 7	" " ..	12317	18138	26·79	11·55	6·66	10·81	44·19	42·06	9·54	1·80	" ..	H. Wade "
" 8	" " ..	12318	18140	27·11	10·27	7·51	12·11	42·96	42·72	8·97	1·80	" ..	Allan & Turner, Brockville, Ont.
" 8	"Nestlé's," H. Vevey, Switzerland.	12319	18141	26·11	11·01	8·16	14·78	39·94	40·19	9·79	1·92	" ..	" "
" 10	"Eagle," New York Condensed Milk Co.	12320	18142	27·85	9·75	5·83	11·70	44·87	42·98	8·25	1·79	" ..	G. E. Kennedy, Ottawa.
" 10	"Nestlé's," H. Vevey.....	12321	18143	26·76	12·27	7·61	14·28	39·08	38·55	10·25	2·05	" ..	" "

APPENDIX J.—INSPECTION OF BLACK PEPPER—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
				Ash.	Moisture.	Nitrogen.	Piperine and Resin.		
1899.	*Official Analyst, Dr. W. H. Ellis, Toronto.*			p. c.	p. c.	p. c.	p. c.		
Mar. 31	Black pepper, Gorman, Eckhart & Co., London, Ont	12322	18146	12·75	5·88	1·84	3·28	Adulterated by admixture with mineral and farinaceous matter.	E. Gander, St. Catharines, Ont.
" 31	" Hamilton Coffee and Spice Co.	12323	18147	8·17	4·45	2·38	8·90	Unadulterated	Hodgins Bros. "
" 31	" Not known	12324	18148	8·35	5·35	2·41	9·55	"	A. B. Wark, Hamilton, Ont.
" 31	" Lumsden Bros., Hamilton.	12325	18149	7·20	5·58	2·35	7·35	"	J. Rodgers "
" 31	" Not known	12326	18150	7·25	5·60	2·09	6·65	Adulterated with farinaceous matter.	R. W. Manning Wholesale Supply Co., Toronto.
" 31	" "	12327	18151	7·05	6·73	2·10	7·83	Unadulterated	J. Reed, Rossin House Grocery, Toronto.
April 1	" Snowdrift Baking Powder Co., Brantford, Ont.	12328	18152	7·18	5·05	2·35	7·33	"	McGill & Darroch, Collingwood, Ont.
" 1	" Todhunter & Mitchell, Toronto.	12329	18153	8·50	5·58	2·38	8·90	"	I. G. & J. Brown "
" 3	" Not known	12330	18154	8·40	4·83	2·08	7·30	"	W. J. Brown, Goderich, Ont.
" 3	" Elliott, Marr & Co., London, Ont.	12331	18155	8·63	4·48	2·39	7·61	"	P. T. Deane "

APPENDIX K.—INSPECTION OF WATER—Tabulated Statement.

Date of Collection.	Description of Sample, and Name and Address of Furnisher.	No. of Sample.	Result of Analysis. Parts per Million.							Remarks by Analyst.	Name and Address of Vendor of Sample.
			Total Solids.	Total Solids after Ignition.	Loss on Ignition.	Chlorine.	Nitrogen as Nitrates and Nitrites.	Nitrogen as free, and Saline Ammonia.	Nitrogen as Albumenoid Ammonia.		
1899.	*Official Analyst, Prof. E. B. Kenrick, Winnipeg.*										
Ap. 1 & 2	Water from Indian Head, N.W.T.	A	2723	2121	602	76·2	6·3	0·58	0·45	Extremely impure.	From Davidson's well.
" 1 & 2	"	B	4281	3063	1218	196·3	35·5	None.	0·23	Very impure.	" W. R. Boyd's well.
" 1 & 2	"	C	1866	1491	375	22·4	0·52	Trace.	0·02	"	" " "
" 1 & 2	"	D	959	464	495	41·3	33·3	0·015	0·23	Impure.	" Angus Currie's "
" 1 & 2	"	E	2660	2122	538	42·0	20·7	0·02	0·06	Cannot be considered safe.	" S. R. Edwards' "
" 1 & 2	"	F	2648	2053	395	7·9	0·60	0·34	0·34		" J. Glenn's "
" 1 & 2	"	G	2704	2080	624	77·9	35·6	0·03	0·074	Shows former contamination.	" J. Brown's "
" 1 & 2	"	H	2365	1802	563	27·1	1·2	0·48	0·12	Impure.	" T. Kernaghan's "
" 1 & 2	"	I	4561	3911	650	88·7	0·6	0·03	0·05	Shows high chlorine and total solids, while the nitrogens are all low.	" H. A. Gordon's "
" 1 & 2	"	J	522	321	201	None.	None.	0·02	Trace.	Of very remarkable purity.	" E. Sample's "

APPENDIX L.—INSPECTION OF WHEATEN FLOUR—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.							Remarks by Analyst.	Name and Address of Vendor of Sample.
				Moisture.	Petrolic Ether Extract.	Nitrogen.	Albuminoids.	Ash.	Colour.	Feel.		
1899.	*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.	p. c.	p. c.	p. c.				
May 12	Flour, "Strong Baker's," from Manitoba.	14580	18166	12·54	1·46	2·17	13·56	0·43	....	.....	A few granules of various starches, genuine.	H. G. Stanley, Ottawa.
" 12	"Patent," uncertain	14581	18167	13·32	1·27	1·96	12·25	0·35	.....	....	" "	F. C. Daniels "
" 12	" R. Buckham, Ottawa	14582	18168	12·74	1·12	2·10	13·12	0·36	....	... ...	" "	D. McLeod "
" 10	"Strong Baker's," H. S. Dowd, Quyon, P.Q.	14586	18172	12·44	0·75	1·82	11·37	0·38	.....	....	" "	R. H. Sayer, Aylmer, P.Q.
" 10	"Gem," Martin & Warnock, Ottawa.	14589	18175	12·41	1·60	2·31	14·44	0·49	....	....	" "	A. D. Trudel, Hull, P.Q.
" 13	"Strong Baker's," Martin & Warnock, Ottawa.	14590	18176	13·02	1·57	2·24	14·00	0·27	.....	.....	" "	P. Baxter, Hintonburg, Ont.
" 13	"Strong Baker's," J.G. Whyte, Galetta, Ont.	14592	18178	13·14	1·22	2·03	12·69	0·29	.....	.....	No foreign starch, pure....	T. W. Belot, Billings Bridge, Ont.
	Official Analyst, F. T. Harrison, London, Ont.											
" 10	Flour	14026	18956	10·00	....	...	.....	0·45	.....	....	Shows wheat starch only, unadulterated.	T. W. Raphael & Co., Montreal.
" 10	"Strong Baker's," Lake of the Wood Milling Co.	14027	18958	10·35	....	. ..	.....	0·58	.....	....	" "	F. Dalton, Toronto.
" 10	Flour, C. Caldwell, Toronto....	14028	18962	10·35	....	...	.....	0·40	.....	... . ..	" "	T. Guay "
" 10	" Keewatin Mills.....	14029	18963	10·60	...	....	....	0·40	.....	....	" "	J. Lackay "
" 11	" Dexter & Sons	14030	18964	10·45	....	....	....	0·44	.....	....	" "	R. Hookway & Co., London.
" 11	" Hunt Bros	14031	18965	10·72	.. ..	....	.... .	0·52	.....	.....	" "	" "
" 12	" Summerfeldt Bros....	14032	18969	10·85	....	....	.....	0·48	.....	....	" "	W. J. Smith & Co., Cannington, Ont.

		Official Analyst, Dr. C.J. Fagan, New Westminster, B.C.												
April	27	Flour, Lake of the Wood Milling Co.	15007	20107	12·88	....	....	.....	....	Brownish tinge.	Fine and soft.	Wheat starch, genuine.	....	Supplied by the B.C. Penitentiary.
"	27	" Lockerby Bros., Montreal.	15008	20108	11·68	....	....	....	....	"	"	"	....	Supplied by the Provincial Hospital for the Insane.
"	27	" Lake of the Wood Milling Co.	15009	20109	13·16	....	....	.....	.....	White....	Somewhat gritty.	"	....	Mackenzie Bros., New Westminster.
"	27	" Olanagan Milling Co....	15010	20110	12·51	....	....	....	.....	"	Fine and soft.	"	....	C. A. Welsh, New Westminster.
"	27	" Lake of the Wood Milling Co.	15011	20111	13·20	....	....	....	.....	"	"	"	....	A. L. Lavery "
"	27	" "	15012	20112	12·65	....	....	.....	....	"	Somewhat gritty.	"	....	A. Jackson "
"	28	" "	15013	20113	13·43	....	....	.....	.....	Brownish tinge.	"	"	....	Vienna Bakery, Vancouver.
"	28	" "	15014	20114	13·26	....	....	....	....	White....	Fine and soft.	"	....	Hunt & Timms "
"	28	" Ogilvie Milling Co., Manitoba.	15015	20115	12·76	....	....	.....	....	"	"	"	....	W. H. Muir
"	28	" "	15016	20116	13·19	....	....	....	....	"	Somewhat gritty.	"	....	" "
"	28	" Oak Lake Milling Co...	15017	20117	13·17	....	....	....	.....	"	Fine and soft.	"	....	J. W. Henton "
"	28	" "	15018	20118	12·84	....	....	....	....	"	"	"	....	" "

APPENDIX M.—INSPECTION OF OATMEAL—Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis. Moisture.	Petrolic Ether Extract.	Nitrogen.	Albuminoids.	Ash.	Remarks by Analysts.	Name and Address of Vendor of Sample.
1899.	*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.	p. c.	p. c.	p. c.		
May 12	Oatmeal, fine, McKay Co., Ottawa...	14583	18169	8·56	5·92	2·24	14·00	1·83	Only a few barley granules	H. G. Stanley, Ottawa.
" 12	" coarse, not known	14584	18170	9·68	2·95	1·96	12·25	0·93	"	F. C. Daniels, "
" 12	" medium, R. Buckham, Ottawa.	14585	18171	9·60	6·10	2·52	14·75	1·99	"	D. McLeod "
" 12	" round cut, McKay Co., Ottawa.	14587	18173	8·75	6·48	2·31	14·44	1·75	Wheat starch under 5 p.c.; genuine.	R. H. Sayer, Aylmer, Que.
" 13	" Martin & Warnock, Ottawa.	14588	18174	9·51	6·38	2·66	16·40	1·88	" ..	" "
" 13	" Not known.	14591	18177	8·45	6·33	2·17	13·56	2·02	One or two barley and rye granules per slide; genuine.	P. Baxter, Hintonburg, Ont.
" 13	Rolled oats, Kemptville Milling Co.	14593	18179	9·72	6·80	2·45	15·31	1·62	Only a few barley granules	T. W. Belot, Billing's Bridge, Ont.
	Official Analyst, F. T. Harrison, London, Ont.									
" 10	Oatmeal, Archibald, Beachville, Ont.	14033	18959	7·65	.....	....	.....	2·17	Oat starch only; unadulterated....	F. Dalton, Toronto.
" 10	" Ireland National Food Co..	14034	18960	7·55	.....	..	.....	1·78	Oat starch; one or two bits of pea were found, doubtless accidentally present; unadulterated.	" "
" 10	" " ..	14035	18961	7·70	.....	.....	.....	2·15	Oat starch only; unadulterated.....	T. Guay, "
" 11	" W. Thompson	14036	18966	6·50	..	...	.....	1·80	Oat starch; a few broken grains of wheat and barley were found, but not enough to lead me to believe they were added as an adulterant; unadulterated.	R. Hookway & Co, London, Ont.
" 12	" "	14037	18967	6·40	....	.....	...	1·70	Shows oat starch only; unadulterated.	H. Brandon, Cannington, Ont.
" 12	" Tilson & Co., Tilsonburgh, Ont.	14038	18968	7·95	....	.....	.....	1·70	Shows oat starch; one or two grains of crushed wheat were found, doubtless accidentally present; unadulterated.	W. G. Smith & Co. "
" 12	" Dundas & Flaveth, Lindsay, Ont.	14039	18970	6·85	.....	.....	.....	1·75	Shows oat starch only; unadulterated.	Samis & Wood z

APPENDIX N.—INSPECTION OF CANNED TOMATOES—
Tabulated Statement.

Date of Collection.	Description of Sample, Name and Address of Manufacturer or Furnisher, as given by Vendor.	No. of Analyst's Certificate.	No. of Sample.	Analyst's Remarks.	Name and Address of Vendor of Sample.
1899.	*Official Analyst, Dr. J. B. Edwards, Montreal.*				
June 13	Canned Tomatoes.....	15601	19518	Fruit sound and in good order, no evolution of gas, no fermentation, flavour good, no metallic impurity, and no discoloration of can.	J. D. Bolieau. Montreal.
" 13	"	15602	19519	" " ..	"
" 13	"	15603	19520	" " ..	"
" 13	"	15604	19521	" " ..	"

APPENDIX O.

BULLETIN No. 60—TINCTURE OF OPIUM, CITRATE OF IRON AND QUININE.

OTTAWA, 10th January, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—I beg to submit herewith a report from Mr. F. T. Harrison, Public Analyst, London, Ont., on samples of Tincture of Opium and Citrate of Iron and Quinine submitted to him for analysis, and also a similar report from Dr. W. H. Ellis, Public Analyst, Toronto, on samples of Tincture of Opium. Twenty-two samples were collected in all, and only eleven of these were found to be up to the standard required by the British Pharmacopœia. Full particulars regarding all the samples are to be found in the following tables, which also contain the names of the vendors and manufacturers.

It appears to me that it would be unwise for the present to institute any proceedings against the vendors of the defective drugs as some of them may have been unaware of the inferior quality of the material employed in preparing them. On the other hand, I would recommend the publication of the reports, and the circulation of the bulletins containing them among druggists, so as to warn them of the liabilities they incur in selling defective goods.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

RESULTS of the Examination of 7 samples of Tincture of Opium

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Total solids grammes in 100 CC.	Morphine grammes in 100 CC.
1898.			$ cts.	*Seaforth, Ont.*			
Aug. 17	19111	10 oz.	1 00	J. V. Fear, druggist	Archdale Wilson & Co., Hamilton, Ont.	3·06	0·72
				Stratford, Ont.			
" 18	19112	1 lb.	1 00	C. E. Nasmyth, druggist...	Vendor	3·00	0·83
" 18	19114	1 "	1 00	G. J. Waugh, druggist ...	"	3·50	0·57
				London, Ont.			
" 18	19115	1 "	1 00	C. McCallum, druggist....	"	3·52	0·74
" 18	19116	1 "	1 00	J. Callard "	"	3·38	0·85
				St. Thomas, Ont.			
" 18	19117	1 "	1 00	G. R. McColl, druggist....	"	2·84	0·65
" 18	19118	1 "	1 00	H. F. Spencer "	"	1·74	0·38

RESULTS of the Examination of 8 samples of Tincture of

				Petrolia, Ont.			
Sept. 15	19119	1 lb.	1 00	W. H. Dale, druggist.....	Vendor.....	2·45	0·79
" 15	19120	1 "	1 00	J. McRobie, druggist	"	3·37	0·71
				Windsor, Ont.			
" 15	19201	1 "	1 00	F. H. Lane, druggist.....	"	3·20	0·58
" 15	19202	1 "	1 00	J. E. D'Avignon, druggist.	"	3·77	0·70
				Chatham, Ont.			
" 15	19203	1 "	1 00	A. J. McCall & Co., druggist.	"	2·10	0·62
" 15	19204	1 "	1 00	C. H. Gunn & Co., druggist, Guelph, Ont.	"	2·95	0·70
" 15	19205	1 "	1 00	A. B. Petrie, druggist.....	"	3·70	0·77
" 15	19206	1 "	1 00	W. Herod "	"	2·27	0·71

by Mr. Franklin T. Harrison, Public Analyst, London, Ont.

Results of Analysis.					
Specific gravity of tincture.	Absolute alcohol by volume CC. in 100 CC.	Absolute alcohol grammes in 100 CC.	Absolute alcohol by weight, grammes in 100 grammes.	Name of Analyst.	Analyst's Remarks.
0·9397	52·65	41·77	44·45	F. T. Harrison, London, O.	Of proper strength and unadulterated. The alcoholic strength is greater than required in the new B. P.
0·9485	48·06	38·22	40·30	" " ..	A little over B. P. strength.
0·9530	46·38	36·95	38·77	" " ..	Adulterated in that it does not contain sufficient morphine.
0·9525	47·22	37·62	39·50	" " ..	Of proper strength and unadulterated.
0·9444	50·70	40·63	43·01	" " ..	A little over B. P. strength.
0·9549	44·85	35·94	37·64	" " ..	Too low in morphine by B. P. standard.
0·96025	39·12	31·12	32·41	" " ..	Adulterated; containing only about half the required amount of morphine, also deficient in alcohol.

Opium by Dr. W. H. Ellis, Public Analyst, Toronto.

·96868	34·80	27·62	28·52	Dr. W. H. Ellis, Toronto..	Alcohol below standard of B. P.
·95287	44·36	35·21	36 96	" "	Genuine.
·97727	30·43	24·16	24·72	" " ..	Morphine and alcohol below B. P. standard.
·9556	43·89	34·84	36·46	" " ..	Genuine.
·92808	52·25	41·47	44·69	" " ..	Morphine below standard of B. P.
·95891	40·95	32·51	33·90	" " ..	Genuine.
·97825	30·49	20·20	24·74	" " ..	Alcohol below standard B. P.
·93003	52·48	41·66	44·79	" " ..	Genuine.

RESULTS of the Examination of 7 samples of Citrate of Iron and Quinine,

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Moisture and loss in drying.
1898.			$ cts.	*Paris, Ont.*		p. c.
Oct. 4	19121	2 oz.	0 60	J. S. Armitage, druggist	Winer & Co., wholesale druggists, Hamilton, Ont.	8·20
" 4	19122	1 "	0 30	P. L. Scott "	Howard & Sons, England.	8·00
				Hamilton, Ont.		
5	19123	2 "	0 60	J. W. Gerrie, 30 James St...	Howard & Sons, England.....	7·10
" 5	19124	2 "	0 55	Garland & Rutherford, 7 King St.	Winer & Co., Hamilton.....	9·40
				Toronto, Ont.		
" 6	19125	2 "	0 60	R. Tuckett, 155 King St. E..	Lyman Bros. & Co., Toronto....	8·10
6	19126	2 "	0 60	J. W. McLean, Queen St. E.	Not known.....	10·50
" 6	19127	2 "	0 60	J. K. Lee, 256 " ..	Evans & Sons, Toronto.....	7·40

by Mr. Franklin T. Harrison, Public Analyst, London, Ont.

Results of Analysis.			Name of Analyst.	Analyst's Remarks.
Ferric oxide.	Ammonia.	Quinine.		
p. c.	p. c.	p. c.		
21·57	5·82	6·10	F. T. Harrison, London, Ont.	Adulterated, being deficient in quinine.
19·03	4·73	14·54	" "	Unadulterated
19·00	4·85	14·58	" "	Unadulterated.
20·64	5·75	5·92	" "	Adulterated, being deficient in quinine. This sample is not well scaled, but contains lumpy masses.
18·27	4·29	14·78	" "	Unadulterated.
19·96	6·05	11·40	" "	Adulterated, being deficient in quinine according to B. P.
17·49	4·42	13·50	" "	Slightly below B. P. standard. The label on this bottle states "Citrate of Iron and Quinine, 25 per cent."

OFFICE OF PUBLIC ANALYST,
LONDON, October 31, 1898.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present herewith my report on samples of Tincture of Opium and Citrate of Iron and Quinine, examined by me during the past two months.

I think when it is considered how very important it is to have medicines conform, as nearly as possible, to a fixed standard, it will be seen that the variation which I have found is in some instances greater than should exist. In the New British Pharmacopœia just issued, a very considerably increased number of preparations are now standardized so as to contain a definite percentage of active principle and are not dependent on the quality of the drug which happens to be used.

I attach herewith tables showing analytical results of the various samples submitted to me. The quantity purchased, the cost and the name and address of vendor and manufacturer have been filled in by the chief analysts branch since my returns were made.

Tincture of Opium.

My method of analysis was as follows:—

The total solids were obtained by drying in water-bath in Macfarlane asbestos tubes to constant weight. The specific gravity was taken in Sp. Gr. bottle at 15·5° C. The alcohol was determined by distilling and determining the Sp. Gr. of distillate. The morphine was determined in duplicate by the process detailed in the 1898 edition of the British Pharmacopœia. This process has remedied defects in the process of the former edition. By the process given in the 1885 Pharmacopœia, I was able to get results which tallied well with duplicates, but were somewhat lower than obtained by some other methods of assay. The process now given appears to be satisfactory and easily manipulated.

These samples were doubtless manufactured according to the Pharmacopœia of 1885, as they were collected very soon after the new edition appeared. The 1885 British Pharmacopœia directed that opium containing about 10 per cent of morphine (or not less than 9½ per cent or more than 10½ per cent) be extracted with proof spirit; 1½ ounce being used to make one pint of tincture. If made according to these directions the tincture would contain about 0·75 per cent of morphine, and have a spirit strength of 57 per cent of absolute alcohol by volume, or nearly that, an allowance being made for necessary loss in manufacture. The new British Pharmacopœia tincture, though made in a different way, is practically of the same morphimetric strength. By the new process a strong tincture is made and assayed, and then diluted so that the finished product may contain in each 100 cc. not less than 0·70 grammes or over 0·80 grammes. The alcoholic strength is less, however, than in the former preparation, being made with equal parts of water and alcohol of 90 per cent by volume.

The United States Pharmacopœia tincture is considerably stronger than that of the British Pharmacopœia. It is not to be concluded that morphine is the only principle of medicinal value in opium. It is, however, the most important, and for practical purposes it seems impossible to make estimations of the other constituents, which are very numerous.

The total solids, dried at 100 cc. in the samples examined by me which I returned as unadulterated, varied from 3·00 to 3·52 per cent. Sample No. 19114 which I returned as adulterated, contains 3·50 per cent of solids, which might indicate that there was used in the manufacture the proper amount, but a low grade of opium. No. 19117 which is a little low in morphine is also a little low in solids, which would indicate that too small an amount of opium had been used, or what would be the same thing, possibly

the moist opium was used instead of dry powder, as I am told is sometimes done. No. 19118 which only contains about half the required amount of morphine is relatively low in solids. Of course the method of extraction and the strength of menstruum would effect the percentage of solids. Mr. J. H. Hoseame, (Chemist and Druggist, 1889), from a number of samples examined by him gave 3·74 per cent as an average in solids.

With reference to the morphimetric strength, it will be noticed that two samples are a little too strong. In my returns I simply noted the fact, but this is as serious as being under strength, and if much over the limit ought to be considered an adulteration. The Adulteration Act defines the adulteration of a drug to consist in *differing* from the standard in strength, quality or purity.

Citrate of Iron and Quinine.

Citrate of Iron and Quinine occurs in commerce in the form of thin scales of greenish, golden yellow colour. It is prepared in practically the same way, and is of the same strength in the 1898 edition of the British Pharmacopœia as in the former edition.

It is required to contain 15 per cent of quinine. My method of analysis is as follows :—For moisture and loss in drying, a portion was dried in water-bath to constant weight. Under the heading of "Ferric Oxide" is indicated the residue on ignition; moistening with Nitric Acid and re-ignition. Ammonia was determined by distilling after addition of excess of potash, and the quinine was determined according to the process given in the British Pharmacopœia, 1898. This consists in dissolving a definite quantity in water, adding excess of solution of ammonia, dissolving out the precipitated quinine by repeated treatment with ether, separating, evaporating the ether, and weighing the residue after completely drying at 120° C. I found it necessary, for ensuring the complete extraction of quinine, to agitate the alkaline solution with as many as 5 or 6 portions of ether.

I found no abnormal constituents, such as fixed alkalies or sulphates in sufficient quantity to be worth noting. It has been stated that this preparation is sometimes made by adding the sulphate of quinine instead of the precipitated quinine, and that this seriously affects it in as much as it gives turbid solutions. All the samples submitted to me were evidently properly made in this respect.

The moisture varied from 7·10 per cent to 10·50 per cent which is not excessive. Allen gives as an average 8 per cent with a limit of not more than 10 or 12 per cent. The lowest percentage of ferric oxide was 17·49 per cent, and the highest 21·57 per cent. For this Allen gives as an average 18 to 20 per cent.

The most probable adulteration in citrate of iron and quinine is a deficiency of quinine. The British Pharmacopœia requires 15 per cent of dried quinine. Three of the samples, Nos. 19122, 19123 and 19125 came within one half per cent of this; and these I have returned as unadulterated. On the other hand Nos. 19121, 19124 contained only 6·10 per cent and 5·92 per cent, only a little over one third the proper strength. No. 19127, as I noted, was labelled citrate of iron and quinine 25 per cent. However, I judged it by the British Pharmacopœia standard of 15 per cent, and only returned it as slightly adulterated. It contained 13·5 per cent. All the extracted alkaloids gave tests showing that quinine was present. Time did not permit me to examine them as fully as I would have desired to enable me to say absolutely that no other alkaloid was associated with it. I would recommend that further samples of citrate of iron and quinine be collected and analysed, as I am informed by druggists that it can be bought at a great variety of price.

I have the honour to be, sir,
Your obedient servant,

FRANKLIN T. HARRISON.

SCHOOL OF PRACTICAL SCIENCE,
TORONTO, December 31, 1898.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—I beg to forward a report on the examination of eight samples of Tincture of Opium which I have analysed for the department during the past year. You will see from the inclosed tabular statement of my results, that of the eight samples, four were genuine and four were adulterated in the sense of being below the standard of the British Pharmacopœia.

Three of the adulterated samples were deficient in alcohol according to the requirements of the British Pharmacopœia for 1898, and two of them were deficient in morphine. One sample was low in both alcohol and morphine.

I have the honour to be, sir,
Your obedient servant,

W. HODGSON ELLIS,
Public Analyst.

SESSIONAL PAPER No. 7b

APPENDIX P.

BULLETIN No. 61.—MILK, 1898.

OTTAWA, January 24, 1899.

E. MIALL, Esq.,

Commissioner of Inland Revenue.

SIR,—In the month of September, 1898, the health authorities of the town of Windsor, and Mr. William McGregor, M.P. for North Essex, made application to the Minister of Inland Revenue for the collection and analysis of samples of the Milk sold in Windsor and its neighbourhood. In accordance with your instructions this was done, not only there, but in Hamilton, Collingwood, Barrie and Orillia, in the months of October, November and December last year. 74 samples in all were collected in these places, and the particulars regarding them will be found in the tabulated statement accompanying this report. Opposite the description of each sample will be found two lines of figures, the upper one showing the results reported by Dr. W. H. Ellis, Public Analyst, Toronto, and the lower line those obtained by Mr. A. L. Tourchot, Assistant Analyst in this laboratory. According to the opinions expressed regarding these samples by the Public Analyst, they may be classified as follows :—

Genuine	54	samples.
Under average	17	"
Watered	2	"
Partly skimmed	1	"
Total	74	samples.

Only two out of these 74 samples, those which were found to be watered, were reported as cases for prosecution; the one which was found to be partly skimmed (No. 19218) was a sample obtained at the farmer's house, and which was not nearly as good as the article sold by the same party in Hamilton. It will be observed that in a number of cases the sample collected is described as a "house sample," the meaning of which term has to be explained. The Food Inspector was instructed, when making this collection, to obtain also some samples from the herds yielding the milks collected from the vendors in the open market. This, it seems, he was unable to do on account of the very inclement weather prevailing at the time: at least he found it impossible so to arrange matters as to obtain "herd samples" from milkings under his own observation. He therefore contented himself with collecting samples at the farmers' houses of milk said to represent the most recent milking. A comparison of the samples thus

obtained, with those sold by the same vendors in public, will be found in the following table :—

No.	Street or House Sample.	Name of Vendor or Furnisher.	Butter Fat.	Other Solids.	Total Solids.	Public Analyst's Remarks.
		Windsor.	p. c.	p. c.	p. c.	
19132	Street..	Edward Cook	4·17	9·54	13·71	Genuine.
			4 55	9·16	13·71	
19141	House..	E. & C. Cook	3·54	8·66	12·20	"
			3·50	8·73	12·23	
19146	Street..	Wm. Stocks	3·41	8·83	12·18	Under average.
			3·35	8·81	12·36	
19151	House..	Wm. Stocks	4·38	8·96	13·34	Genuine.
			4·40	9·14	13·54	
19128	Street..	T. Parent	3·46	8·38	11·84	Under average.
			3·64	8·20	11·84	
19143	House..	T. Parent	4·49	8·99	13·48	Genuine.
			4·35	9·13	13·34	
19129	Street..	Wm. St. Amour	4·39	9·67	14·06	"
			4·60	9·40	14·00	
19142	House..	Wm. St. Amour	4·21	8·70	12·91	"
			4·08	8·91	12·99	
		Hamilton.				
19155	Street..	W. Berry, fr. E. Liddycott	3·85	7·93	11·78	Under average.
			3·75	7·90	11·65	
19178	House..	E. Liddycott	3·94	9·02	12·96	Genuine.
			4·00	8·90	12·90	
19168	Street..	W. Young & Sons	4·16	9·07	13·23	"
			4·15	9·05	13·20	
19180	House..	J. W. Young	4·76	9·41	14·17	"
19176	Street..	B. Sheppard	3·29	8·50	11·79	Under average.
			3·27	8·61	11·88	
19179	House..	B. Sheppard	3·43	8·66	12 09	"
			3·54	8·60	12 14	
		Collingwood.				
19210	Street..	Hy. Whalen	3·99	9·00	12·99	Genuine.
			4·00	8·69	12·69	
19218	House..	Hy. Whalen	2·47	9·01	11·48	Partly skimmed.
			2·56	8·72	11·28	
19200	Street..	A. Knuff	1·74	9·04	13·78	Genuine.
			4·84	8·79	13·63	
19219	House..	A. Knuff	4·04	8·76	12·80	"
			4·10	8·50	12·60	
19208	Street..	R. Emerson	3·99	8·97	12·96	"
			4·10	8·66	12·76	
19220	House..	R. Emerson	3·04	9·38	12·42	Under average.
			3·14	9·01	12·15	
19199	Street..	A. Fisher	5·65	9·01	14·66	Genuine.
			5·82	8·72	14·54	
19221	House..	A. Fisher	4·98	9·08	14·06	"
			4·95	8·75	13·70	
19207	Street..	W. R. Copeland	3·64	8·74	12·38	"
			3·73	8·50	12·23	
19222	House..	W. R. Copeland	3·92	8·75	12·67	"
		Barrie.				
19227	Street..	Wm. Ainsly	4·17	8·56	12·73	Genuine.
			4·16	8·37	12·53	
19230	House..	Wm. Ainsly	3·28	9·04	12·32	Under average.
			3·21	8·80	12·01	
19228	Street..	S. Dymon	4·36	9·54	13·90	Genuine.
			4·44	9·26	13·70	
19231	House..	S. Dymon	5·25	9·77	15·02	"
			5·25	9·60	14 85	
		Orillia.				
19234	Street..	W. Beacon	4·88	9·10	13·98	Genuine.
			5·04	8·80	13·84	
19236	House..	W. Beacon	5·10	9·24	14·34	"
			5·30	8·95	14·25	
19235	Street..	J. Sinclair	3·53	8·80	12·33	"
			3·63	8·50	12·13	
19237	House..	J. Sinclair	3·85	8·86	12·71	"
			4·03	8·65	12·68	

A close inspection of these figures will show that; of these sixteen double samples, four show practical agreement; that in seven cases the house samples gave lower results than those collected on the street; as if the farmers kept the poorest quality of milk for their own use, and that in five cases the milks sold were inferior to the corresponding house samples. Considering the manner in which the latter were taken it would, however, be unwise to draw further conclusions.

On the whole the samples described in this report are of a higher quality than usual. Excluding the two reported as watered, but including all the "under average" samples, the averages of the different collections, are as follows :—

	Butterfat.	Other solids.	Total solids.
Windsor	3·94 p. c.	8·74 p. c.	12·68 p. c.
Hamilton	3·74 "	8·84 "	12·58 "
Collingwood	3·98 "	8·99 "	12·97 "
Barrie	4·25 "	9·06 "	13·31 "
Orillia	4·08 "	8·97 "	13·05 "
Total averages	3·99	8·92	12·91

These results are based upon the figures obtained by Dr. Ellis, and, when compared with the averages given in Bulletin No. 1 (1887) for "standard milks," are slightly higher. The averages of the latter, which were pure milks collected from all parts of the Dominion, were as follows :—

Butterfat	3·86 p. c.
Other solids	8·62 "
Total solids	12·48 "

It appears therefore that the quality of the milk sold in the western towns above referred to justify the adoption of the following as the lowest limits for the milk supply of Canada :—

Butterfat	3·5 p. c.
Other solids	8·5 "
Total "	12·0 "

In collecting the above described samples, bichromate of potash was used as a preservative in the same way as referred to in Bulletin No. 53, p. 2. On the other hand the samples from Hamilton, Collingwood, Barrie and Orillia were sent without any admixture, and advantage was taken of this circumstance by Mr. Tourchot to determine their acidity which has been given in the tabulated statement. It will be observed that, in stating this, the use of the expression "degrees of acidity" has been avoided because that has a different signification in different countries. According to W. Thorner (Allen's Organic Analysis, Vol. IV., p. 195) milk which coagulates in boiling requires 2·3 cc. decinormal soda for the neutralization of 10 cc. A number of the milks above described go beyond this figure, but 33 out of the 46 samples which were tested for acidity cannot be objected to in this respect. The cause of greater acidity in some instances is no doubt owing to longer time having elapsed betwixt the milking and the testing, but there appear to be other reasons which it may be found possible to indicate in a future bulletin. It is perhaps worthy of mention that an acidity corresponding to less than 1·6 cc. decinormal soda for 10 cc. of milk appears to be indicative of dilution. (See Nos. 19164 and 19165). I beg to recommend the publication of this report, and I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

Results of the Examination of 74 Samples of Milk.

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Analysis.			Total Solids.	Acidity.		Remarks by Public Analyst.
			Water.	Butter Fat.	Other Solids.		No. CC $\frac{N}{10}$ soda required to neutralize 10 CC. milk.	Lactic Acid ($C_3 H_6 O_3$.) Grammes in 100 CC.	
1898.		*Windsor, Ont.*	p. c.	p. c.	p. c.	p. c.			
Oct. 14	19128	Thomas Parent, Tecumseh Road, street sample.	88·16	3·46	8·38	11·84			Under average in fat and solids.
			88·16	3·64	8·20	11·84			
" 14	19129	Wm. St. Amour, Langlois Avenue, street sample.	85·94	4·39	9 67	14·06			Genuine.
			86·00	4·60	9·40	14·00			
" 14	19130	Josh Gilbault, Langlois Avenue	88 63	3·59	7·78	11·37			Under average in total solids.
			88 83	3·70	7 47	11·17			
14	19131	Fred. Dumouchel, Tecumseh Road	88·04	3·90	8·06	11·96			" "
			88·16	3·95	7·89	11·84			
" 14	19132	Ed. Cook, Moyer Farm, street sample	86·29	4·17	9·54	13·71			Genuine.
			86·29	4·55	9·16	13·71			
" 14	19133	D. H. Bedford, Essex Co. Farm	87·21	3·77	9·02	12·79			"
			87·16	3 94	8·90	12·84			
" 14	19134	Rich. Cook, Howard Avenue	87·13	3·97	8·90	12·87			"
			86·92	4·04	9·04	13·08			
" 14	19135	Saml. Wisson, Riverside Dairy	87·50	3·50	9·00	12·50			"
			87·42	3·59	8·99	12·58			
" 14	19136	Victor Maillpux, Sandwich West	87·03	4·30	8·67	12·97			"
			87·02	4·39	8·59	12·98			
" 14	19137	Arthur Phillips, Sandwich West	88·65	3·54	7·81	11·35			Under average in solids.
			88·41	3·27	8·32	11·59			
" 14	19138	Edward Knight, Howard Avenue	86·84	4·26	8 94	13·20			Genuine.
			86·67	4·22	9·11	13·33			
" 14	19139	Wm. J. Terry, Sandwich West	86·89	3·70	9·41	13·11			"
			86·77	3·71	9 52	13·23			
" 14	19140	Alex. King, 135 Howard Avenue	86·90	3·97	9·13	13·10			"
			86·82	3·99	9·19	13·18			
" 14	19141	E. & C. Cook, Moyer Farm, house sample	87·80	3·54	8·66	12·20			"
			87·77	3·50	8·73	12·23			
" 14	19142	W. St. Amour, Langlois Avenue, house sample.	87·09	4·21	8·70	12·91			"
			87·01	4·08	8·91	12·99			
" 14	19143	T. Parient, Sandwich West, house sample	86·54	4·49	8·99	13·48			"
			86·52	4·35	9·13	13·48			

" 15	19144	Robt. Nichol, City	86·66	4·48	8·86	13·34	.....	.....	"
			86 67	4·35	8·98	13·33	.....	.....	
" 15	19145	Hy. Keeler, Dougall Avenue	87·37	3·87	8·76	12·63	.....	.....	"
			87·51	3·53	8·96	12·49	.....	.....	
" 15	19146	Wm. Stocks " street sample	87·73	3·41	8·86	12·27	.....	.....	Under average in cream.
			87·82	3·35	8·83	12·18	.....	.....	
" 15	19147	Charles Mickle, Shop in City	87·64	3·55	8·81	12·36	.....	.....	Genuine.
			87·79	3·29	8·92	12·21	.....	.....	
" 15	19148	M. Kavanagh, Union St	88·29	3·77	7·94	11·71	.....	.....	Under average in solids.
			88·11	3·74	8·15	11·89	.....	.....	
" 15	19149	Jas. Oakly, Morgan Road	88·13	3·70	8·17	11·87	.....	.....	" "
			87·93	3·68	8·39	12·07	.....	.....	
" 15	19150	M. O'Brine, Maldon Road	86·57	4·58	8·85	13 43	.....	.....	Genuine.
			86·45	4·28	9·27	13·55	.....	.....	
" 15	19151	Wm. Stocks, Dougall Ave., house sample	86 66	4·38	8·96	13·34	.....	.....	"
			86·46	4·40	9·40	13·54	.....	.....	
		Hamilton, Ont.							
Nov. 11	19152	Wm. Michael, 330 Emerald St	88 53	3·05	8·42	11·47	.....	.....	Under average in solids and cream.
			88·78	2·91	8·31	11·22	2·00	1·80	
" 11	19153	Mrs. Daniel Reid	86·95	3·82	9·23	13·05	.....	.....	Genuine.
			87·08	3·77	9·15	12·92	1·85	1·67	
" 11	19154	J. Rasberry West Flamborough Tp.	88·59	3·40	8·01	11·41	.....	.....	Under average in cream and solids.
			87·72	3·34	8·94	12·28	1·52	1·37	
" 11	19155	Wm. Berry, 118 Stephen St., street sample.	88·22	3·85	7·93	11·78	.....	.....	Under average in solids.
			88·35	3·75	7·90	11·65	1·65	1·48	
" 11	19158	J. F. Bethune, Glanford Tp.	86·78	4·19	9·03	13·22	.....	.....	Genuine.
			86 78	4 22	9·00	13·22	1·40	1·26	
" 11	19159	Isa. Nelson, Barton Tp.	85·90	4·82	9·28	14·10	.....	.....	"
			86·03	4·66	9·31	13·97	1·70	1·53	
" 11	19160	J. D. Ames, Mount Albion P.O., Barton Tp.	87·54	3·65	8·81	12·46	.....	.....	"
			.....	.....	.....	.....	.....	.....	Contents of bottle lost.
" 11	19161	Adam Inch, Barton Tp.	87·51	3·58	8 91	12·49	.....	.....	Genuine.
			87·54	3·58	8·88	12·46	1·70	1·53	
" 11	19162	Thomas Yeo, Stanford Tp.	87·24	3·74	9·02	12·76	.....	.....	"
			87 17	3·75	9 08	12·83	1·45	1·30	
" 11	19163	F. W. Schoendery, Barton Tp.	87·85	3·50	8 65	12·15	.....	.....	"
			87·95	3·45	8·60	12·05	1·52	1·37	
" 11	19164	John Rykman	89·29	3·00	7·71	10·71	.....	.....	Watered.
			89·23	2·94	7·83	10·77	1·32	1·19	
" 11	19165	G. H. Cline, Ancaster Tp.	91·16	3·10	5·74	8·84	.....	.....	"
			91·31	3·14	5·55	8·69	0·90	0·81	
" 15	19166	Bartram Bros., Dundas Road	87·15	3·62	9·23	12·85	.....	.....	Genuine.
			87·30	3·65	9·05	12 70	1·60	1·44	
" 15	19167	Cameron Bros., West Flamboro' Tp.	86·68	3·91	9·41	13·32	.....	.....	"
			86·83	3·93	9·24	13·17	1·70	1·53	
" 15	19168	W. Young & Sons, Barton Tp., street sample	86·77	4·16	9·07	13·23	.....	.....	"
			86·80	4·15	9·05	13·20	1·65	1·48	

RESULTS of the Examination of 74 Samples of Milk—*Continued.*

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Analysis.			Total Solids.	Acidity.		Remarks by Public Analyst.
			Water.	Butter Fat.	Other Solids.		No. CC $\frac{N}{10}$ soda required to neutralize 10 CC. milk.	Lactic Acid ($C_3 H_6 O_3$). Grammes in 100 CC.	
1898.		*Hamilton, Ont.*—Continued.	p. c.	p. c.	p. c.	p. c.			
Nov. 15	19169	R. Hutton, 445 Ferguson Avenue.....	88·31	3·35	8·34	11·69	.....	.....	Under average in solids and cream.
			88·49	3·28	8.23	11·51	2·40	2·16	
" 15	19170	W. Pearson & Sons, West Flamboro'....	88·19	3·45	8·36	11·81	.....	.....	" "
			88·37	3·40	8·23	11·63	1·57	1·41	
" 15	19175	T. W. Crow, 143 Jackson St.....	86·99	3·36	9·65	13·01	.....	.....	Genuine.
			87·14	3·38	9·48	12·86	1·72	1·55	
" 15	19176	B. Shepherd, West Flamboro', street sample.	88·21	3·29	8·50	11·79	.....	.....	Under average in solids and cream.
			88·12	3·27	8·61	11·88	1·55	1·40	
" 15	19177	J. R. Long, East Flamboro'.....	87·17	4·01	8·82	12·83	.....	.....	Genuine.
			87·11	4·03	8·86	12·89	1·50	1·35	
" 15	19178	E. Tiddycot, West Flamboro', house sample.	87·04	3·94	9·02	12·96	.....	.....	"
			87·10	4·00	8·90	12·90	1·50	1·35	
" 15	19179	B. Shepherd, West Flamboro', house sample.	87·91	3·43	8·66	12·09	.....	.....	Under average in cream.
			87 86	3·54	8·60	12·14	1·60	1·44	
" 15	19180	J. W. Young, Barton Tp., house sample.	85·83	4·76	9·41	14·17	.....	.....	Genuine.
			.....	.....	.....	.....	.....	.....	Bottle broken, contents lost.
" 15	19181	J. Webb & Son, Ancaster Tp.....	87·81	3·41	8·78	12·19	.....	.....	Under average in cream.
			87·92	3·57	8·51	12·08	1·45	1·30	
		Collingwood, Ont.							
" 29	19199	Alexander Fisher, street sample.....	85·34	5·65	9·01	14·66	.....	.....	Genuine.
			85·46	5·82	8·72	14 54	2·30	2·07	
" 29	19200	Angus Knuff, street sample.	86·22	4·74	9·04	13·78	.....	.....	"
			86·37	4·84	8·79	13·63	3·0	2·70	
" 29	19207	W. R. Copeland "	87·62	3 64	8·74	12·38	.....	.....	"
			87·77	3·73	8·50	12·23	4·4	3·96	
" 29	19208	Robert Emerson "	87·04	3·99	8·97	12·96	.....	.....	"
			87·24	4·10	8·66	12·76	2·4	2·16	
" 29	19209	Duncan Blackstock.....	86·92	3·89	9·19	13·08	.....	.....	"
			87·10	4·02	8·88	12·90	4·4	3·96	

" 29	19210	Henry Whalen, street sample	87·01	3·99	9·00	12·99	.....	.....	Genuine.
			87·31	4·00	8·69	12·69	2·4	2·16	
" 29	19217	Neill McFee, Collingwood, house sample	87·53	3·48	8·99	12·47	.....	.....	"
			87·76	3·61	8·63	12·24	2·6	2·34	
" 29	19218	Henry Whalen, Lot 39, Concession 7, Nottawasaga, house sample.	88·52	2·47	9·01	11·48	.....	.....	Partly skimmed.
			85·46	2·56	8·72	11·28	2·0	1·80	
" 29	19219	Angus Knuff, Lot 37, Concession 8, Nottawasaga, house sample.	87·20	4·04	8·76	12·80	.....	.....	Genuine.
			86·37	4·10	8·50	12·60	1·7	1·53	
" 29	19220	R. Emerson, Collingwood, house sample.	87·58	3·04	9·38	12·42	.....	.....	Under average in cream.
			87·77	3·14	9·01	12·15	2·0	1·80	
" 29	19221	A. Fisher " "	85·94	4·98	9·08	14·06	.....	.....	Genuine.
			86·30	4·95	8·75	13·70	1·6	1·44	
" 29	19222	W. R. Copeland, Lot 38, Concession 9, Nottawasaga, house sample.	87·33	3·92	8·75	12·67	.....	.....	"
			.....	.....	.....	.....	.....	.....	Bottle broken, contents lost.
		Barrie, Ont.							
" 30	19223	Mrs. Gilfoil	87·40	3·88	8·72	12·60	.....	.....	Genuine.
			87·66	3·80	8·54	12·34	4·4	3·96	
" 30	19224	Patrick Cavanagh, Vesna Tp	87·41	3·84	8·75	12·59	.....	.....	"
			87·71	3·75	8·58	12·33	4·7	4·23	
" 30	19225	John Nixon, Innesfield Tp	86·17	4·92	8·91	13·83	.....	.....	"
			86·85	4·80	8·35	13·15	6·5	5·85	
" 30	19226	Charles Bennet, Barrie	86·49	4·29	9·22	13·51	.....	.....	"
			86·86	4·22	8·92	13·14	6·7	6·03	
" 30	19227	Wm. Amsly, street sample	87·27	4·17	8·56	12·73	.....	.....	"
			87·47	4·16	8·37	12·53	1·7	1·53	
" 30	19228	Simon Dymon, Barrie, street sample	86·10	4·36	9·54	13·90	.....	.....	"
			86·30	4·44	9·26	13·70	1·5	1·35	
" 1	19230	Wm. Ainsby, Barrie, house sample	87·68	3·28	9·04	12·32	.....	.....	Under average in cream.
			87·99	3·21	8·80	12·01	1·3	1·17	
" 1	19231	Simon Dymon, Barrie, house sample	84·98	5·25	9·77	15·02	.....	.....	Genuine.
			85·15	5·25	9·60	14·85	1·9	1·71	
		Orillia, Ont.							
Dec. 2	19234	William Beacon, street sample	86·02	4·88	9·10	13·98	.....	.....	Genuine.
			86·16	5·04	8·80	13·84	7·7	6·93	
" 2	19235	James Sinclair "	87·61	3·53	8·80	12·33	.....	.....	"
			87·87	3·63	8·50	12·13	5·9	5·31	
" 2	19236	Wm. Beacon, Orillia Tp., house sample	85·66	5·10	9·24	14·34	.....	.....	"
			85·75	5·30	8·95	14·25	1·5	1·35	
" 2	19237	J. Sinclair, South Orillia "	87·29	3·85	8·86	12·71	.....	.....	"
			87·32	4·03	8·65	12 68	1·5	1·35	
" 2	19239	Thomas Hughes " "	87·80	3·59	8·61	12·20	.....	.....	"
			87·84	3·63	8·53	12·16	1·2	1·08	
" 2	19240	David Dunn " "	87·22	3·52	9·21	12·73	.....	.....	"
			87·31	3·78	8 91	12·69	1·4	1·26	

APPENDIX Q.

BULLETIN No. 62—QUININE WINE, TINCTURE OF CINCHONA.

OTTAWA, February 15, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—I submit herewith a tabulated statement of the results obtained by Mr. Franklin T. Harrison, Public Analyst, in examining certain samples of Quinine Wine and of Tincture of Cinchona. So far as regards the results of analysis and the analyst's remarks, the results referred to constitute the table referred to in Mr. Harrison's report of December 31, 1898, which is appended hereto. The particulars as to the name and address of the vendor, &c., which were unknown to Mr. Harrison, have been supplied in this office. One-half of the samples in question have been found by Mr. Harrison to be defective, and characterized by him as "adulterated." These consist of four samples of Quinine Wine, Nos. 19173, 19174, 19193 and 19197, and four samples of Tincture of Cinchona, Nos. 19156, 19189, 19191 and 19192. I would recommend that the provisions of sections 11 and 12 of the Adulteration Act be applied in these cases, and that Mr. Harrison's report and these remarks, together with the tabulated statement, be published.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

OFFICE OF PUBLIC ANALYST,
LONDON, December 31, 1898.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to submit to you a report of work done in my laboratory during the past two months; the work done in the first month of the quarter having already been placed before you. I have examined sixteen samples as tabulated below:

RESULTS of the Examination of Eight Samples of

Date of Collection.	Number of Sample.	Quantity Purchased.	Cost.	Description of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1898.			$ c.		*Hamilton, Ont.*	
Nov. 14	19172	1½ pts.	1.80	Quinine Wine	J. A. Barr, James St.....	Vendor .....
" 14	19173	3 "	2.40	" ...	J. W. Gerrie, James St.....	J. Winer & Co., Hamilton.
" 15	19174	3 bots.	1.90	"	A. H. Ross, James and Cameron Sts.	Meagher Bros., Montreal..
					London, Ont.	
" 18	19193	2 "	1.50	"	W. J. McDermid, 272 Dundas St.	Kenneth, Campbell & Co., Montreal.
" 18	19194	3 "	1.80	"	W. E. Saunders & Co., 352 Clarence St.	Vendors.....
" 18	19196	2 "	1.50	"	E. W. Boyle, 652 Dundas St.	Ontario Chemists' Manufacturing Co., Hamilton and Toronto.
" 18	19197	2 "	1.50	"	G. McCallum & Co., cor. Dundas and Richmond Sts.	Northrop, Lyman & Co., Toronto.
" 18	19198	2 "	1.40	"	B. A. Mitchell, 114 Dundas St.	Vendor .....
					Hamilton, Ont.	
" 11	19156	8 ozs.	.50	Tincture of Cinchona	Garlan & Rutherford, 5 and 7 King St.	Vendors.....
" 11	19157	8 "	.45	" ..	John A. Clark, 77 King (W.) St.	Vendor .....
" 14	19171	18 "	1.35	" ..	John A. Barr, James St.....	Archdale, Wilson & Co., Hamilton.
					London, Ont.	
" 17	19189	24 "	.75	" ..	Anderson & Wells, 240 Dundas St.	Vendors.....
" 17	19190	24 "	.75	" ..	W. T. Strong & Co., Dundas St.	Vendor .....
" 17	19191	24 "	.75	" ..	J. Callard, 390 Richmond St.	" .....
" 18	19192	16 "	.50	" ..	W. J. McDermid, 272 Dundas St.	Kenneth, Campbell & Co., Montreal.
" 18	19195	24 oz.	.80	" ..	W. E. Saunders & Co., 352 Clarence St.	Vendors.....

SESSIONAL PAPER No. 7b

Quinine Wine and Eight Samples of Tincture of Cinchona.

Results of Analysis.							No. of Sample.	Public Analyst's Remarks.
Specific Gravity.	Alcohol by Volume — cc in 100cc.	Alcohol by Weight — Grammes in 100 Grms.	Alcohol. — Grammes in 100cc.	Solids. — Grammes in 100cc.	Quinine. — Grammes in 100cc.	Sulphate of Quinine. — Grains in 1 Ounce.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
·9888	21·09	16·93	16·74	2·77	0·162	0·955	19172	Unadulterated.
·9821	22·27	18·00	17·67	1·74	0·125	0·737	19173	Not up to B. P. strength of quinine, and therefore adulterated.
1·0380	17·37	13·28	13·79	13·55	0·134	0·790	19174	" "
1·0214	17·92	13·93	14·23	9·52	0·100	0·589	19193	" "
·9971	20·33	16·18	16·14	4·43	0·320	1·886	19194	About double strength.
·9937	18·03	14·41	14·32	3·23	0·158	0·931	19196	Unadulterated.
·9928	16·98	13·58	13·48	2·71	0·008	0·047	19197	Adulterated, being deficient in quinine.
1·0040	22·18	17·54	17·61	6·09	0·162 Total Alkaloids.	0·955	19198	Unadulterated.
·9387	53·16	44·97	42 22	2·96	0·17	.....	19156	Adulterated, being deficient in alkaloidal strength.
·9675	48·76	40·02	38·72	11·44	0·50	.....	19159	Unadulterated. (Marked U. S. P. Tincture.)
·9412	53·16	44·84	42·21	3·38	0·50	.... ..	19171	Only one-half strength of simple tincture, but exact strength of compound tincture.
·9503	47·56	39·74	37·77	2·64	0·10	.....	I9189	Adulterated, being deficient in alkaloids. (Marked Tr. Cinchona Co.)
·9591	47·76	39·53	37·92	5·24	0·43	.....	19190	Not adulterated. (Marked Tr. Cinchona Co.)
·9438	51·72	43·48	41·04	2·92	0·17	.....	19191	Adulterated, being deficient in alkaloids. (Tr. Cinchona Co.)
·9622	40·48	33·40	32·12	2·68	0·10	.....	19192	" "
·0080	35·62	28·05	28·28	18·04	0·43	.....	19195	Not adulterated. (Marked Tr. Cinchona Co.) Not made according to B. P.

It will be seen that I have found ten samples which do not conform to the standard of the British Pharmacopœia.

Quinine Wine.

This was directed to be made, in the 1885 edition of the British Pharmacopœia, by dissolving sulphate of quinine in orange wine with the aid of citric acid, the strength required being that each fluid ounce should contain one grain of sulphate of quinine. The new British Pharmacopœia preparation is of nearly the same strength (slightly stronger), containing one grain of hydrochlorate of quinine in each fluid ounce. It is made with orange wine as in the former preparation, but no citric acid is used. One sample, it will be noticed, is practically double strength, due doubtless to carelessness in manufacture.

Tincture of Cinchona.

There are two tinctures of Cinchona in the British Pharmacopœia, called Tincture of Cinchona and Compound Tincture of Cinchona. The latter is just one-half the strength of the former in cinchona alkaloids. All the samples I received were labelled "Tincture of Cinchona" by the collectors, but I was quite satisfied that most of the druggists understood that it was the Compound Tincture that was wanted, and in nearly every instance that is what was supplied. In some instances the druggist's label had not been removed from the bottle and distinctly stated that it was the Compound Tincture. I consequently judged the samples by this standard. Nos. 19157 and 19195 contained glycerine, but as they contained the required alkaloids, and an alcoholic strength as great or greater than required in the British Pharmacopœia of 1898, I did not consider this an adulteration.

I have the honour to be, sir,

Your obedient servant,

FRANKLIN T. HARRISON.

SESSIONAL PAPER No. 7b

APPENDIX R.

BULLETIN No. 63.—COMMERCIAL BEEF EXTRACTS.

OTTAWA, April 10, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—The first Examination of Beef Extracts made by the District Analysts of the Dominion, was in the summer of 1894, and the results are recorded at p. 17 of the Annual Report on Adulteration of Food, for the year ending June 30, 1895. At that time Dr. W. H. Ellis wrote that these "proprietary foods were not judged because no standard to which they should attain has been fixed by the department." The analytical determinations made were as follows:—water, petroleum, ether extract, alcohol, extract after petroleum, aqueous extract after alcohol, insoluble residue, ash and total nitrogen. In the month of September last year it was thought wise to make another effort to obtain material upon which to base a standard, and establish methods which might prove to be advantageous in the analysis of the substances in question. The collection of samples was, according to your instructions, made in the Quebec district, and reports were made by Dr. M. Fiset, the official analyst, whose assistant Miss Edith Davidson, obtained the results detailed in Table I., which is appended to this report. The duplicate samples were submitted in this laboratory to a searching examination by Mr. A. McGill, B.A., whose report forms part of the present bulletin.

In view of the very full discussion of the nature of these extracts of meat which has been given in the recently published fourth volume of Allen's Commercial Organic Analysis, it does not seem necessary, to make any reference to their history in the present report. It is, however, of some importance to come to a conclusion as to whether they are to be regarded as food or condiments or pharmaceutical preparations. They are not mentioned in the pharmacopœias, and, with reference at least to unmixed or "straight" extracts, the weight of authority is against considering them as foods. "Extract of meat," says Liebig, "is beef tea made from fresh meat—not roasted—in the purest state, condensed to the consistency of a thick honey, *to which nothing whatever is added by the manufacturer.*" He further declares that it is not nutriment in the ordinary sense, and classes it with tea and coffee. It seems therefore to be evident that pure extract of meat is neither a food, nor a drug, but a condiment. The latter word corresponds to the German "Genussmittel," which, according to König, means substances capable of aiding digestion. Among the "Commercial Beef Extracts" of the present day there are, however, many preparations whose manufacturers claim for them the properties of foods. These are extracts with superadded nutritious substances, such as finely comminuted fibrin or other proteids, and sometimes the latter are claimed to be in a soluble or digested condition. Such preparations have been called peptones, fluid beef, &c. It would seem to be very desirable to distinguish between meat or beef extracts, and meat or beef peptones, but this has not been found to be practicable. In the classification adopted by Mr. McGill, all the beef extracts, so called, will be found in Group I., but only one of these, "Ramornie," corresponds to the article as defined by Liebig, since it does not appear that common salt has been used in making it. All the others contain added salt, the manufacturers following the practice which in 1872 was repudiated by Liebig as "an unjustifiable invention."

The results of analysis reported from Quebec will be found in Table I., together with information as to the source of the various samples. In order to connect these

with the descriptions in Mr. McGill's report, a column has been added giving the serial numbers of the corresponding brands in his tables. It is impossible in these comments to make use of all the figures recorded in Table I. Many of them will be valuable for future reference, and some show the necessity for additional determinations, especially regarding the inorganic constituents of the extracts. A very considerable part of the work done in Quebec is connected with the extraction of the dried sample by alcohol. This determination is invariably given by German authorities, and in the majority of analysis contained in König's standard work the extract obtained with 80 per cent (by volume) alcohol is stated, although the figure does not seem to have been used for any purpose except drawing a conclusion regarding the presence of gelatine. The determinations of the extracts given in Table I. are in most cases accompanied by estimations of the nitrogen contained in them. When the latter is calculated to a percentage on the total nitrogen of the sample, some interesting results are obtained. The following show those which have reference to some of the samples classed in Mr. McGill's first group :—

	Percentage of Total Nitrogen contained in	
	80 p. c. Extract.	94 p. c. Extract.
1. Armour's Beef Extract	50·66	32·13
2. Bovril	72·30	20·95
3. Johnston's Fluid Beef	44·00	18·39
4. Libby, NcNeill & Libby's Extract	78·52	34·30
6. Liebig Co.'s Extract	72·06	40·31

From these figures it will be seen that although the quantity of nitrogenous constituents extracted by 94 per cent alcohol is much less than that removed by alcohol of 80 per cent, still it is surprising that the strong alcohol should remove so much, and the conclusion seems reasonable that the nitrogen in the 94 per cent extract must represent that of the flesh base creatinine, with accompanying urea which, as shown in Mr. McGill's report, is in all likelihood present. No attempt has, however, been made to give in the table the percentage of creatinine on this basis, but nevertheless it would seem impossible to utilize the 94 per cent extract for its estimation. By extracting with 50 per cent spirit (after 94 per cent) and regarding the nitrogen contained in this extract as representing peptones, it might be possible to determine these. (Perhaps 60 per cent alcohol would be preferable to 50 per cent, as the former does not remove any gelatine). Table I. also shows some figures obtained in attempting to carry out this method on several of the brands included in Mr. McGill's second group ; but, unfortunately, in applying it to the samples of the first group the necessity of determining also the ash of the alcohol extract was not recognized. In only one case was this done (Serial No. 10, Star Brand) with the result of enabling the following statement to be made. The 94 per cent alcohol extract amounted to 56·07 per cent on the sample and consisted of ash 21·65 and organic solids 34·42. 2·66 of the 5·89 per cent nitrogen contained in the sample were found in the extract. This corresponds (using the factor 3·12) to 8·30 per cent of flesh bases. Deducting this percentage from that of the organic solids, it follows that there are also present in strong alcohol extract of the sample 26·12 per cent of organic constituents, the identification of which has not yet been accomplished. Results corresponding with these may be obtained from Mr. McGill's figures as given in Group I., No. 10, the analysis of which may be stated as follows :—

Water	25·200	p.c.
Total ash	33·000	"
Fat	0·230	"
Insoluble proteids	0·813	"
Proteids pptd. by bromine	9·456	"
Flesh bases	8·867	"
Undetermined (by difference)	22·434	"
	100·000	

From this it will be seen that, not only does the percentage of flesh bases, determined by the method which Mr. McGill describes, correspond closely with that obtained by extracting with 94 p. c. alcohol, but that the presence of a very large percentage of undetermined constituents is confirmed. These are mentioned by Allen as non nitrogenous extractive matters and are probably carbohydrates of some description derived from the glycogen contained in the original meat. Mr. McGill's results, restated in analytical form, give strong evidence of the presence of large amounts of undetermined constituents in many of the samples of Group I :—

Serial No.—	1	2	3	4
	Armour's.	Bovril.	Johnston's.	Libby's.
Water	21·900	37·200	38·700	26·500
Ash	22·200	17·900	14·000	30·000
Fat	1·070	1·130	0·770	0·590
Insoluble proteids	3·575	4·113	5·075	1·088
Proteids pptd. by bromine	6·290	2·969	18·810	6·431
Flesh bases	18·876	18 617	11·975	17·444
Undetermined (by difference)	26·089	18·071	10·670	17·947
	100·000	100·000	100·000	100·000

Serial No.—	6	7	8	9
	Liebig's; Chicago Co	Morris's.	Mosquera.	"Ramornie."
Water	19·800	28·500	30·900	20·800
Ash	28·300	23·300	22·600	17 600
Fat	0·520	0·140	0·370	1·020
Insoluble proteids	3·106	2·419	1·400	3·431
Proteids pptd. by bromine	11·637	17·500	11·182	5·425
Flesh bases	15·525	19·740	25·366	24·845
Undetermined (diff)	21·012	8·401	8·182	26·879
	100·000	100·000	100·000	100·000

For the sake of greater clearness the results obtained by Mr. McGill in the examination of samples of the Group II. are here given in analytical form :—

Serial No.—	11	12	14	15
	Fluid Beef Can. Co.	Cibils.	Staminal	Valentines.
Water	64·300	65·300	60·900	54·600
Ash	8·950	16·900	13·600	11·100
Fat	1·230	0·120	1·100	0·940
Insoluble proteids	9·019	1·443	2·575	.....
Soluble proteids	5·625	0·591	2·806	2·006
Flesh bases	4·515	6·864	7·759	8·867
Undetermined (diff.)	6·361	8·782	11·260	22·487
	100·000	100·000	100·000	100·000

Serial No.—	16	17	18	19
	Vigoral.	Vimbos.	Wyeth's.	Extract Canadian Co.
Water	43·600	43·500	59·200	64·800
Ash	14·400	13·600	16·300	16·440
Fat	1·010	1·040	0·530	.....
Insoluble proteids	6·613	5·306	0·581	3·944
Soluble proteids	11·294	9·725	1·881	6·569
Flesh bases	5·863	8·727	8·680	4·337
Undetermided (diff.)	17·220	18·102	12·828	3·910
	100·000	100·000	100·000	100·000

The four samples which constitute Mr. McGill's group IV., when the figures are re-arranged in the foregoing manner, show the following composition:—

	20	21	22	23
	Bovinine.	Panopepton.	Brands.	Beef Peptonoids.
Alcohol	4·750	16·000	.....	.....
Water	74·250	65·400	90·600	4·600
Ash	1·470	0·880	1·270	4·600
Fat	0·270	0·790	none	0·710
Insoluble proteids	none	none	none	16·406
Soluble proteids	14·150	0·493	5·425	7·788
Flesh bases	1·017	3·058	1·894	none
				Carbo-hydrates.
Undetermined (diff.)	4·093	13·379	0·811	65·896
	100·000	100·000	100·000	100·000

It is doubtful as to whether any of these brands should be included in the list of commercial beef extracts because No. 20 and 21 contain alcohol, No. 22 has gelatine among the soluble proteids, and No. 23 is to a very large extent of vegetable origin.

With regard to methods of analysis it is impossible at present to recommend any others than those indicated by Mr. McGill. Whether it will be possible to utilize the alcohol extracts will have to be determined by further investigation. Neither is it possible in the present state of our knowledge to make any suggestions regarding a standard, beyond recommending a lowest limit for the percentage of water and the amount of added salt, action regarding which may well for the present be delayed. The whole subject must still be regarded as under investigation, but considering its importance and the number of workers in the field, it is not unlikely that definite recommendations may be made in the near future.

In conclusion I beg to recommend the publication of this report with its appendices.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

TABLE I.—Results of the Examination of 20 Samples of Beef Extracts.

Date of Collection.	Number of Sample.	Quantity Purchased.	Cost.	Description of Sample.	Name and Address of		Result of Analysis.									Serial No. in group Tables.
					Vendor.	Manufacturer or Furnisher as given by Vendor.	Water.	Extract.					Nitrogen.			
								By petroleum ether.	By 80 p.c. alcohol after P. E.	By hot water after alcohol.	Insoluble.	Ash in hot water extract.	Total.	In alcohol extract.	In hot water extract.	
1898.		pots	$ c.				p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
Sept. 6	18701	3	0 75	Fluid Beef	J. T. Gaudet, Notre Dame St., Joliette, P.Q.	Canadian Extract Beef Co., Montreal.	65·02	1·30	15·80	4·20	13·68	1·37	3·81	1.74	0·52	11
" 6	18702	3	0 75	Bovril	" "	Bovril Co. (Ltd.), England.	38·85	1·45	41·58	9·00	9·12	3·37	6·39	4·63	0·76	2
" 7	18703	3	0 75	Liebig's Extract of Beef	R. W. Williams, Three Rivers, P.Q.	Liebig Extract Co., Chicago.	17·53	0·80	67·57	9·35	4·75	3·00	6·98	5·03	1·01	6
" 7	18704	2	1 00	Extract of Beef	L. A. Hoerner, Three Rivers, P.Q.	Libby, McNeil & Libby, Chicago.	26·35	0·87	55·90	11·00	5·88	2·87	6·75	5·30	1·27	4
" 7	18705	2	1 00	Fluid Beef	" "	Johnson's Fluid Beef Co.	40·27	1·12	36·67	12·53	9·41	2·00	7·50	3·30	1·69	3
" 13	18706	2	0 80	Liebig's Extract of Beef —"Ramornie."	A. Leclerc & Co., 243 St. Joseph St., Quebec	Australian Meat Co.	19·65	1.00	58·53	15·65	6·24	3·57	9·00	4·00	2·11	9
" 13	18707	2	1 60	Wyeth's Beef Juice	Laroche & Co., 4 Fabrique St. Quebec.	John Wyeth & Brother, Philadelphia.	58·99	0·58	29.27	4·72	6·44	2·16	3·20	2·97	0·21	18
" 13	18708	2	1 00	Mosquera Fluid Beef Jelly.	J. E. Dube, Quebec	Mosquera Julia Food Co., New York and Detroit.	66·90	0·42	29·49	1·93	1·21	0·95	2·96	2 50	0·14	13
" 13	18709	2	0 60	Armour's Beef Extract.	" "	Armour & Co., Chicago	23·27	1 10	59·65	9·72	5·83	4·00	7·50	3·80	0·66	1
" 13	18710	2	1 20	Bovinine	W. Brunet & Co., 139 St. Joseph St., Quebec	The Bovinine Co., Chicago, New York and London.	79·14	0·27	5·18	0·30	15·11	0 09	2·75	0·47	None.	20

TABLE I. *Continued.*—Results of the Examination of 20 Samples of Beef Extracts.

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Description of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Results of Analysis. Water.	Extract by Petroleum Ether.	Extract by 94 p. c. Alcohol.	Extract by Nitrogen in Alcohol.	Extract by Ice cold Water.	Extract by Hot Water.	Total Nitrogen.	Ash.	Chlorine in Chlorides.	Serial No. in Group Tables.
1898.		pots	$ c.				p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
Sept. 6	18701	3	0 75	Fluid Beef	J. T. Gaudet, Notre Dame St., Joliette, P.Q.	Canadian Extract Beef Co., Montreal.	63·57	1·17	15·02	0·71	5·29	3·49	3·77	8·95	3·83	11
" 6	18702	3	0 75	Bovril	"	Bovril Co., Ltd., London, England.	35·48	1·29	42·20	1·76	11·70	2·29	8·40	17·65	5·38	2
" 7	18703	3	0 75	Liebig's Extract of Beef	R. W. Williams, Three Rivers, P.Q.	Liebig Extract Co., Chicago.	19·70	0·24	62·39	3·10	10·93	3·48	7·69	28·40	11·76	6
" 7	18704	2	1 00	Extract of Beef	L. A. Hoerner, Three Rivers, P.Q.	Libby, McNeil & Libby, Chicago.	25·24	0·30	53·04	2·48	17·65	1·98	7·23	28 49	Lost solut'n	4
" 7	18705	2	1 00	Fluid Beef	"	Johnston's Fluid Beef Co.	39·94	0·75	31·24	1·44	17·73	4·33	7·83	14·08	4·16	3
" 13	18706	2	0 80	Liebig's Extract of Beef —"Ramornie."	A. Leclerc & Co., 243 St. Joseph St., Quebec.	Australian Meat Co.	20·87	1·04	50·42	4·50	20·38	3·58	9·76	15·50	1·76	9
" 13	18707	2	1 60	Wyeth's Beef Juice	Laroche & Co., 4 Fabrique St., Quebec.	John Wyeth & Brother, Philadelphia.	58·53	0·77	28·11	0·97	6·38	2·28	3·27	16·22	4·06	18
" 13	18708	2	1 00	Mosquera Fluid Beef Jelly.	J. E. Dube, Quebec	Mosquera Julia Food Co., New York and Detroit.	66·85	0·37	27·79	1·80	3·85	0·70	2·92	10·56	4·26	13
" 13	18709	2	0 60	Armour's Beef Extract	"	Armour & Co., Chicago.	22·66	1·52	55·32	2·40	14·72	2·38	7·47	22·75	5·27	1
" 13	18710	2	1 20	Bovinine	W. Brunet & Co., 139 St. Joseph St., Quebec.	The Bovinine Co., Chicago, New York and London.	79·04	0·26	5·15	0·34	0·07	0·58	2·52	1·47	0·51	20

TABLE I. *Continued.*—RESULTS of the Examination of 20 samples of Beef Extracts.

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Description of Sample.	NAME AND ADDRESS OF		RESULTS OF ANALYSIS.									Serial No. in group tables.
					Vendor.	Manufacturer or Furnisher as given by Vendor.	Water.	Extract by 94 p.c. Alcohol.	Nitrogen in Alcohol extract.	Ash in Alcohol extract.	Na. Cl. in Alcohol extract.	Total Ash.	Chlorine (as Na. Cl.)	Total Nitrogen	Fat.	
1898.		Pots or jars	$ c.		*Montreal.*		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
Nov. 8	18736	2	0 80	"Vigoral"..... ...	Hy. Lanctot, 299 St. Lawrence St.	Armour & Co., Chicago.	44·17	32·16	1·15	9·40	0·17	14·36	5·48	5·00	1·00	16
" 8	18737	2	1 50	Beef extract, "Star Brand."	Wallace Dawson, 169 St. Lawrence St.	The Pioneer Pkg. Co., Om:, U.S.A.	24·35	56·07	2·66	21·65	10·53	32·14	20·38	5·89	0.23	10
" 8	18738	2	2 00	Beef peptonoids.....	H. R. Gray, St. Lawrence St.	The Arlington Chem'l Co. Yonkers, N.Y.	3·76	41·11	0·33	1·84	0 16	4·60	1·00	3·83	0·71	23
" 8	18739	2	1 20	Essence of beef, "Brands."	A. Robert, 1 St. Lawrence St.	Brand & Co., London, Eng.	90·16	3·44	0·36	1·23	0·04	1·34	0·20	1·38	....	22
" 8	18740	2	2 50	Panopepton.....	Dr. J. Leduc & Co., 2052 Notre Dame St.	Fairchild Bros. & Foster, New York.	81·92	8·64	0·17	0·85	0·02	0·88	0·26	1·00	0·79	21
" 9	18741	2	2 50	Meat juice	John Lewis, 2208 St. Catherine St.	Mann, G. Valentine, Richmond, Va.	55·81	32·62	1·31	7·50	0·14	11·84	1·56	2·90	1·18	15
" 9	18742	2	0 30	Fluid beef, "Vimbos".	C. E. Scarff, 2262 St. Catherine St.	"Vimbos Limited." W. Wallace Auld, Managing Director.	43·60	35·72	1·21	6·88	0·57	13·60	4·97	5·38	1·06	17
" 9	18743	2	1 30	" "Staminal".	J. H. T. Charron, 1978 Notre Dame St.	Johnston Fluid Beef Co.	59·96	26·56	1·71	14·00	0·24	13·60	4·85	3·52	1·10	14
" 14	18744	2	1 20	Fluid beef ext., "Cibils"	T. D. McLeish, 499 St. Lawrence St.	W. F. Schmoele & Co., Antwerp, Belgium.	63·91	27·07	1·53	10·26	4·78	18·06	13·47	2·84	0·12	12
" 14	18745	2	0 50	Ext. of beef, "Liebigs"	"	The Ontario Chemical Mfg. Co., Agents.	20·72	63·85	3·60	24·05	4·91	31·44	15·99	5·66	1·00	5

TABLE I. *Concluded.*—RESULTS of the Examination of 20 samples of Beef Extracts.

Date of Collection.	Number of Sample.	Quantity Purchased.	Cost.	Description of Sample.	NAME AND ADDRESS OF		RESULTS OF ANALYSIS.									Group Serial Number in Tables.
					Vendor.	Manufacturer or Furnisher as given by Vendor.	Extract by 50 p. c. Alcohol Extract, after 94 p. c.	Nitrogen in 50 p. c. Alcohol Extract.	Ash in 50 p. c. Alcohol Extract.	Ice Cold Water Extract, after Alcohol.	Nitrogen in Ice Cold Water Extract.	Ash in Ice Cold Water Extract.	Hot Water Extract, after Cold Water.	Nitrogen in Hot Water Extract.	Ash in Hot Water Extract.	
1898.		pots	$ cts.		*Montreal.*		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
Nov. 8	18736	2	0 80	"Vigoral."	Hy. Lanctot, 299 St. Lawrence St.	Armour & Co., Chicago	9·75	2·30	Lost.	1·33	0·05	1 00	1·87	0·13	0·93	16
" 8	18737	2	1 50	Beef extract, "Star Brand."	Wallace Dawson, 169 St. Lawrence St.	The Pioneer Pkg. Co., Om., U.S.A.	11·50	1·25	6·55	1·40	0·08	0·70	1·95	0·17	0·90	10
" 8	18738	2	2 00	Beef peptonoids	H. R. Gray, St. Lawrence St.	The Arlington Chemical Co., Yonkers, N.Y.	10·92	0·51	0·98	1·39	Lost.	0·60	3·88	0·12	0 75	23
" 8	18739	2	1 20	Essence of beef	A. Robert, 1 St. Lawrence St.	Brand & Co., London, Eng.	4·80	0·76	0·50	0·37	0·05	0·25	0·77	0·08	0·40	22
" 8	18740	2	2 50	Panopepton	D. J. Leduc & Co., 2052 Notre Dame St.	Fairchild Bros. & Foster, New York.	7·34	0·48	0·20	0·27	Trace.	0·10	0·47	0·09	0·25	21
" 9	18741	2	2 50	Meat juice	John Lewis, 2208 St. Catherine St.	Mann, G. Valentine, Richmond, Va.	5·50	0·43	4·00	0·67	None.	0·66	1·43	0·11	1·06	15
" 9	18742	2	0 30	Fluid beef, "Vimbos"	C. E. Scarff, 2262 St. Catherine St.	Vimbos, Limited, W. Wallace Auld, Managing Director.	8·28	0·84	3·40	1·54	0·10	1·16	1·68	0·06	0·92	17
" 9	18743	2	1 30	" "Staminal"	J. H. T. Charron, 1978 Notre Dame St.	Johnston Fluid Beef Co.	6·00	0·51	2·80	0·94	0·08	0·84	1·30	0·05	0·82	14
" 14	18744	2	1 20	Fluid beef extract, "Cibils."	T. D. McLeish, 499 St. Lawrence St.	W. F. Schomaele & Co., Antwerp, Belgium.	4·03	0·44	2·00	0·87	0·06	0·60	0·82	0·02	0·60	12
" 14	18745	2	0 50	Extract of beef, "Liebigs."	" "	The Ontario Chemical Mfg. Co., Agents.	7·97	0·44	4·45	1·87	None.	1·86	1·25	0·11	1·05	5

LABORATORY, INLAND REVENUE DEPARTMENT,
OTTAWA, March 24, 1899.

T. MACFARLANE, F.R.S.C., &c.,
Chief Analyst.

SIR,—I have the honour to submit to you herewith an account of work done on forty-nine (49) samples of meat extracts, and similar preparations, as they are found on the Canadian market. These represent twenty-three (23) different brands, and I have arranged them, for more convenient comparison, in three more or less arbitrary groups. The first group comprises such semi-solid extracts as approximate to the Liebig formula. Several of these are professedly prepared according to this formula, but others differ from it by having a proportion of insoluble beef-meal, or finely ground dried beef, added. One or two profess to contain peptonized proteids, the raw material having been subjected to a peptonizing process before extraction. The second group contains preparations which only differ from those described in group I., by containing more water in proportion to the solids. Group III. contains four samples which differ in many respects from those of the preceding groups, and which possess but few points in common among themselves.

The work has been mainly done in this laboratory, but I have had some help from the laboratory in Quebec. I have not judged it necessary to give details of analysis in the case of each sample, but have stated averages obtained from working upon two, or in a few cases, three samples of each brand. Since these extracts are not definite chemical compounds, it is inevitable that different batches should vary slightly in quality. Further remarks on this head will be found under the notes appended to the tables.

Although this work was begun in September last, the results herein given are far from being as complete as I could wish. During the whole progress of the work, other and very varying analyses have been carried on in my laboratory. It is further to be remembered that many of the processes employed are intricate and require very careful attention to details of manipulation; also, that the whole *modus operandi* on proteids is in an unsettled state, and that much has yet to be done before our methods can be regarded as fully satisfactory. In the principal laboratories of Europe and America, investigations, having in view the perfecting of our knowledge regarding peptones, proteoses, flesh bases, and other nitrogenous food materials, are being carried on. I have made trials of many recently suggested methods in the course of this examination, and have been led to modify some modes of operating, as indicated in the sequel. A great deal of my work is referred to in these notes, rather than published *in extenso*, owing to various difficulties in interpretation, or to unsatisfactoriness in the methods themselves. I have included in the tables only such results as may be taken as positive additions to our knowledge of these meat products. Even here, the attempt to explain the meaning of the analytical numbers must be undertaken with great caution. Much has yet to be done by experimental physiologists before we can pronounce finally upon the food (nutritive) value (if any) of the flesh bases which, in most instances, form the chief portion of the azotized material in these extracts. Then, the bases certainly differ among themselves in food value; and, of course, if this is true of the flesh bases, it is *a fortiori* true of the various forms in which proteid matter occurs in these preparations, viz., as peptones, proteoses, acid albumins, &c.

My experiments suggest that a part of the nitrogen in some of these preparations exists as urea. Urea certainly can have no food value: nor can one readily understand how its use as a stimulant can be justified. Nature seems to have provided for its prompt elimination from the system; and it is certain that any failure to get rid of it by way of the kidneys, results in serious disturbance of the vital functions, and may

end in death by uræmia. Unfortunately, I have been unable to discover any practical method of working by which a sharp line can be drawn between the nitrogen present as urea and that present in Creatin, Creatinin and Xanthin. This is one of the many points which have been suggested in this examination, which demand further work. I have not thought it necessary to undertake the detailed analysis of the mineral matter present. Of course, it consists largely of lime salts, chiefly phosphates. Perhaps, at some future collection of meat extracts and allied products this point, with many others, left for the present untouched, may be taken up.

I have the honour to be, sir,

Your obedient servant,

A. McGILL.

GROUP I.—Meat Extracts of pasty Consistency, containing from 60 to 80 per cent Solids.

Number.	Name.	Number of samples analysed.	Dry Solids.	Water.	Ash—Mineral Salts, &c.	Organic Solids.	Chlorine—calculated to common Salt (NaCl).	Mineral matter other than common Salt.	Sodium Chloride calculated to a percentage on		Fat.		(1) Total Nitrogen.	Nitrogen expressed as a percentage on the Organic Solids.	Nitrogen in portion insoluble in water.	Equivalent Proteids—N × 6·25	Nitrogen in soluble matter ppt'd. by Bromine.	Equivalent proteids—N × 6·25	Nitrogen in soluble matter not ppt'd. by Bromine.	Equivalent Flesh Bases—N × 3·12.	Added Salt—NaCl. (3)
									Total Dry Solids.	Organic Solids.	Petroleum ether extract.	Expressed as a percentage on Organic Solids.									
			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			p. c.		p. c.								
1	Armour's	3	78·1	21·9	22·2	55·9	8·70	13·50	11·14	15·56	1·07	1·91	7·630	13·65	0·572	3·575	1·008	6 290	6·050	18·876	4·02
2	Bovril	2	62·8	37·2	17·9	44·9	7·13	10·77	11·36	15·90	1 13	2·51	7·100	15·70	0·658	4·113	0·475	2·969	5·967	18·617	3·35
3	Johnston's (2)	3	61·3	38·7	14·0	47·3	6·85	7·15	11·17	14·44	0·77	1·63	7·660	16·20	0·812	5·075	3·010	18·810	3·838	11·975	3·19
4	Libby, McNeil & Libby's	3	73·5	26·5	30·0	43·5	9·81	20·19	13·35	22·55	0·59	1·35	6·853	15·75	0·174	1·088	1·029	6·431	5·591	17·444	5·40
5	Liebigs—Ont. Mfg. Co	1	79·8	20·2	31·4	48·4	16·00	15·40	20·05	33·06	0·75	1·55	5·381	11·12	...	....	.....	.....	.....	.....	11·20
6	Liebigs—Extract Co. Chi.	2	80·2	19·8	28·4	51·8	19·41	8·99	24·20	37·47	0·52	1·00	7·335	14·16	0·497	3·106	1·862	11·637	4·976	15·525	14·61
7	Morris's	2	71·5	28·5	23·3	48·2	11·44	11·86	16·00	23·73	0·14	0·29	7·514	15·59	0·387	2·419	2·800	17·500	6 327	19·740	7·12
8	Mosquera Beef Jelly	2	69·1	30·9	22·6	46·5	9·97	12·63	14.43	21·44	0·37	0·80	10·143	21·81	0·224	1·400	1·789	11·182	8·130	25·366	5·83
9	Ramorine	3	79·2	20·8	17·6	61·6	3·20	14·40	4·04	5·20	1·02	1·66	9·380	15·23	0 549	3·431	0 868	5·425	7·963	24·845	None
10	Star	2	74·8	25·2	33·0	41·8	21·70	11·30	11·30	29·01	0·23	0·55	5·970	14·28	0·130	0·813	1·513	9·456	2·842	8·867	17·2

NOTE—(1)—Nitrates and Salts of Ammonia were proved absent.

(2)—Solution does not give (spectroscopic) hæmoglobin bands.

(3)—The numbers in this column are obtained by multiplying dry solids per cent, by the factor 0·06, to obtain chlorides naturally present, and subtracting the product from the total chlorine calculated to common salt. Of course the chlorine is naturally present in combination with potassium.

Group II.—Meat Extracts, more or less liquid, containing from 30 to 60 per cent Solids.

No.	Name.	Number of samples analysed.	Dry Solids.	Water.	Ash—Mineral Salts, etc.	Organic Solids.	Chlorine—calculated to common Salt, (NaCl).	Mineral matter other than common Salt.	Sodium Chloride calculated to a percentage on		Fat.		Total Nitrogen.	Nitrogen expressed as a percentage on the Organic Solids.	Nitrogen in portion insoluble in water.	Equivalent proteids—N × 6·25.	Nitrogen in soluble matter precipitated by Bromine.	Equivalent proteids—N × 6·25.	Nitrogen in soluble matter not pptd. by Bromine.	Equivalent Fresh Bases, N × 3·12.	Remarks.
									Total dry Solids.	Organic Solids.	Petroleum ether extract.	Expressed as a percentage on Organic Solids.									
			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			p. c.		p. c.								
11	Fluid Beef—Can. Ext. Beef Co.—Montreal..	2	35·7	64·3	8·95	26·7	6·32	2·63	17·70	23·67	1·23	4·61	3·790	14·20	1·443	9·019	0·900	5·625	1·447	4·515	
12	Cibils.	2	34.7	65·3	16·90	17·8	11·74	5·16	33·83	65·96	0·12	0·75	2·862	16·10	0·071	0·444	0·591	3·696	2·200	6·864	
13	Mosquera Fluid Beef Jelly..	2	32·6	67·4	10·60	22·0	7·02	3·58	21·53	31·91	0·42	1·91	2·659	12·09	....	....	....	....	....	....	
14	Staminal	2	39·1	60·9	13·60	25·5	4·66	8·94	11·92	18·28	1·10	4·31	3·348	13·13	0·412	2·575	0·449	2·806	2·487	7·759	
15	Valentine's..	2	45·4	54·6	11·10	34·3	1·45	9·65	3·19	4·23	0·94	2·74	3·163	9·22	None.	....	0·321	2·006	2·842	8·867	Contains 2·89 p.c. of P_2O_5.
16	Vigoral.	2	56·4	43·6	14·40	42·0	5·49	8·91	9·74	13·08	1·01	2·40	4·744	11·30	1·058	6·613	1·807	11·294	1·879	5·863	
17	Vimbos.	2	56·5	43·5	13·60	42·9	4·78	8·82	8·45	11·14	1·04	2·42	5·202	12·13	0·849	5·306	1·556	9·725	2·797	8·727	
18	*Wyeth's	3	40·8	59·2	16·30	24·5	6·63	9·67	16·25	27·06	0·53	2·16	3·176	12·98	0·093	0·581	0·301	1·881	2·782	8·680	Contains 2·07 p.c. of P_2O_5.
19	Extr. of Fl. Beef—Can. Extr. of Beef Co	1	35·2	64·8	16·44	18 8	10·91	5·53	31·00	58·00	....	....	3·072	16·34	0·631	3·944	1·051	6·569	1·390	4·337	

*Gives doubtful oxy-hæmoglobin bands.

Group III.—Meat preparations of Exceptional Character.

20	*Bovinine.	2	21·0	79·0	1·47	19·5	0·84	0·63	4·00	4·35	0·27	1·38	2·590	13·28	None.	.....	2·264	14·150	0·326	1·017	Contains 10·4 p.c. proof spirit.
21	Panopepton.	2	18·6	81·4	0·88	17·7	0·33	0·55	1·77	1·89	0·79	4·47	0·931	5·25	None.	.....	0·079	0·493	0·852	3·058	Contains 34·5 p.c. proof spirit.
22	Brand's.	2	9·4	90·6	1·27	8·1	0·19	1·98	2·02	2·34	None.	.....	1·475	18·21	None.	.....	0·868	5·425	0·607	1·894	Contains gelatine.
23	Beef Peptonoids	2	95·4	4·6	4·60	90·8	0·96	3·64	1·01	1·05	0·71	0·78	3·840	4·23	2 625	16·406	1·246	7·788	None.	....	Contains a large amount of wheat starch.

*Becomes semi-solid on heating to 55°C., showing fibrin; is pptd. by excess of alcohol and gives bi-uret reaction. Contains no oxalates; no salicylic acid our formaldehyde found. Gives bands of met-hæmoglobin and crystals of hæmin.

Treatment with Alkaline Permanganate.

A considerable number of experiments were made with alkaline permanganate, as in the Wanklyn albuminoid-ammonia process, but employing much stronger solutions.

The potash solution contained 300 grammes caustic potash per litre; the permanganate, 25 grammes of the potash salt per litre.

The beef extracts were used in approximately one per cent solution, calculated upon the dry solid matter of the extract. The soluble portion only of the meat extracts was employed.

Working under similar conditions, the amount of ammonia obtained in the distillates were fairly constant for the same sample. The following numbers (percentage weights of ammonia (NH_3) on the dry substance used) were obtained :—

	Ammonia.
Valentine's Meat Juice	4·79 per cent.
Wyeth's Meat Juice	6·66 "
Bovril Fluid Beef	6·40 "
Liebig's Extract (Chicago)	7·13 "
Johnston's Fluid Beef	7·85 "
Armour's Extract of Beef	5·82 "

Each of the above numbers is a mean from several concordant experiments. When studied in relation to other analytical numbers, and especially in relation to the content in flesh bases, as indicated by the soluble nitrogen not precipitated by bromine, they are disappointing, and suggest no useful conclusions so far as the composition of the article is concerned.

Experiments with Alkaline Hypobromite.

Reagent.—The reagent was freshly prepared for each test by adding bromine to ten (10) volumes of a cold forty (40) per cent solution of caustic soda.

Urea.—Urea contains 46·67 per cent of nitrogen. Experiments, at room temperature (about 20° C.), gave (*a*) 45·22 per cent nitrogen in ten minutes; (*b*) 45·57 per cent nitrogen in 10 minutes.

Creatin.—Creatin contains 32·06 per cent of nitrogen. Experiments conducted as above gave—

(*a*)—A sample of Merck's manufacture	5·25 p.c.
(*b*)—Another sample of Merck's manufacture	11·75 "
(*c*)—Sample prepared from fowl	15·25 "
(*d*)—Another sample prepared from fowl	18·50 "
(*e*)—Sample from flesh of goose	4·90 "
(*f*)—Sample prepared from Liebig's Extract	6·10 "

All the above samples were fairly well crystallized. Much larger amounts of nitrogen were obtained by allowing to stand several hours; but in none of the experiments was the theoretical amount reached.

Creatinin.—Creatinin contains 37·17 per cent of nitrogen. A sample obtained from Eimer & Amend, New York, gave 2·375 per cent nitrogen on treatment as above for ten minutes. On allowing to stand for an hour 14·375 per cent was obtained.

Beef Extracts.—Solutions of some of the beef preparations were treated with alkaline hypobromite, as above described. In the following tables I have calculated the weight of nitrogen obtained in ten minutes to a percentage (1) on the dry solids of the

sample; (2) on the flesh bases in the sample, as found by multiplying the amidic nitrogen by the factor 3·12 :—

	(1.)	(2.)
Bovinine—gave nitrogen	2·52	51.90
Bovril "	1·49	5·03
Mosquera Beef Jelly gave nitrogen	1·42	3·90
Ramornie "	1·57	5·02
Valentine's Extract "	2·60	13·31
Wyeth's Beef Extract "	2·95	13·90

Professor Mallet (Bulletin 54, U. S. Department of Agriculture;—has shown that all proteids give some gaseous nitrogen when treated as above. He obtained generally about two-fifths of the total amount present; but many of his experiments were made at high temperatures, and carried on for longer periods, than mine.

Conclusion.—While the above experimental research is unsatisfactory so far as definiteness of result is concerned, it appears to justify the inference that where very large amounts of nitrogen are obtained the presence of urea is probable.

The following scheme for analysis of meat extracts was proposed at the beginning of this investigation; but was greatly modified as further explained.

Scheme proposed for Analysis of Meat Extracts and similar preparations.

From 5 to 25 grammes of the sample is exhausted with water at about 20°C using about 200 to 250 cc, and filtered through a tarred filter. (See note 1.)

Filtrate A.—Is boiled to coagulate soluble albumens, and filtered—(or cleared by centrifuge).

Residue A.—Is dried at 100°C. and weighed for *Insoluble Matter*. Nitrogen is determined in an aliquot part, and calculated (× 6·25) to *insoluble proteids*.

Filtrate B.—Is made exactly neutral, and if a precipitate forms this is filtered off. (4.)

Residue B.—Is dried, on a nitrogen-free filter; its nitrogen is determined and calculated to *coagulable albumen*, by the usual factor.

Filtrate C.—Is saturated with zinc sulphate and the precipitate filtered off. (2.)

Residue C.—Is dried, and nitrogen determined. The nitrogen × 6·25 = *Acid (or Alkali) Albumen.*

Filtrate D. (3)—Is treated with a little hydrochloric acid, and bromine added to saturation.

Residue D.—The nitrogen is determined in the dried residue, and × 6·25—*proteoses* (albumoses).

Filtrate E.—May be used for determination of amidic nitrogen; but is so loaded up with sulphate of zinc, bromine, etc., that large errors come into the nitrogen estimation. It is preferable to take the sum of nitrogen found in the different residues A to E from the *total nitrogen* determined independently. The difference so found is the *amidic nitrogen*; and the flesh bases are calculated by the factor 3·12.

Residue E.—Nitrogen is determined, and × 6·25 gives *peptones.*

(1.) In some cases filtration is impossible. By a centrifugal machine a clear solution can generally be obtained, and the sediment washed on the filter.

(2.) Saturation is much assisted by using a mechanical shaker.

(3.) This is allowed to stand over night for precipitation of peptones. The operation is best performed in the Kjeldahl digestion flask. It may be necessary to take an aliquot part only, since it is impracticable to work with large amounts.

(4.) It is generally advisable to use an aliquot part of this filtrate for determination of proteoses.

The working out of the preceding scheme was found to involve so much labour as to make it impossible to carry it through with all the samples; and this particularly because the value of the results was not such as to clearly justify the time and labour spent upon winning them.

The scheme was fully worked out on two samples only; and the following results obtained :—

Results Obtained.	Vigoral.	Vimbos.
Insoluble residue (per cent)	8·95	6·32
Contains nitrogen (per cent on sample)	1·047	0·906
" " (per cent on itself)	11·60	14·30
Equivalent proteid matter by factor 6·25	6·544	5·663
Soluble matter (per cent)	47·45	50·18
Nitrogen in coagulable albumens	0·0196	0·058
Coagulable albumen (nitrogen × 6·25)	0·1225	0·363
Syntonin (acid albumen)	none.	none.
Proteose nitrogen (by zinc sulphate)	0 314	0·391
Equivalent proteoses (× 6·25)	1·963	2·444
Peptone nitrogen	1·059	1·400
Equivalent peptones (× 6·25)	6·621	8·750
Amidic (flesh base) nitrogen (by difference)	2·305	2·447
Equivalent flesh bases (× 3·12)	7·192	7·635

On comparing these results with those obtained by direct treatment of the soluble matter with bromine, it will be seen that the sum of nitrogen as coagulable albumen proteoses and peptones in Vigoral is less than that in the bromine precipitate by 0·414 per cent; while in Vimbos it exceeds the nitrogen of the bromine precipitate by 0·293 per cent.

It may be that differences so great are the results of errors inherent in the method; but I have not been able to give more time to this investigation. The nutritive value of proteose nitrogen as compared with peptone nitrogen—and of this, again, as compared with the nitrogen of undigested albumen—is something which must be settled by physiologists, and not by chemists.

In the light of these considerations, I have thought it best to accept the suggestion of Dr. Wiley, (Bulletin No. 54, U. S. Department of Agriculture, 1898)—and to discriminate between—

1. Nitrogen present in soluble proteids.
2. Nitrogen present in soluble proteids by precipitating these with bromine.
3. Amidic nitrogen, *i.e.*, nitrogen in soluble compounds which are not precipitated by bromine, in acid solution.

The details of this method will be found in the Bulletin quoted; and also in the Analyst, vol. XXIII.

Notes on processes used—

Moisture.—A quantity of the sample, varying from 5 to 25 grammes, was diluted to 100 cc.; and 20 cc. was dried in asbestos (Macfarlane) tubes to constant weight at 95° C.

Ash.—Was obtained by burning in platinum at as low a temperature as possible. Nitrate of ammonium was employed to burn off refractory carbon.

Chlorine.—Was determined gravimetrically in a solution of the ash.

Fat.—Was determined by extraction of the dry residue in asbestos, with hot petroleum ether.

Nitrogen.—All estimations of nitrogen were made by the Gunning modification of Kjeldahl's process, after ascertaining that its indications were identical with those obtained by the use of mercurie oxide and permanganate.

Insoluble nitrogen.—A weighed amount of the sample was treated with a large excess of tepid water, filtered, and the insoluble residue dried and weighed. It was then—or an aliquot part of it—treated for nitrogen.

Proteid nitrogen.—The filtrate, to about 200 Cc., was treated in a Kjeldahl digestion flask, with a few drops of hydrochloric acid, and then with excess of bromine. After being well shaken several times, it was allowed to stand over night, the liquid passed through a filter, and the residue washed with bromine water. This residue with the filter, is returned to the flask, and its nitrogen determined as usual.

Amidic nitrogen.—The sum of insoluble and proteid nitrogen taken from the total nitrogen, determined independently, gives the amidic (flesh base) nitrogen.

EXPERIMENTS WITH CREATINE, ETC.

When Creatine is boiled with baryta water it is said to yield two-thirds of its nitrogen as Urea. An attempt was made to utilize this reaction for the estimation of Creatine; but after many experiments under varied conditions of concentration, etc., the attempt had to be given up. Urea is itself converted into ammonia by boiling with baryta water, but the reaction seems to be incomplete under the conditions of my experiments.

Creatine reduces Fehling's solution without precipitating the copper; hence Pavy's modification alone is eligible. I have found that improvements in the usual way of working this method consists in (1) employing nitrogen instead of coal gas as a non-oxidizing atmosphere in the flask. The formation of copper acetylide is prevented; (2) using a vertical condenser on the boiling flask, whereby loss of ammonia is retarded; (3) causing the nitrogen supply to bubble through a strong solution of ammonia, thus compensating for the inevitable loss of ammonia, during the time of experiment. Nitrogen, containing no more than *one* per cent of oxygen can easily be prepared by burning phosphorus in air, under proper conditions; and this answers very well for Pavy-Fehling work.

The end point, on working with well crystallized creatine, is fairly sharp.

The following numbers were obtained with a solution of 0·239 grm. Creatine to 100 cc.—50 cc. Pavy-Fehling solution.

= (a) 27·8 cc. Creatine Solution.
(b) 27·2 cc. "
(c) 24·8 cc. "

The first two results give 50 cc Pavy-Fehling, equivalent to 0·0657 grm. Creatine. Interpreting results of work on certain samples by this factor, I obtained—

For *Vigoral*	9.54	per cent Creatine
" *Vimbos*	3·20	" "
" *Liebig's Extract* (Chicago)	8·50 (?)	" "

I put these numbers on record without attaching any importance to them as guides to the value of the samples used. The end reactions were very uncertain, and in the last case, particularly so. I have not thought it worth while to continue this investigation for the present. The numbers recorded do not seem to bear any intelligible relation to those obtained by other methods of working.

The samples were prepared for titration by treatment with basic lead acetate and separation of the excess of lead by hydrogen sulphide. Excess of sulphide was boiled off and the solution made ammoniacal.

Basic lead acetate does not completely precipitate peptones, hence the solutions used in titration contain these bodies, in addition to flesh-bases and flesh sugars, dextrose, levulose, inosite, etc. Since all of these bodies reduce Fehling solution, and some of them in a higher degree than creatine (E. G 50 cc. Pavy-Fehling = 0·025 grm. dextrose) it is evidently inadmissible to express the total reduction as due to creatine.

EXPLANATORY NOTE.

In the foregoing account of research work upon meat extracts it is inevitable that many, more or less technical, and therefore unfamiliar terms should have been used; and it seems desirable and proper to attempt a description, in simple language, of the processes of nutrition, with such incidental explanation of technicalities as may enable unprofessional readers to understand the value of the work done and the meaning of the results obtained.

Every vital action (or thought) is attended with destruction of muscle and nerve material. This waste must be made good by a corresponding process of repair; and both the material for repair and the energy (force) necessary to accomplish repair come from food. Substances used for food must supply the chemical elements which the tissues require. Muscle and nerve tissues contain carbon, hydrogen, oxygen, nitrogen and sulphur, with traces of other elements. Much of our food contains no nitrogen, *e. g.*, starches, sugar, fat, etc. Of foods that contain nitrogen the chief are lean beef, gluten of wheat, legumen of peas and beans, albumen of eggs and casein of cheese and milk. It is not enough, however, that a food-stuff should contain nitrogen. It is of prime importance that this nitrogen should be capable of absorption by the digestive system and of being assimilated or made use of in tissue building. The nitrogen present in peas and beans, in cheese, and even in gluten, is less easily available for tissue repair than that present in lean meat. Hence the desirability of meat as a part of our food; and the use of meat may become a necessity when the functional activity of the digestive organs is impaired by disease or otherwise.

The nitrogen in lean beef is present in combination with carbon, hydrogen, oxygen and sulphur, to form very complex compounds known as proteids. The proteids differ among themselves to an extent which is far from fully known, and it is therefore very difficult to frame a definition which shall fully and concisely describe them. For the purposes of this sketch they may be characterized as substances more or less like white of egg, glue, muscular fibre, etc., and containing about 16 per cent of nitrogen. Most of the proteids of beef are insoluble in water; and it is necessary that proteids become soluble before they can be assimilated, *i. e.*, made available for repair of tissue waste. Even that small portion of beef proteid matter which is soluble in cold water is mainly coagulated, and rendered insoluble when the water is heated.

The digestive system is provided at different parts of its course with secreting organs (glands) which produce ferments or peculiar substances capable of digesting, *i. e*, rendering soluble, these otherwise unavailable proteids. Thus, boiled white of egg is insoluble in water, but becomes readily soluble when treated with the gastric juice, a fluid secreted by glands in the stomach, and containing a ferment known as pepsin.

Muscle fibre, gluten of wheat, cheese, etc., become soluble under the same conditions, and thus available for nutrition. Other glands known as pancreatic, and still others generally known as intestinal, are situated along the course of the digestive canal, and aid in making food material soluble. When a proteid becomes soluble in this (or any other) way, the product is called a peptone. A proteid food, not fully converted into the peptone stage, is known as a proteose (or albumose).

Proteids may be converted into peptones (or proteoses) without taking them into the stomach. The peptonization may be effected by the aid of pepsin (obtained from the stomach of animals, generally pigs) or by various ferments, some of these having a vegetable origin, or by acids. It is evident that a nitrogenous food taken in the form of a peptone, has a nutritive value of a peculiar kind. It is already in a condition for absorption by the system, and makes the digestive functions unnecessary. Peptones are therefore very useful in certain diseases of the digestive organs.

When tissue wastes, it is, of course, necessary that the decayed matter should be got out of the system. Much of the carbon comes away by the lungs, as carbonic acid gas. The lungs also get rid of much of the hydrogen and oxygen as water vapour; and a great deal of water vapour is eliminated by the skin. The nitrogen is mainly excreted as urea in the urine. Urea contains nearly 47 per cent of its weight of nitrogen, whereas proteids contain only 16 per cent. When proteid tissue (muscle, nerve, etc.) are worn out, and their nitrogen takes the form of urea, a great deal of energy (force) is liberated, and, no doubt, this energy set free appears as what we call vital energy, or life force, or vitality. The change from proteid matter to urea is not, however, accomplished without intermediate stages. Compounds less complex than protein, but more complex than urea, are formed, and these are called, generally, flesh-bases; because, so far as we know anything of their intimate structure, they resemble the amidogen compounds known as alkaloids, which are widely distributed through the vegetable kingdom. Of these so-called flesh-bases, creatine may be taken as a type, since it exists in largest amount. Creatine contains 32·06 per cent of nitrogen.

It is evident that the flesh-bases cannot be called food stuff in the proper sense of that term. They represent a stage of the process by which complex nitrogen compounds are changed to simple ones, supplying the energy so set free to the animal organism in the form of vital force. They may still have some food value, since they are not excreted as such, but undergo further simplification, till they appear as urea. It is certain that their food value (if any) is very much less than that of proteids proper. When once the urea stage is reached, the urea must be promptly got rid of. A form of blood poisoning known as uræmia results when any obstruction to the elimination of urea occurs.

The blood is the vehicle by which nutritive matter, which has been digested and made soluble, is conveyed to all parts of the body: and it is also the vehicle by which waste matter is conveyed to the lungs and other excretory organs, to be got rid of. Flesh bases are always present in the blood, though in small amounts. They are much more largely present in muscle tissue; and when fresh, lean beef is treated with hot water, these flesh bases are the chief material taken into solution. Apart from any possible nutritive value which they have, these flesh bases undoubtedly possess a stimulant action on the system, analogous to that exhibited by the alkaloids of tea, coffee, cocoa, etc., and it is beyond question that to this stimulating effect, rather than to any true nutritive power, they owe their medical value.

If, however, the beef tissues have been peptonized before extraction by water, the peptone formed will be taken into solution, along with the flesh bases, and the extract so formed will possess a true food value. Some manufacturers claim to peptonize the material from which they prepare their extract. This peptonization is not usually effected by means of pepsin, which would be too costly, but by acids, mineral or organic, or by vegetable ferments, such as that present in pineapple juice.

Another way of introducing into the article, material, is to add finely ground true proteid "beef meal" to the extract proper. Of course, such proteid matter is insoluble, and requires to be digested in the stomach before it becomes available for the repair of tissue waste. It does not properly form a part of the real *extract*, but has been added to this, in order to furnish a food value, which the true extract is known not to possess. No special value can be claimed for the ground beef so added, over an equivalent weight of ordinary lean beef, except such as may accrue from the fact of its being in very fine powder, and thus more easily acted on by the digestive fluids of the stomach.

A. McGILL.

APPENDIX S.

BULLETIN No. 64—MILK—1899.

OTTAWA, May 3, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—I beg to submit to you the results of analysing a collection of milk samples made during January and February last in Montreal, St. Hyacinthe and Sherbrooke. These results are shown in Table I., appended to this report, in which the names of the various vendors are also given. Opposite each vendor's name will be found two lines of figures, the upper one showing the results reported by Dr. J. B. Edwards, public analyst, Montreal, and the lower line the figures obtained by Mr. A. L. Tourchot, assistant analyst in this laboratory. It will be observed that there is, in general, very close agreement between the figures of the two lines so far as regards total solids and butter-fat, and that Mr. Tourchot has added additional results regarding the quantities of lactose and casein present, as well as the degree of acidity shown by the various samples.

Mr. Tourchot ascribes considerable importance to these additional determinations, and has addressed to me a report which explains his views. This I have appended hereto and request that you will have the kindness to sanction its publication as well as that of my own remarks. I am of opinion that the additional estimations of lactose and casein, in the manner described by Mr. Tourchot, should, hereafter, be adopted in all cases of milk analysis, but I scarcely think that the determination of the acidity of herd samples can, under present circumstances, be of much practical value. It would be impossible to ascertain the time which elapses between the milking of the various samples and the testing for acidity, or so to regulate that interval as to have it the same in all cases, and, without this, a comparison of results becomes impossible. Nevertheless there may possibly occur cases in which abnormal acidity in a herd sample might justify a health officer in interdicting its sale, and, as Mr. Tourchot points out, when applied to the milk of single cows, the acidity test furnishes indications of great value. In order that individual dairymen, may, if so minded, derive some advantage from the acidity test, Mr. Tourchot's views are here placed on record.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

Results of the Examination of 29 Samples of Milk, collected in the Province of Quebec.

Date of Collection	No. of Sample.	Name and Address of Vendor.	Results of Analysis.								Analyst's Remarks.	No. of Sample.
			Specific Gravity.	Water.	Total Solids.	Butter Fat.	Lactose, &c. (soluble in water) after ether.	Casein, &c. (insoluble in water).	Acidity.			
									Cc $\frac{N}{10}$ soda required to neutralize 10 cc milk.	Lactic Acid ($C_3H_6O_3$) grammes in 100 cc.		
1899.		*Montreal.*		p. c.	p. c.	p. c.	p. c.	p. c.				
Jan. 13..	18758	R. W. Campbell, 34 St. George St	1·034	88·13	11·87	2·90	.....	.....	.....	.....	Adulterated under Act.....	18758
				88·27	11·73	2·98	...	....	.....	.....	Partly skimmed.	
" 13..	18759	E. Demers, 215 St. Charles St.....	1·033	87·90	12·10	3·48	.....	.....	.....	... .	Genuine and of good quality.....	18759
				87·97	12·03	3·48	....	....	... .	.....	Genuine.	
" 13..	18761	O. Jasmin, St. Laurent.....	1·035	88·30	11·70	2·60	...	.....	.....	.....	Below standard..... ...	18761
				88·68	11·32	2·57	....	...	.....	.....	Partly skimmed.	
" 13..	18762	L. G. Clapin & Co., 768 St. Lawrence St.	1·0270	82·23	17·77	9·53	.....	.....	.....	.....	Obtained in a store from stationary	18762
				82·28	17·72	9·79	...	....	.....	.....	Partly cream. [vessel.	
Feb. 1..	18790	" (a second sample from same depot)	1·0330	87·21	12·79	3·93	.....	.....	.....	.....	Genuine.....	18790
			1·0336	87·21	12·79	3·89	5·28	3·62	2·80	0·232	"	
Jan. 13..	18763	O. Chabot, 595B St. Lawrence	1·028	88·53	11·47	4·22	.....	...	.....	.. ..	Not adulterated..... .	18763
				88·76	11·24	4·22	....	.....	.....	...	Probably rich milk watered.	
" 13..	18764	N. Morin, 112 St. Maurice St.	1·0300	86·23	13·77	5·45	.....	....	.....	.....	Abnormal	18764
				85·20	14·80	7·00	.. .	.....	.....	.....	Partly cream.	
Feb. 2..	18791	" (a second sample from same vendor)	1·0333	86·94	13·06	4·19	.....	.....	.....	.....	Genuine	18791
			1·0331	86·80	13·20	4·14	5·08	3·98	1·70	0·153	"	
Jan. 18..	18765	R. H. Gordon, 17 Drummond St.....	1·0333	87·43	12·57	3·43	....	...	.....	.....	"	18765
			1·0330	87·58	12·42	3·68	4·89	3·85	1·15	0·108	"	
" 18..	18766	W. H. Griffith, 374 St. Antoine St ...	1·0324	87·45	12·55	3·61	....	....	.....	.....	"	18766
			1·0315	87·54	12·46	3·95	4·89	3·62	4·40	0·125	"	
" 18..	18767	M. Jasmin, St. Laurent	1·0295	89·02	10·98	2·70	.....	.....	.....	.....	Adulterated by addition of water ..	18067
			1·0295	89·19	10·81	3·01	4·43	3·37	1·20	0·108	Watered.	
" 18..	18768	John McWillis, St. Laurent	1·0333	87·30	12·70	3·68	.....	.....	.....	.....	Genuine.....	18768
			1·0335	87·53	12·47	3·82	4·87	3·78	1·30	0 117	"	
" 18..	18769	M. Haggerty, Côte St. Michel	1·0342	88·28	11 72	2 83	.....	.....	.....	.....	Adulteration doubtful	18769
			1·0333	88·40	11 60	3·04	4·95	3·61	1·80	0·162	Partly skimmed.	
" 18..	18770	D. Fraser, St. Laurent	1·0342	87·05	12·95	3 52	.....	.....	.....	.....	Genuine.....	18770
			1·0348	87·07	12·93	3·60	5·20	4·13	1·55	0·140	"	

			St. Hyacinthe, Que.										
"	25..	18772	Vital Lacoste, Bourdays St.	1·0312	85·74	14·26	5·14	..	....	.....	.....	Genuine and over average in cream.	18772
				1·0338	86·01	13·99	4·84	4·65	4·50	5·00	0·450	Genuine.	
"	25..	18773	Louis Currier, 31 Pascal St.	1·0331	87·61	21·39	3·60	..	....	.....	.....	"	18773
				1·0343	87·84	12·16	3·36	4·43	4·37	1·60	0·144	Under average in butter fat.	
"	25..	18774	P. Lascombe, Cascade St.	1·0336	86·72	13·28	4·28	.....	....	.....	.....	Genuine	18774
				1·0344	86·73	13·27	4·22	5·09	3·96	3·55	0·315	"	
"	25..	18775	Alphonse Deland, Cascade St.	1·0340	85·74	14·26	5·00	.....	....	.....	.....	Genuine and over average in cream.	18775
				1·0339	86·04	13·96	4·90	4·85	4·21	1·75	0·153	Genuine and rich.	
			Sherbrooke, Que.										
"	26..	18776	W. Hunt, Oxford St.	1·0314	87·01	12·99	4·25	.....	....	.....	.....	Genuine	18776
				1·0320	87·05	12·95	4·22	5·17	3·56	1·65	0·157	"	
"	26..	18777	J. W. Belton, Quebec St.	1·0325	86·13	13·87	4·60	...	....	.....	.....	Genuine and over average in fat	18777
				1·0342	86·12	13·88	4·54	4·51	4·83	1·50	0·136	Genuine and rich.	
"	26..	18778	W. S. Armitage, Ascot St.	1·0304	85·74	14·26	5·33	...	....	.....	.....	Genuine and over average in fat	18778
				1·0332	85·81	14·19	5·34	4·74	4·11	1·90	0·171	Genuine and rich.	
"	26..	18779	J. Lascombe, Oxford St.	1·0336	85·92	14·08	4·88	...	....	.....	.....	Genuine and over average in fat	18779
				1·0334	86·06	13·94	4·77	4·80	4·37	1·90	0·171	Genuine and rich.	
			Petite Côte, Que.										
"	30..	18780	Archie Drummond	1·0337	86·65	13·35	4·24	...	....	.....	.....	Genuine	18780
				1·0338	86·66	13·34	4·31	5·28	3·75	1·80	0·162	"	
"	30..	18781	Thos. Ramage	1·0347	87·55	12·45	3·13	.....	....	.....	.....	"	18781
				1·0347	87·47	12·53	3·16	5·36	4·01	1·60	0·144	Under average in butter-fat.	
			Montreal.										
"	30..	18782	A. Hannaford, 218 Coursol St.	1·0342	87·46	12·54	3·16	.....	....	.....	.....	Genuine	18782
				1·0347	87·45	12·55	3·07	5·18	4·30	1·90	0·171	Under average in butter-fat.	
"	30..	18783	Louis Leblanc, 532 St. Hypolite St.	1·0344	87·80	12·20	3·17	.....	....	.....	.....	Genuine	18783
				1·0347	87·57	12·43	3·24	5·47	3·72	1·75	0·157	Under average in butter-fat.	
"	30..	18784	John Stewart, 354 Charlevoix St.	1·0344	87·71	12·29	3·39	.....	....	.....	.....	Genuine	18784
				1·0347	87·62	12·38	3·49	5·34	3·55	1·60	0·144	"	
"	30..	18785	P. Skelly, Côte St. Louis.	1·0306	86·77	13·23	4·68	.....	....	.....	.....	"	18785
				1·0308	86·82	13·18	4·75	4·73	3·70	1·65	0·157	"	
"	30..	18789	Thos. Hannah, Côte St. Laurent.	1·0326	88·08	11·92	3·19	.....	....	.....	.....	"	18789
				1 0325	88·07	11·93	3·29	5·56	3·08	1·55	0·139	Under average in butter-fat.	

OTTAWA, May 3, 1899.

THOMAS MACFARLANE, Esq.,
Chief Analyst, Inland Revenue Department.

DEAR SIR,—In the course of examining certain samples of milk, collected in the province of Quebec in January and February last, it occurred to me that an estimation of the lactose and albuminoids contained in them might readily be made merely by lixiviating with water, at room temperature, the residues contained in the milk tubes after the petroleum ether treatment, and then drying and weighing. The results obtained in thus treating the samples above mentioned have been reported to you, but I have further to mention the results of special lixiviations made at your request with water, at higher temperature on the residues from samples obtained by myself in the neighbourhood of Ottawa. Six trials were made of three different samples with the result shown in the following table (I.):—

TABLE I.

No. of Sample.	Trial.	Total Solids.	Loss by Petroleum Ether. — Butter-fat	Loss to Cold Water after Petr. Ether. — Lactose, &c.	Loss to Water of 60° C. after Petr. Ether. — Lactose, &c.	Loss to Water of 90° C. after Petr. Ether. — Lactose, &c.	Insoluble Residue. — Casein, &c.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
I.	1	10·46	2·35	5·50			2·61
	2	10·53	2·36	5·57			2·63
	3	10·51	2·37		5·39		2·80
	4	10·55	2·35		5·32		2 88
	5	10·54	2·33			5.52	2·69
	6	10·55	2·37			5·56	2·60
II.	1	11·67	3·56	5·13			2·98
	2	11·77	3·53	5·21			3·03
	3	11·70	3·53		4·89		3·28
	4	11·60	3·53		4·95		3·15
	5	11·74	3·58			5·04	3·12
	6	11·75	3·59			5·08	3 08
III.	1	15·80	5·29	5·08			5·43
	2	15·78	5·36	4·94			5·48
	3	15·82	5·30		4·75		5·77
	4	15·77	5·31		4·73		5·73
	5	15·74	5.30			4·62	5·82
	6	15·76	5·33			4·78	5·65

From these figures it would appear that cold water is capable of removing more soluble matter from the non-fatty solids than water at higher temperatures. The explanation of this may possibly be that a small quantity of albumen is removed by the cold water which is coagulated by the same solvent at higher temperatures. These are points deserving further investigation, which should be extended to the ash of the milk in order to ascertain its behaviour during the lixiviation. Meanwhile and until such investigations are concluded, I would recommend the use of water at ordirary temperatures, and regard, provisionally, the loss sustained as lactose with albumen (lactose, &c.) and the residue as casein and ash (casein, &c.)

However important the percentage composition of milk may be from a commercial point of view or that of sophistication, it does not appear to me that the examination should be limited to an analysis. The organoleptic properties of milk are of equal importance when considered with regard to the public health, and such authorities as Fremy, Vieth, Chevallier, Baudimont, Wurtz and others insist upon the necessity of an examination as regards odour, colour, taste and consistency.

The determination of acidity appears also to be worthy of greater attention than it generally receives, and this too from a sanitary point of view. According to German and Danish authorities milk is said to have amphoteric reaction, on account of it reddening blue litmus paper and turning red litmus paper blue. This only shows that litmus is not a proper indicator for milk and far inferior to phenolphthalein. Other authorities such as Heret, Marchand, Peligot and Chesnel agree in maintaining that milk has an acid reaction. Marchand places the mean of acidity at 0·184 per cent lactic acid. In order to ascertain the average acidity of fresh milk, I have examined a number of samples of known origin and give the results in the following table (II.):—

TABLE II.

Date of collection.	From whom obtained.	Age of sample.	Acidity.		Remarks.
			$\frac{N}{10}$ soda required to neutralize 10 cc milk.	Lactic Acid, grammes in 100 cc.	
1898.		Hours.			
Oct. 21.	John D. Anderson, Hurdman's Bdg.	7	1·50	0·135	Nothing particular was observed in these milks with regard to their colour, taste and odour. They all possessed the organoleptic properties of good milk. Some of the samples were produced from cows fed on pasture and others from cows wholly fed in the stable.
" 22.	"	7	1·45	0·133	
" 24.	"	7	1·55	0·140	
Nov. 7.	"	6½	1·50	0·135	
Oct. 22.	F. Auclair	6½	1·50	0·135	
" 23.	"	30	1·80	0·162	
" 22.	Mme. Martin	7	1·50	0·135	
" 22.	Mr. Nelson	7	1·45	0·131	
" 25.	Mr. Mulligan	7	1·50	0·135	
" 24.	Geo. Heron	over 7	1·70	0·153	
" 24.	Mme. Martin	7	1·60	0·144	
" 22.	Mme. Leveillé	7	1·30	0·117	
" 24.	"	over 7	1·60	0·142	
" 25.	"	7	1·50	0·135	

It will be seen that the acidity in these milks is fairly constant, 10 cc. of milk requiring from 1·4 to 1·6 cc. of decinormal soda for neutralization. This applies when no more than 12 hours have elapsed from the time of milking to the time of testing.

A number of street samples collected in Ottawa gave the results detailed in the following Table III. :—

TABLE III.

Date of Collection	No. of Sample.	From whom obtained.	Specific Gravity at 15 p.c.	Analysis.					Acidity.		Colour.	Odour.	Remarks.
				Total Solids.	Water.	Butter Fat.	Lactose, &c.	Casein, &c.	cc. $\frac{N}{10}$ Soda required to neutralize 10 cc. milk	Lactic Acid, Gr'mes in 100 cc.			
1898.				p. c.	p. c.	p. c.	p. c.	p. c.					
Dec. 5..	1	Mather, Ottawa	1·0332	12·06	87·94	3·30	8·76		1·40	0·126	White....	Good.....	Normal.
" 5..	2	Veith "	1·0303	11·59	88·41	3·54	8·05		0·90	0·081	Yellowish	"	Watered.
" 5..	3	W. Henry "	1·0332	12·91	87·09	4·04	8·87		1·40	0·126	.....	Ordinary..	Normal.
" 5..	4	J. H. Graham "	1·0333	12·74	87·26	3·95	5·69	3·10	1·30	0·117	Yellowish	Good.....	Doubtful.
" 5..	5	Honeywell "	1·0333	12·48	87·52	3·64	5·28	3·56	1·25	0·112	.....	"	Probably watered.
" 5..	6	Jas. Heron "	1·0332	12·16	87·81	3·68	5·55	2·96	1·20	0·108	....	"	"
" 6..	7	T. Shillington "	1·0333	12·74	87·26	3·97	8·77		1·40	0·126	.....	"	Normal.
" 6..	8	E. W. Clark "	1·0333	13·58	86·42	4·50	9·08		1·60	0·144	....	"	"
" 6..	9	W. Graham "	1·0334	13·50	85·60	4·10	9·40		1·40	0·126	.... ..	"	"
" 6..	10	J. A. Heron "	1·0314	13·00	87·00	4·20	8·80		1·30	0·117	....	"	"
" 6..	11	Benedict, Hull	1·0317	12·97	87·03	4·50	8·47		1·43	0·129	....	"	"
" 6..	12	Clark, Woodruff Dairy	1·0332	12·56	87·44	3·62	8·94		1·30	0·117	.....	"	Doubtful.
" 7..	13	W. Duff, Ottawa	1·0338	14·81	85·82	4·82	5·84	3·52	1·30	0·117	.....	Ordinary..	Abnormal.
" 7..	14	W. Bennett "	1·0261	16·68	83·32	9·70	4·95	2·03	1·20	0·108	....	Good.....	"
" 7..	15	Unknown.	1·0326	12·91	87·09	4·16	8·75		1·20	0·108	....	"	"
" 12..	16	"	1·0331	12·47	87·53	3·66	8·81		2·10	0·189	.....	Bad.....	Unfit for use.
" 12..	17	"	1·0321	12·83	87·17	3·86	8·96		1·40	0·126	.....	Ordinary..	Normal.
" 12..	18	"	1·0310	12·79	87·21	4·05	8·74		2·00	0·180	.. . .	" ..	Unfit for use.

The remarks contained in the foregoing table are largely based on the test for acidity, the normal quantity being placed at 0·126 to 0·144 per cent lactic acid. A weaker acidity indicates watering, or a milk consisting partly of cream. A greater acidity than the foregoing figures may be caused by the milks being too old or unclean or having been derived from freshly calved cows.

With regard to milk from the latter source my observations tend to show that it possesses a higher acidity than ordinary milk (sometimes reaching 1·8 cc. $\frac{N}{10}$ soda, for cc. milk), and that this high acidity continues for two weeks after calving, such milk still retaining its peculiar odour. Moreover it does not curdle as easily as ordinary milk, nor its acidity increase so rapidly. Further, it purifies more readily, and these phenomena I ascribe to the relatively small quantity of lactose which milk from a newly calved cow contains. The following table IV. contains the results of examining a number of samples of newly calved cows, principally belonging to the herd of Mr. J. D. Anderson. In this table there have also been inserted the particulars regarding two samples of milk from cows which had calved 8 or 10 months previously. In the same table will be found a comparison between samples from cows milked in the evening and the morning.

TABLE

Date of Collection.	When Milked.	From whom obtained.	Designation of Cow.	Days elapsed since Calving.	Sp. Gr. at 15° C.	Total Solids.	Water.
1898.						p. c.	p. c.
Nov. 5..	.....	Experimental Farm, Ottawa	A	3	1·0359	13·10	86 90
Dec. 1..	.....	J. D. Anderson	B	2	1·0368	12·22	87·78
" 9..	.....	"	B^1	11	1·0355	12·06	87·94
" 22..	Evening....	"	B^2	24	1·0327	11·94	88·06
1899.							
Jan. 18..	Morning ...	"	B^3	50	1·0329	10·54	89·46
Feb. 7..	Evening....	"	B^4	70	1·0320	12·01	87·99
" 8..	Morning ...	"	B^5	70	1·0323	10·85	89·15
1898.							
Dec. 1..	.....	"	C (Ayrshire)..	14	1·0368	13·31	86·69
" 9..	.....	"	C^1 " ..	23	1·0328	12·06	87·94
" 22..	Evening....	"	C^2 " ..	36	1·0327	13·10	86·90
1899.							
Jan. 18..	Morning ...	"	C^3 " ..	62	1·0321	11·71	88·29
Feb. 7..	Evening ...	"	C^4 " ..	82	1·0316	12·85	87·15
" 8..	Morning ...	"	C^5 " ..	82	1·0308	12·16	87·84
Jan. 23..	.....	H. Mather.....	D	7	.....	15·02	84·98
Feb. 24..	.....	B. Rothwell	E.....	10	1·0330	12·26	87·74
1898.							
Dec. 15.	.....	Mme E. Wolfe.....	I	4	1·0360	13·39	86·61
" 15..	.....	"	II	7	1·0358	15·07	84·93
" 22..	Evening....	J. D. Anderson	A III. Jersey.	about 8 months	1·0347	13·78	86·22
1899.							
Jan. 18..	.....	"	B III. " .	"	1·0365	15·76	84·24
.....	Evening...	"	No. I	.....	1·0327	11·94	88·06
					1·0320	12·01	87·99
.....	Morning ...	"	No. I	.....	1·0335	10·52	89·48
					1·0323	10·85	89·15
.....	Evening....	"	No. II..	.....	1·0327	13·10	86·90
					1·0310	12·85	87·15
.....	Morning ...	"	No. II.....	.....	.....	11·71	88·29
					.....	12·16	87·84

IV.

Analysis.			Acidity.				
Butter Fat.	Lactose, &c.	Casein, &c.	cc. $\frac{N}{10}$ Soda to 10 cc Milk.	Lactic Acid. — Grammes in 100 cc.	Colour.	Odour.	Remarks.
p. c.	p. c.	p. c.					
3·34	4·68	5·08	2·20	0·198	Good	Characteristic.	
5·32	3·80	3·10	2·30	0·207	"	"	
2·74	5·48	3·84	1·80	0·162	"	Weak	
3·28	5·42	3·24	1·80	0·162	"	Special	24 days after calving the acidity is still above that of normal milk. Becomes normal 48 days after calving. Evening milk is the richest.
2·35	5·46	2·73	1·40	0·126	"	Good	
3·52	5·30	3·19	1·43	0·130	"	Normal	
2·42	5·33	3·10	1·45	0·131	"	"	
5·15	3·80	4·36	1·60	0·144	"	Weak	
3·60	5·22	3·24	1·50	0·131	"	Ordinary	
4·45	5·45	3·20	1·50	0·131	"	"	Acidity becomes normal 14 days after milking. In this case also the richest milk seems to be produced at evening milking.
3·55	5·06	3·10	1·45	0·129	"	Good	
4·23	5·22	3·40	1·45	0·131	"	Normal	
3·81	5·19	3·16	1·47	0·132	"	"	
6·24	5·32	3·46	1·80	0·162	"	Characteristic.	
3·32	5·14	3·80	1·90	0·172	"	"	Forcibly cleaned.
3·42	5·32	4·65	1·60	0·144	Ordinary	"	Cows thin and badly fed.
4·98	5·04	5·76	1·50	0·135	"	"	
3·90	5·45	4·43	1·95	0·178	Yellowish.	Good	
5·31	4·74	5·71	1·50	0·136	"	"	
3·28	5·42	3·24	1·50	0·136			
3·52	5·30	3·19	1·43	0·130			
2·35	5·46	2·71	1·40	0·126			The evening milk is richer than that of the morning. The acidity is very little affected.
2·42	5·33	3·10	1·45	0·131			
4·45	5·45	3·20	1·50	0·136			
4·23	5·22	3·40	1·45	0·131			
3·55	5·06	3·10	1·45	0·131			
3·81	5·19	3·16	1·45	0·131			

In conclusion, I have to report that I made a few experiments to ascertain the effect produced on the acidity of certain samples of milk by the introduction of water, with the following results :—

Date of Collection.	From whom obtained.	cc. $\frac{N}{10}$ Soda Require to Neutralize 10 cc. of					
		Original Sample.	Mixture of 1 Vol. Milk and 1 Vol. Water.	Mixture of 1 Vol. Milk and 2 Vols. Water.	Mixture of 1 Vol. Milk and 3 Vols. Water.	Mixture of 1 Vol. Milk and 4 Vols. Water.	Mixture of 1 Vol. Milk and 5 Vols. Water.
1898.							
Oct. 22.	Mme. Martin.....	1·50	0·75	.....	.....	.....	.....
" 22.	J. D. Anderson.....	1·50	0·73	0·48	.....	.....	.....
" 24.	"	1·60	0·78	0·48	0·40	.....	.....
Nov. 7.	"	1·50	0·78	0·48	0·40	0·30	0·24

From these figures it is plain that the decrease in acidity is in proportion to the amount of added water. Some of the foregoing figures were obtained by the use of centinormal soda.

From the results which have been given in the foregoing report, it appears to me that the importance of ascertaining the acidity of milk will be very evident. In the first place, it shows whether the sample offered for sale is in a normal condition and possesses a proper food value. If its acidity when sold exceeds a certain degree, say 1·7 cc. $\frac{N}{10}$ soda to 10 cc. milk, in summer when the cows are on pasture, and 1·6 when being stall-fed, it should be rejected as unfit for food. This may be caused by the milks being too old, the cattle being badly cared for, the use of unclean vessels, or the presence in the producing herd, of a cow which has calved within the preceding three weeks. If, on the other hand, the acidity falls below 1·2 in winter and 1·4 in summer, it is an indication of a fraudulent addition of water or of the presence of an unhealthy cow in the herd, which of course renders the milk unfit for food. These figures are the mean of my personal observation for this country. It might be well to extend the experiments to a larger number of samples to ascertain whether there are any variations for the different seasons or different provinces before attempting to fix a standard. Many dairy men in France take the acidity of milk in order to ascertain the proper time for skimming; a milk that is too acid, furnishes a poor cream, which will only make bad butter. In several parts of France, in the east particularly, intelligent cheese makers apply the acidity test in the manufacture of Gruyere cheese. For these reasons I am of the opinion that the acidity of milk is a very valuable indicator. Its determination is a very simple operation which any intelligent person could very easily perform.

I have the honour to be, sir,

Your obedient servant,

A. L. TOURCHOT.

APPENDIX T

BULLETIN No. 65—FERTILIZERS—1899.

OTTAWA, June 13, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—In the year 1898 two bulletins on fertilizers were published by the Inland Revenue Department, being No. 55, Fertilizers, dated March 7, 1898, and No. 56, Fertilizers as sold, dated April 25, 1898. The present report, which is presented at a later date, is intended to be the only one addressed to you for publication during the present year, and will contain all the information formerly given in two reports. It may be necessary and useful here to record the reasons which were placed before you, and which caused you to decide in favour of this change in the time and manner of publication. It was represented by many of the Canadian manufacturers of fertilizers that it was next to impossible for them to supply their standard samples out of actual stock previous to the end of January in each year, and that the time should be extended at least one month. To do this meant that the bulletin could not possibly be issued before the beginning of May, and, consequently not until after the farmers had made their purchases of fertilizers. It was contended that this would be no disadvantage to the farmers because they, for the most part did not receive the new bulletin early enough, and some of them were content to make their purchases after reference to the bulletin of the previous year. It was further maintained that the publication of an early bulletin encouraged, an illegitimate use which was said to be made of it by certain manufacturers, and which consisted in using the results of the analysis of the standard samples as a means of advertising their goods. It was held that the standard samples might not fairly represent the stock, and might possibly deceive the purchaser, who would be unable to compare the analysis with those of the "fertilizers as sold" until too late.

It was principally for these reasons, I believe, that you came to the decision to publish the matter of the two bulletins simultaneously, in the month of June each year, and to cause them to be distributed in the summer and fall. It was supposed that those parties interested would have time to peruse and study them during the winter, note those brands whose analysis of samples sold in the open market corresponded closed, with the analysis of the standard samples, and thus become fully posted and prepared to make their purchases in the following spring.

The number of standard samples which, in accordance with the requirements of the Fertilizers Act, have to be sent into the department is continually on the increase. The numbers analysed :—

For	1897 was	108
"	1898 "	124
"	1899 "	154

At the beginning of the present year, a special circular (G 545) was issued to manufacturers requesting them to be careful in furnishing the statement required by law as

regards the nature of the materials which enter into the composition of the fertilizer, and also to see that the precise results of analysis are given. They were also informed that "should two percentages be stated as regards the contents of any one of the fertilizing constituents, the lowest percentage will always be taken as representing the guarantee of the manufacturer or vendor." Nevertheless, omissions were made in many instances to state the nature of the materials, and also in furnishing the exact particulars which "a certificate of analysis" calls for. Possibly in some of these cases the results may be that a lower relative value is attached to them than would have been the case if the manufacturer had seen fit to make the declaration in question. The standard samples are given in Table I. attached to this report, and it will be observed that as a rule two lines of figures are given opposite the description of each sample; the upper line gives the quantities of fertilizing constituents guaranteed by the manufacturers, and the lower line the results of the analysis in this branch. The fourth column in the table states the materials from which the different fertilizers were manufactured, in all cases where the information has been supplied. The column headed "Relative value per ton of 2,000 pounds," gives the value of each fertilizer based upon the following prices for the constituents :—

	Cents per pound.
Nitrogen in salts of ammonia or nitrates	13
Organic nitrogen in ground bone, fish, blood or tankage	12
Phosphoric acid, soluble in water	6
" soluble in ammonium citrate	5½
" insoluble in ground bone or tankage	5
" insoluble in Thomas's phosphate powder	3½
" in ground rock phosphate	1½
Potash contained in wood ashes	6
" in high grade potash salts	5¼

Since it is impossible in chemical analysis to distinguish between insoluble phosphoric acid from apatite or rock phosphate and that from bone, the declaration of the manufacturer, as regards the material used, is accepted and the calculation based upon it. This declaration also affects the percentage stated in the column headed "Phosphoric acid available," the insoluble phosphoric acid from apatite not being reckoned as "available." Neither can the insoluble phosphoric acid, regarding the source of which no declaration has been made, be regarded as available. It may be remarked as regards the relative values that these figures afford no indication of the prices at which the goods ought to be sold, because, among other reasons, no regard has been paid to the cost of manufacturing or mixing.

The Fertilizers Act contains a provision that, at least every year, samples shall be taken of all fertilizers offered for sale in the Dominion. This has been done during the present year, and the samples have been analysed with the results published in Table II. of this report, in such a manner as to enable them to be compared with the manufacturer's guarantee, and with the figures obtained in analysing the standard samples. Opposite the name and description of each fertilizer there will be found, in three separate lines, (1) the contents guaranteed by the manufacturer, (2) the percentages of fertilizing ingredients contained in the standard sample submitted to the department by the manufacturer or vendor, (3) the same percentages as contained in the sample collected. In cases where no standard samples has been submitted, and nevertheless, in contravention of the provisions of the Fertilizers Act, the fertilizer has been offered for sale, the first and second lines will of course show no figures. Of the 96 samples described in Table II. seven are unregistered, no standard sample of the brands which they represent having been submitted to the department. I have on former occasions called your attention to this illegal sale of fertilizers and recommended the institution of legal proceedings against the offenders. Particulars are also given in Table II. as regards the samples which have been challenged by the district analysts, the analyses of which show deficiencies in their fertilizing constituents.

I have appended to the tables certain "Memoranda on Manures" which have been found useful in former bulletins, and to which it is desired to give as wide a circulation as possible. I respectfully recommend them as well as this report for publication.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
887	Pacific Guano Co., Boston, Mass.	Huestis & Mills, Sussex, N.B.		Soluble Pacific Guano— Guaranteed..... Found.....
888	M. J. Lewis, Central Onslow, N.S.	Manufacturer.....		Bone Meal— Guaranteed..... Found.....
888½	H. B. Marcille, Thorold.	do		Fertilizer— Guaranteed ..... Found.....
889	H. F. Tucker & Co., State St., Boston, Mass.	do		Tucker's Imperial Superphosphate— Guaranteed..... Found.....
890	Crocker Fertilizer and Chemical Co., Buffalo, N.Y.	do		Crocker's Ground Bone Meal— Guaranteed..... Found.....
891	Pickhardt Renfrew Co., Stouffville, Ont.	do		Persiatic Plant Food, Exhibit "A" Guaranteed..... Found.....
892	Ingersoll Packing Co., Ingersoll, Ont.	do	Blood, tankage and bone from the hog.	Ingersoll Fertilizer— Guaranteed..... Found.....
893	Bradley Fertilizer Co., Boston, Mass.	do		Bradley's X L Superphosphate— Guaranteed..... Found.....
894	do ..	do		Bradley's Eclipse Phosphate for all Crops— Guaranteed..... Found.....
895	do .	do		Bradley's Potato Fertilizer— Guaranteed..... Found.....
896	do ..	do		B. D. Seafowl Guano— Guaranteed..... Found.....
897	do ..	do		Farmers' New Method Fertilizer Guaranteed..... Found.....
898	do ..	do		Bradley's Ammoniated Dissolved Bone— Guaranteed..... Found.....
899	do ..	do		Bradley's Dissolved Bone with Potash— Guaranteed..... Found.....
900	do ..	do		Bradley's Niagara Phosphate— Guaranteed..... Found.....
901	do ..	do		Bradley's Fruit and Vine Fertilizer— Guaranteed ..... Found.....
902	do ..	do		Bradley's Complete Manure for Potatoes and Vegetables— Guaranteed..... Found.....

of Commercial Fertilizers registered for 1899.

Results of Analysis.									Relative value per ton of 2,000 lbs.	Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.		
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p, c.	p. c.	p. c.	$ cts.	
2·25	2·75	7·00	1·50	2·00	10·50	8·50	2·00	15·00	18 15	887
1·78	2·81	5·12	3·20	3·20	11·52	8·32	2·28	15·34	17 28	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	888
3·94	4·79	0·45	3·07	17·11	20·63	20·63	Traces.	9·24	30 48	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	888½
1·65	2·01	0·77	0·57	3·97	5·31	1·34	1·51	3·18	8 29	
1·03	1·25	7·00	1·00	1·00	9·00	8·00	2·15	....	14 55	889
1·37	1·66	6·23	2·09	1·91	10.23	8·32	2·21	15·85	15 96	
2·00	2·50	.....	.....	.....	26·00	.....	.....	.....	.....	890
2·47	2·98	.....	7·97	21·61	29·58	29·58	.....	2·50	36 31	
3·01	3·66	.....	.....	.....	2·01	.....	1·10	.....	.....	891
2·27	2·75	.....	0·38	0·51	0·89	0·38	0·25	2·19	6 28	
.....	7·00	.....	.....	.....	8·00	.....	.....	.....	.....	892
7·77	9·41	0·64	4·74	6·65	12·03	12·03	0·38	1·17	31 68	
2·07	2·50	8·00	.....	.....	10·00	.....	1·00	.....	.....	893
2·58	3·12	6·08	1·86	2·68	10·62	7·94	1·43	1·12	17 84	
1·00	1·25	8·00	2·00	2·00	12·00	10·00	1·50	.....	16 38	894
1·29	1·56	7·99	1·99	2·30	12·28	9·98	1·70	1·24	17 36	
2·06	2·50	6·00	3·00	2·00	11·00	9·00	3·25	....	18 25	895
2·24	2·72	6·71	1·73	2·18	10·62	8·44	3·90	1·19	20 08	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	16 42	896
2·66	3·23	6·15	1·79	2·68	10·62	7·94	2·16	1·03	18 80	
0·82	1·00	5·00	3·00	2·00	10·00	8·00	2·15	.....	14 13	897
1·62	1·96	6·07	2·50	2·05	10·62	8·57	2·37	1 20	17 02	
1·65	2·00	5·00	2·00	1·00	8·00	7·00	1·00	....	14 21	898
2·24	2·72	5·91	2·28	2·43	10·62	8·19	1·50	1·27	18 98	
0·82	1·00	5·00	3·00	2·00	10·00	8·00	2·15	.....	15 53	899
1·88	2·28	5·75	2·32	2·68	10·75	8·07	2·76	1·27	19 59	
0·82	1·00	5·00	2·00	1·00	8·00	7·00	1·08	.....	11 60	900
1·38	1·67	3·83	3·33	3.20	10·36	7.16	2·14	0·96	14 78	
2·06	2·50	4·00	3·00	3·00	10·00	7·00	5·40	.....	19 61	901
2·22	2·69	4·80	8·32	1·27	14·39	13·12	5·65	10·64	26 53	
3·30	4·00	6·00	2·00	1·00	9·00	8·00	7·00	.....	24 97	902
3·47	4·22	7·20	.....	2·39	9·59	7·20	8·10	10·16	26 19	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
903	Bradley Fertilizer Co., Boston, Mass.	Manufacturer		Bradley's Complete Manure for Corn and Grain— Guaranteed Found
904	do	do		Bradley's Complete Manure for top-dressing Grass and Grain— Guaranteed Found
905	do	do		Bradley's Complete Manure with 10 p.c. Potash— Guaranteed Found
906	E. Frank Coe Co., 133 Front St., New York.	do	Dried blood, meat, fish guano, bone, phosphatic guanos, potashes and oil of vitriol.	E. Frank Coe's High Grade Potato Fertilizer— Guaranteed Found
907	do	do		E. Frank Coe's High Grade Ammoniated Bone Superphosphate Guaranteed Found
908	do	do		E. Frank Coe's Standard Grade Ammoniated Bone Superphosphate— Guaranteed Found
909	do	do		E. Frank Coe's Columbian Potato Fertilizer— Guaranteed Found
910	do	do		E. Frank Coe's Special Grass and Grain Fertilizer— Guaranteed Found
911	Wm. Davis & Co., Ltd., Toronto.	do	Dried blood, bones and tankage.	"Exhibit" A— Guaranteed Found
912	Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	do		Bowker's Ground Bone— Guaranteed Found
913	do	do		Bowker's Ground Bone— Guaranteed Found
914	do	do	Bone, bone black, phosphatic guano, bone phosphates, dried blood, meat or fish, sulphate of ammonia or nitrate of soda, sulphate of potash or muriate of potash and sulphuric acid.	Bowker's Vermont Fertilizer— Guaranteed Found
915	do	do		Bowker's Square Brand Bone and Potash Fertilizer— Guaranteed Found
916	do	do		Bowker's Farm and Garden Fertilizer— Guaranteed Found
917	do	do		Bowker's Potato and Vegetable Fertilizer— Guaranteed Found

of Commercial Fertilizers registered for 1899 —*Continued.*

Result of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
3·30	4·00	4·00	8·00	....	13·00	12·00	3·00	.....	24 67	903
3·29	3·99	5·43	9·13	1·91	16·47	14·56	3·78	9·56	28 99	
4·95	6·00	4·00	1·00	1·00	6·00	5·00	2·50	.....	20 70	904
4·34	5·27	4·48	2·25	1·90	8·63	6·73	3·60	11·08	22 62	
3·30	4·00	4·00	2·00	1·00	7·00	6·00	10·00	..	25 72	905
2·81	3·41	4·64	1·44	1·28	7·36	6·08	11·19	9·04	26 02	
2·40	3 00	6·00	1·00	2·00	9·00	7·00	6·50	.....	22 18	906
2·49	3·03	6·56	2·07	1·92	10·55	8·63	7·24	9·98	24 98	
1·85	2·25	7·00	2·00	2·00	11·00	9·00	2·25	.....	18 70	907
2·28	2·77	7·52	3·20	1·91	12·63	10·72	4·24	9·88	23 70	
1·20	1·50	7·00	1·50	1·50	10·00	8·50	2·25	.....	16 26	908
2·07	2·51	7·03	1·35	2·43	10·81	8·38	5·62	7·55	22 37	
1·20	1·50	6·50	2·00	1·50	10·00	8·50	2·50	.....	16 49	909
1·43	1·73	6·46	1·23	3·19	10·88	7·69	3·59	8·85	18 38	
0·80	1·00	6·50	2·00	2·00	10·50	8·50	1·50	.....	14 80	910
1·09	1·33	8·12	1·48	3·19	12·79	9·60	1·89	10·80	18 05	
8·4	10·20	0·20	6·69	3·30	10·19	6·89	0·47	8·83	31 55	911
7·72	9·37	0·48	7·35	4·48	12·31	7·83	0·42	8·32	32 12	
....	3·00	....	....	....	18·00	....	....	....	....	912
3·02	3·66	0·44	6·28	19·12	25·84	25·84	.....	3·95	33 80	
....	2·00	....	....	....	16·00	....	....	....	....	913
1·88	2·28	0·44	4·42	21·11	25·97	25·97	.....	2·70	31 01	
....	2.50	8·00	....	....	10·00	8·00	3·00	.....	....	914
2·52	3·06	6·97	2·18	1·47	1· ·62	9·15	4·10	14·40	22 07	
....	2·00	6 00	....	....	12·00	6·00	2·00	.....	.....	915
2·18	2·65	5·44	4 16	4·09	13·69	9·60	3·01	10·10	22 16	
....	2·00	8·00	....	....	10·00	8·00	2·00	.....	.....	916
2·11	2·56	6·62	2·21	1·92	10·75	8·83	2·53	14·75	19 34	
....	2·00	9·00	. .....	....	11·00	9·00	4·00	....	.....	917
2·40	2·92	7·67	2·06	1 92	11·65	9·73	4·80	14·65	24 19	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
918	Great Eastern Fertilizer Co., Rutland, Vt., U.S.A.	Manufacturer		Bowker's Potash Bone Fertilizer Guaranteed Found
919	do	do		Stockbridge Potato and Vegetable Fertilizer— Guaranteed Found
920	Bradley Fertilizer Co., Boston, Mass.	do		Bradley's Fine Ground Bone— Guaranteed Found
921	do	do		Dissolved Bone, Justice Brand— Guaranteed Found
922	do	do		Bradley's Nova Scotia Ground Bone— Guaranteed Found
923	Laing Packing and Provision Co., Montreal.	do		Tankage— Guaranteed Found
924	The Standard Fertilizer & Chemical Co, Smith's Falls, Ont.	do	Apatite	Superphosphate of Lime— Guaranteed Found
925	do	do	Nitrate of soda, sulphate of ammonia, potash and magnesia salts, mineral, superphosphate, bone char and fine bone meal.	Special Fertilizer— Guaranteed Found
926	do	do		No. 1 Fertilizer— Guaranteed Found
927	do	do		Fruit Tree Fertilizer— Guaranteed Found
928	do	do		Standard Fertilizer— Guaranteed Found
929	do	do		Corn and Grass Fertilizer— Guaranteed Found
930	do	do		Bone Meal— Guaranteed Found
931	do	do		Nitrate of Soda— Guaranteed Found
932	Great Eastern Fertilizer Co., Rutland, Vt., U.S.A.	do		Great Eastern Dissolved Bone Fertilizer— Guaranteed Found
933	do	do		Great Eastern Grass and Oats Fertilizer— Guaranteed Found
934	do	do		Great Eastern Northern Corn Special Fertilizer— Guaranteed Found

of Commercial Fertilizers registered for 1899—*Continued.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
.....	2·00	5·00	.....	.....	7·00	5·00	2·00	.....	.....	918
1·67	2·02	5·05	1·10	1·79	7·94	6·15	3·03	10·65	15 64	
.....	4·00	6·00	.....	.....	7·00	6·00	10·00	.....	.....	919
3·71	4·50	5·52	0·88	0 64	7·04	6·40	11·89	13·25	29 38	
2·50	3·00	.....	.....	.....	21·00	.....	.....	.....	.....	920
4·24	5·15	0·32	7·09	16·15	23·56	23·56	.....	6·86	34 51	
.....	.....	10·00	.....	1·00	13·00	12·00	.....	.....	.....	921
0·17	0·21	12·15	2·25	1·11	15·51	14·40	.....	11·00	18 57	
2·50	3·00	.....	.....	.....	21·00	.....	.....	.....	.....	922
3·49	4·24	0·38	8·77	13·05	22·20	22·20	.....	6·65	31 49	
4·12	5·00	.....	.....	.....	14·71	.....	.....	5·52	.....	923
3·90	4·74	0·44	9·41	10·49	20·34	20·34	0·31	6·65	31 06	
.....	.....	.....	.....	.....	16·00	13·00	.....	.....	.....	924
.....	.....	9·60	0·90	4·60	15·10	10·50	.....	16·35	13 89	
.....	3·50	8·00	.....	.....	10·00	.....	6 00	.....	.....	925
3·52	4·27	6·40	.....	4·73	11·13	6·40	7·30	12·60	26 89	
.....	1·50	9·00	.....	.....	12·00	.....	1·00	.....	.....	926
1·66	2·02	8·64	1·00	4·30	13·94	9·64	1·83	15·85	20 17	
.....	2·00	8·00	.....	.....	10·00	.....	8·00	.....	.....	927
2·10	2·55	8·39	0·43	1·90	10 72	8·82	9·11	9·25	26 42	
.....	2·50	9·00	.....	.....	11·00	.....	2·00	.....	.....	928
2·68	3·26	7·16	0·51	4·35	12·02	7·67	2·95	14·25	21 51	
.....	2·00	.....	.....	.....	9·00	7·00	4·00	.....	.....	929
2·61	3·17	7·99	0·71	4·35	13·05	8·70	4·59	14·95	24 28	
.....	4·50	.....	.....	.....	.....	22·50	.....	.....	.....	930
4·06	4·93	0·70	7·24	16·37	24·31	24·31	.....	6·15	34 91	
.....	18·50	.....	.....	.....	.....	.....	.....	.....	.....	931
15·69	19·05	.....	.....	.....	.....	.....	.....	1·30	37 66	
.....	.....	11·00	3·00	2·00	16·00	14·00	.....	.....	18 50	932
0·28	0·34	11·83	2·08	Trace.	13·91	13·91	0·05	10·10	17 21	
.....	.....	9·00	2·00	1·00	.....	11·00	2·00	.....	15 75	933
0·42	0·52	7·04	3·33	2·43	12·80	10·37	2·16	11·25	16 12	
2·88	3·50	6·00	2·00	1·00	.....	8·00	2·00	.....	19 06	934
3·22	3·91	1·12	6·81	1·66	9·59	7·93	2·91	11·85	20 12	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
935	Great Eastern Fertilizer Co., Rutland, Vt., U.S.A.	Manufacturers		Great Eastern General Fertilizer Guaranteed Found
937	do	do		Great Eastern Potato Manure Fertilizer— Guaranteed Found
938	Provincial Chemical Fertilizer Co., St. John, N.B.	do	Bone, tankage, bone char, blood, fish scrap, muriate of potash and sulphate of ammonia.	Special Potato Phosphate— Guaranteed Found
939	do	do		Imperial Superphosphate— Guaranteed Found
940	do	do		Victor Guano— Guaranteed Found
941	do	do		Fruit Free Fertilizer— Guaranteed Found
942	do	do		Special Tobacco Fertilizer— Guaranteed Found
943	do	do		Bone Meal— Guaranteed Found
944	M. J. Lewis, Central Onslow, N.S.	do		Bone Meal— Guaranteed Found
45	Imported from Germany.	G. C. Miller, Middleton, N.S.		Thomas' Phosphate Slag— Guaranteed Found
946	Standard Fertilizer Co., State Street, Boston, Mass.	Manufacturers		Standard Guano— Guaranteed Found
947	do	do		Lawn Dressing— Guaranteed Found
48	Henry F. Tucker & Co., State Street, Boston, Mass.	do		Imperial Bone Superphosphate for Corn— Guaranteed Found
949	do	do		Imperial Bone Superphosphate for Potatoes— Guaranteed Found
50	do	do		Imperial Superphosphate— Guaranteed Found
951	do	do		Pure Bone Meal— Guaranteed Found
952	The Quinnipiac Co., 92 State Street, Boston, Mass.	do		Potato Phosphate— Guaranteed Found
953	do	do		Seeding Down Manure— Guaranteed Found

of Commercial Fertilizers registered for 1899--*Continued.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
0·83	1·00	6·00	2·00	1·00	.....	8·00	4·00	...	16 24	935
1·26	1·53	1·74	6·70	3·84	12·28	8·44	3·78	11·80	17 60	
2·06	2·50	6·00	2·00	1·00	.....	8·00	4·00	.....	19 19	937
2·24	2·72	trace.	8·64	1·12	9·76	8·64	4·09	12·40	19 51	
3·49	4·24	11·83	.....	2·48	14·31	.....	5·94	.....	31 30	938
4·85	5·89	10·07	0·04	2·17	12·28	10·11	6·83	9·30	33 10	
3·19	3·87	12·10	.....	2·56	14·66	.....	1·02	.....	25 83	939
3·75	4·55	6·55	1·12	5·12	12·79	7·67	7·53	7·00	31 11	
1·40	1·70	8·24	.....	7·46	15·70	.....	3·59	.....	19 26	940
2·80	3·40	7·83	1·64	6·65	16·12	9·47	1·41	10·80	21 40	
4·96	6·02	7·01	.....	8·20	15·21	.....	5·04	.....	33 80	941
4·48	5·44	8·57	1·66	2·56	12·79	10·23	7·01	8·25	32 78	
5·86	7·12	7·78	.....	5·66	13·44	.....	9·89	.....	39 45	942
6·32	7·68	4·95	1·28	3·84	10·07	6·23	8·11	6·15	34 88	
3·50	4·25	.....	.....	.....	26·28	.....	.....	.....	34 68	943
2·52	3·06	trace.	7·57	18·16	25·73	25·73	.....	5·85	32 54	
4·28	5 20	.....	.....	.....	22·00	.....	.....	.....	.....	944
3·57	4·33	0·64	8·34	8·77	17·75	.....	0·14	8·20	27 45	
.....	.....	.....	.....	.....	16·00	.....	.....	.....	.....	945
.....	.....	.....	3·97	11·38	15·35	3·97	.....	·03	12 34	
1·25	1·50	.....	.....	2·00	8·50	6·50	3·00	.....	.....	946
1·52	1·85	6·72	2·56	1·27	10·55	9·28	3·30	12·64	18 37	
4·95	6·00	4·00	1·00	1·00	6·00	5·00	2·50	.....	20 70	947
4·60	5·59	5·91	2·56	0·96	9·43	8·47	3·48	10·49	24 89	
1·25	1·50	7·00	2·00	2·00	11·00	9·00	1·85	...	17 54	948
1·47	1·78	7·20	2·22	2·76	12·18	9·42	2·04	13·74	19 48	
1·25	1·50	7·00	2·00	2·00	11·00	9·00	1·85	...	17 54	949
1·38	1·68	7·43	2·13	2·82	12·38	9·56	1·91	13·53	19 39	
1·03	1·25	7·00	1·00	1·00	9·00	8·00	2·15	....	14 53	950
1·01	1 23	7·15	1·47	1·84	10·46	8·62	2·12	17·76	15 40	
2·47	3·00	.....	.....	.....	20·00	.....	.....	.....	.....	951
3·17	3·85	0·55	6·67	15·83	23·05	23·05	.....	7·12	31 44	
2·05	2 50	6·00	2·00	1·00	9·00	8·00	3·00	.....	17 77	952
2·16	2·63	6·65	3·15	3·78	13·58	9·80	3·02	12 53	20 92	
0·82	1·00	7·00	2·00	1·00	10·00	9·00	2·00	.....	14 97	953
1·04	1·26	7·22	2·81	2·15	12·18	10·03	2·44	16·96	17 46	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufactnrer.	By whom sent.	From what Material produced.	Name or Brand of Fertilizer.
954	The Quinnipiac Co., 92 State Street, Boston, Mass.	Manufacturers		Climax Phosphate for all Crops— Guaranteed Found
955	The Cleveland Dryer Co., 92 State Street, Boston, Mass.	do		Fertilizer for all Crops— Guaranteed Found
956	do	do		Fine Ground Bone— Guaranteed Found
957	Pacific Guano Co., Boston, Mass.	do		Soluble Pacific Guano— Guaranteed Found
958	do	do		Potato Special— Guaranteed Found
959	do	do		Nobsque Guano— Guaranteed Found
960	do	do		Pure Bone Meal— Guaranteed Found
961	Clark's Cove Fertilizer Co., State Street, Boston.	do		King Philip Alkaline Guano for Potatoes— Guaranteed Found
962	Thos. Reid, St. John, N.B.	do		Superphosphate— Guaranteed Found
963	W. Faint, Peterboro', Ont.	do		Pure Bone Meal— Guaranteed Found
964	The Nichol's Chemical Co., Capelton, Que.	do	In making these superphosphates and complete fertilizers, Canadian apatite and American phosphate are used, which is dissolved with sulphuric acid. Sulphate of ammonia and muriate of potash are added to complete the manufacture.	The Capelton Superphosphate— Guaranteed Found
965	do	do		The Royal Canadian— Guaranteed Found
966	do	do		"The Victor"— Guaranteed Found
967	do	do		"The Reliance"— Guaranteed Found
968	do	do		No. 1 Grade— Guaranteed Found
969	do	do		Crown Brand— Guaranteed Found
970	Williams & Clark Fertilizer Co., New York and Boston.	do		Americus Potato Manure— Guaranteed Found
971	do	do		Americus Corn Phosphate— Guaranteed Found
972	do	do		Pure Bone Meal— Guaranteed Found

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of Commercial Fertilizers registered for 1899—*Continued.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
1·30	1·25	7·00	1·00	1·00	9·00	8·00	2·00	.....	14 37	954
1·66	2·02	7·13	2·16	1·53	10·82	9·29	2·93	16·90	18 42	
1·03	1·25	7·00	1·00	1·00	9·00	8·00	2·00	.....	14 37	955
1·12	1·36	7·13	1·92	2·33	11·38	9·05	2·77	17·04	16 97	
3·47	3·00	.....	.....	.....	20·00	.....	.....	.....	.....	956
3·10	3·77	0·43	2·37	22·30	25·10	25·10	.....	7·32	32 87	
2·25	2·75	7·00	1·50	2·00	10 50	.....	2·00	15·00	18 15	957
2·41	2·93	8·09	1·75	2·18	12·02	9·84	2·27	12·42	20 45	
2·05	2·50	6·00	2·00	1·00	9·00	8·00	3·00	.....	17 77	958
1·63	1·98	7·51	3·40	1·44	12·35	10·91	4·02	13·75	21 31	
1·15	1·40	5·00	3·00	1·00	9·00	8·00	2·00	.....	14 46	959
0·88	1·08	6·40	2·07	1·92	10·39	8·47	3·25	17·50	16 06	
2·47	3·00	.....	.....	.....	20·00	.....	.....	.....	25 93	960
2·48	3·01	0·80	3·84	13·91	18·55	18·55	0·52	7·05	25 59	
1·24	1·50	5·00	1·50	1·50	8·00	6·50	3·00	.....	14 22	961
1·33	1·61	7·20	2·72	1·28	11·20	9·92	7·13	13·20	22 69	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	962
2·82	3·42	1·60	3·04	6·72	11·36	4·64	.....	25·10	14 09	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	963
3·01	3·66	0·75	3·90	14·23	18·88	18·88	.....	5·30	26 64	
.....	.....	.....	.....	.....	.....	8·00	.....	.....	.....	964
0·22	0·27	3·52	5·75	13·12	22·39	9·27	0·25	3·96	15 17	
.....	4·00	.....	.....	.....	.....	9·00	5·00	.....	.....	965
4·26	5·17	7·48	2·63	1·73	11·84	10·11	5·05	8·82	27 89	
.....	2·00	.....	.....	.....	.....	7·00	3·00	.....	.....	966
2·52	3·00	7·42	3·82	2·36	13·60	11·24	3·21	12·12	23 23	
.....	2·00	.....	.....	.....	.....	6·00	2·00	.....	.....	967
1·98	2·41	4·16	3·00	9·92	17·08	7·16	2·14	6 44	18 27	
.....	.....	.....	.....	.....	.....	11·50	.....	.....	.....	968
0·24	0·29	10·04	4·03	1·92	15·99	14·07	0·50	12·48	18 16	
.....	2·00	.....	.....	.....	.....	11·00	2·50	.....	.....	969
2·36	2·86	9·98	4·09	0·96	15·03	14·07	2·88	10·26	25 45	
2·06	2·50	6·50	1·50	1·00	9·00	8·00	3·00	.....	17 30	970
2·47	3·01	7·04	2·94	2·43	12·41	9·98	2·39	10·75	20 85	
2·06	2·50	7·00	2·00	1·00	10·00	9·00	1·50	.....	17 41	971
2·70	3·28	7·19	3·05	2·43	12·67	10·24	1·82	8·85	21 11	
2·47	3·00	.....	.....	.....	20·00	20·00	.....	.....	.....	972
3·50	4·25	trace.	5·89	15·09	20·98	20·98	0·46	6·55	30 45	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
973	Cumberland Bone Phosphate Co., Portland, Me., U.S.A.	Manufacturers		Royal Bone Phosphate for all Crops— Guaranteed Found.
974	Cumberland Bone Phosphate Co., Portland, Me., U.S.A.	do		Cumberland Fine Ground Bone Guaranteed Found.
975	do	do		Cumberland Superphosphate— Guaranteed Found.
976	do	do		Cumberland Potato Fertilizer— Guaranteed Found.
977	do	do		Cumberland Fertilizer for all Crops— Guaranteed Found.
978	do	do		Cumberland Guano— Guaranteed Found.
979	do	do		Cumberland Seeding Down Manure— Guaranteed Found.
980	do	do		Cumberland Dominion Ground Bone— Guaranteed Found.
981	The Michigan Carbon Works, Detroit, Mich.	J. S. Pearce & Co., London, Ont.		Homestead Bone Black— Guaranteed Found.
982	do	do		Homestead Potato Grower— Guaranteed Found.
983	do	do		Homestead Vegetable Grower— Guaranteed Found.
984	do	do		Dessicated Bone— Guaranteed Found.
985	Lowell Fertilizer Co., 44 North Market Street, Boston, Mass.	Manufacturers	Animal matter, high grade superphosphate, muriate of potash and high grade sulphate of potash.	Swift's Lowell Bone Fertilizer— Guaranteed Found.
986	do	do		Swift's Lowell Animal Fertilizer Guaranteed Found.
987	do	do		Swift's Lowell Potato Phosphate Guaranteed Found.
988	do	do		Swift's Lowell Ground Bone— Guaranteed Found.
989	W. Harris & Co., Danforth Ave., Toronto.	do		Bone Meal— Guaranteed Found.
990	do	do		Brand "H"— Guaranteed Found.

of Commercial Fertilizers registered for 1899—*Continued.*

Results of Analysis.									Relative value per ton of 2,000 lbs.	Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.		
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
1·03	1·25	6·00	1·00	1·00	8·00	7·00	2·00	.....	13 87	973
1·31	1·59	5·43	1·86	2·05	9·34	7·29	2·00	16·50	15 84	
2·47	3·00	.....	.....	.....	20·00	20·00	.....	.....	.....	974
3·87	4·70	0·16	6·02	15·41	21·59	21·59	0·48	6·60	31 93	
2·06	2·50	6·00	2·00	2·00	10·00	8·00	2·00	...	17 04	975
2·50	3·04	8·55	1·44	0·76	10·75	9·99	2·36	11·45	20 55	
2·06	2·50	6·00	3·00	2·00	11·00	9·00	3·00	.....	19 19	976
2·47	3·03	6·80	3·31	2·68	12·79	10·11	3·03	9·75	21 71	
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	977
1·42	1·73	5·43	2·50	2·05	9·98	7·93	2·64	16·00	16 06	
1·03	2·50	5·00	3·00	2·00	10·00	8·00	2·00	....	14 47	978
1·42	1·73	5·44	2 04	1·92	9·40	7·48	2·31	15·90	15 18	
1·03	1·25	6·00	2·00	2·00	10·00	8 00	2·00	....	14 57	979
1 31	1·59	5·75	2·15	1·69	9·59	7·90	1·96	17·30	14 98	
2·47	3·00	.....	.....	.....	20·00	20·00	.....	...	.....	980
3·58	4·35	trace.	4·30	17·14	21·44	21·44	0·56	6·30	31·05	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	981
2·67	3·24	8·00	1·28	1·28	10·56	9·28	2·18	10·00	20 99	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	982
1·92	2·33	8·80	1·11	0·32	10·23	9·91	5·61	15·18	22 37	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	983
4·79	5·82	6·56	1·27	0·80	8·63	7·83	6·91	11·02	28 27	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	984
1·65	2·00	0 32	10·22	22·71	33·25	33·25	... ...	1·38	38 29	
.....	1·64	.....	.....	.....	.....	8·00	3·00	.....	.....	985
2·02	2 45	6·87	2·24	1·92	11·03	11·03	3 21	10·50	20 84	
.....	2·46	.....	.....	.....	.....	9.00	4·00	.....	.....	886
2·71	3·29	7·84	1·44	1·91	11·19	9·28	4·23	11·54	23 84	
.....	2·46	.....	.....	.....	.....	8·00	6·00	.....	.....	987
2·86	3·48	7·20	2·24	1·91	11·35	9·44	7·20	7·90	27 43	
.....	2·46	.....	.....	.....	.....	.....	.....	.....	.....	988
2·29	2 78	0·48	11·51	17·43	29·42	29·42	.....	2·58	36 17	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	989
4·04	4·90	0·45	10·62	11·64	22·71	22·71	0·14	5·40	33 71	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	990
6·98	8·48	0·64	7·68	1·66	9·98	8·32	0·32	5·80	26 81	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
991	W. A. Freeman Co., 57 Ferguson Ave., Hamilton, Ont.	Manufacturers		Freeman's Pure Bone Meal— Guaranteed Found.
992	do	do	Bone, tankage, blood, muriate of potash, nitrate of soda, sulphate of ammonia, sulphuric acid and phosphate.	Freeman's Sure Growth Manure Guaranteed Found.
993	do	do		Freeman's Potato Manure— Guaranteed Found.
994	do	do		Freeman's Bone and Potash— Guaranteed Found.
995	do	do		Freeman's Celery and Early Vegetable— Guaranteed Found.
996	do	do		Freeman's Grass and Grain— Guaranteed Found.
997	do	do		Freeman's Tankage Manure— Guaranteed Found.
998	do	do		Freeman's Tobacco Manure— Guaranteed Found.
999	do	do		Freeman's Phosphate Powder— Guaranteed Found.
1000	Robt. West, Hamilton Ont.	do	Pure animal remains.	Plant Food, "Bone"— Guaranteed Found.
1001	do	do		Plant Food, "Flesh"— Guaranteed Found.
1002	H. B. Marcille, Thorold, Ont.	do	Blood, meat and bone of all kinds of animals, clay loam as dryer.	Fertilizer— Guaranteed Found.
1003	The Parmenter & Polsey Fertilizer Co., Peabody, Mass., U.S.	do		P. & P. Potato Fertilizer— Guaranteed Found.
1004	do	do		Star Brand Superphosphate— Guaranteed Found.
1005	do	do		Plymouth Rock Fertilizer— Guaranteed Found.
1006	The Nova Scotia Fertilizer Co., Halifax, N.S.	do	Bone, ammoniates, potash, sulphuric acid.	Ceres Superphosphate— Guaranteed Found.
1007	do	do		Potato Phosphate— Guaranteed Found.
1008	do	do		Apple Tree Phosphate— Guaranteed Found.

of Commercial Fertilizers registered for 1899—*Continued.*

Results of Analysis.									Relative value per ton of 2,000 lbs.	Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.		
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
	3·00				23·00	23·00				991
2·23	2·71	0·23	9·23	17·53	26·99	26·99		5·45	33 31	
	3·50				8·00		3·00			992
5·72	6·96	6·91	0·94	1·15	9·00	7·85	5·60	0·65	30 08	
	3·00				8·00		5·00			993
3·51	4·26	6·27	1·15	1·66	9·08	7·42	8·11	0·45	26 02	
	2·00				9·00		6·00			994
4·46	5·42	4·48	2·81	3·07	10·36	7·29	9·66	0·95	32 38	
	6·00				9·00		6 00			995
6·22	7·55	6·59	0·57	0·51	7·67	7·16	7·18	1·90	31 16	
	2·00				9·00		1·00			996
2·20	2·67	4·48	2·31	5·11	11·90	6·79	2·20	0·50	17 04	
	5·00				12·00					997
6·77	8·22	0·96	4·93	6·39	12·28	12·28		6·15	29 21	
	6·00				7·00		7·00			998
5·98	7·27	6·08	0·89	0·45	7·42	6·97	8·84	0·45	32 04	
					15·00					999
		11 83	0·71	5·37	17·91	12·54		0·90	16 59	
	3·00				16·00					1000
4·45	5·40	Trace.	6·40	12·95	19·35	19·35	1·16	4·55	31 89	
7·00						5·00				1001
7·58	9·20	0·08	3·76	1·44	5·28	5·28		15·25	23 86	
										1002
1·44	1·75	0·32	1·60	4·80	6·72	6·72	0 12	2·36	10 52	
1·64	2 00				7·00	6·00	5·50			1003
2·12	2·58	3·39	3·43	1·66	8·48	6·82	6·24	8·18	19 93	
1·64	2·00				8·00	7·00	2·50			1004
1·74	2·11	3·52	3·42	1·22	8·16	6·94	2·82	9·88	15 97	
2·47	3·00				9·00	8·00	4·00			1005
2·19	2·66	5·76	3·03	1·76	10·55	8·79	3·55	8·10	19 76	
	2·00					9·20	2·14			1006
1·76	2·14	4·80	2·49	1·47	8·76	8·76	2·14	11·60	16 44	
	3·70					7·80	4·70			1007
2·67	3·24	3·65	2·93	2·37	8·95	8·95	3·20	11·64	19 74	
	3·20					7·80	6·52			1008
2·54	3·08	3·84	3·45	2·05	9·34	9·34	4·52	11·44	21 30	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
1009	The Nova Scotia Fertilizer Co., Halifax, N.S.	Manufacturers		Strawberry Phosphate— Guaranteed Found
1010	do	do		Ground Bone or Bone Meal— Guaranteed Found
1011	The Pidgeon Fertilizer Co., Windsor, N.S.	do		Ground Bone— Guaranteed Found
1012	do	do		Eureka Phosphate— Guaranteed Found
1013	do	do		Potato Manure— Guaranteed Found
1014	do	do		Intense Brand— Guaranteed Found
1015	B. Slote, Essex, Ont.	do		Fertilizer— Guaranteed Found
1016	B. & M. Rattenbury, Charlottetown, P.E.I.	do	Tankage and dried blood.	Fertilizer— Guaranteed Found
1017	W. A. Freeman Co., Hamilton, Ont.	do		Freeman's Odourless Fertilizer— Guaranteed Found
1018	Chas. Stevens, Napanee, Ont.	do	Animal bone, potash and hardwood ashes.	Star Brand, Bone and Potash Fertilizer— Guaranteed Found
1019	D. H. Foster, 100 South Clinton St., Syracuse, N.Y.	do	Bone, phosphates, guanos, nitrate of soda, blood, meat, sulpnate of potash, muriate of potash, sulphate of ammonia. The bone and guanos being treated with sulphuric acid.	Read's Standard Fertilizer— Guaranteed Found
1020	do	do		Read's Leader Guano— Guaranteed Found
1021	do	do		Read's New York State— Guaranteed Found
1022	do	do		Samson— Guaranteed Found
1023	do	do		Farmers Friend— Guaranteed Found
1024	The Standard Chemical & Fertilizer Co., Smith's Falls, Ont.	do	Nitrate of soda, sulphate of ammonia, potash and magnesia salts, mineral superphosphate of lime, bone char and fine bone meal.	The Royal— Guaranteed Found
1025	M. J. Lewis, Central Onslow, N.S.	do	Clam shells	Fertilizer, Clam Shells— Guaranteed Found

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of Commercial Fertilizers registered for 1899—*Continued.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
.....	2·00	.....	.....	.....	.....	8·30	6·50	.....	.....	1009
2·46	2·99	3·01	2·04	1·41	6·46	6·46	5·37	9·76	18 80	
.....	4·53	.....	.....	.....	.....	22·66	.....	.....	.....	1010
2·66	3·23	1·09	9·78	9·60	20·47	20·47	0·68	12·66	28 69	
.....	4·00	.....	.....	.....	23·50	.....	.....	.....	.....	1011
4·21	5·11	0·31	7·37	16·62	24·30	24·30	.....	5·98	35 20	
.....	3·00	.....	.....	.....	.....	9 00	2·50	.....	.....	1012
2·27	2·76	3·51	1·93	5·43	10·87	5·44	4·55	11·68	18 19	
.....	4·00	.....	.....	.....	.....	8·00	5·00	.....	.....	1013
3·24	3·93	3·68	2·23	3·36	9.27	5·91	7·97	10·78	24 02	
.....	4·00	.....	.....	.....	.....	7·00	5·50	.....	.....	1014
2·29	2·79	3·67	1 29	3·35	8·31	4 96	10·25	12·52	23 09	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1015
0·85	1·03	0·63	1 46	2 55	4·64	2·09	10·96	15·24	15 69	
.....	7·94	0·51	10·24	1·28	12·03	12·03	.....	7·28	.....	1016
4·86	5·90	.....	7·04	9 59	16·63	7·04	.....	2·95	29·70	
.....	7·00	.....	.....	.....	11·00	.....	9·00	.....	.....	1017
4·68	5·68	2·08	16 95	1·28	20·31	19·03	8·38	6·76	42 45	
.....	.....	.....	.....	.....	8·00	.....	6·00	.....	.....	1018
0·35	0·42	Trace.	1·28	2·71	3·99	3·99	10·40	0·60	15 88	
.....	1·00	.....	.....	.....	.....	8·00	4·00	.....	.....	1019
1·16	1·41	6·40	2·88	0·64	9·92	9·28	3·90	11·02	18 15	
.....	1·00	.....	.....	.....	.....	7·00	2·00	.....	.....	1020
1·14	1·38	4·93	3·90	1·09	9·92	8·83	2·20	9·86	15 97	
.....	1·50	.....	.....	.....	.....	9·00	2·00	.....	.....	1021
1·32	1·60	6·72	3·39	1·09	11·20	10·11	2·36	7·84	18 16	
.....	2·00	.....	.....	.....	.....	6·00	4·00	.....	.....	1022
1·75	2·13	5·25	1·92	0·96	8·13	7·17	4·13	9·66	17 57	
.....	2·50	.....	.....	.....	.....	9 00	2·00	.....	.....	1023
1·65	2·01	7 81	2 42	1·41	11·64	10·23	2·30	11·20	19 32	
.....	2·00	.....	.....	.....	.....	10·00	3·00	.....	.....	1024
2·31	2·81	9·09	1·66	4·48	15 23	10·75	2·90	9·02	24 23	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	102
0·56	0·68	.....	.....	0·64	0·64	.....	.....	0·55	1 98	

TABLE I.—STATEMENT of the Results of Examining 154 Samples

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials produced.	Name or Brand of Fertilizer.
1026	H. B. Marcille, Thorold, Ont.	Manufacturers	Blood, meat and bone, with clay loam as a dryer.	Fertilizer— Guaranteed Found
1027	The Fraser River Oil and Guano Syndicate, Ladner, B.C.	do		No. 1 Guano or Fish Fertilizer— Guaranteed Found
1028	do	do		No. 2 Guano or Fish Fertilizer— Guaranteed Found
1029	Victoria Chemical Co., Ltd., Victoria, B.C.	do		"A" Kainite— Guaranteed Found
1030	do	do		"B" Superphosphate of Lime— Guaranteed Found
1031	do	do		"C" Thomas' Phosphate Powder— Guaranteed Found
1032	do	do		"D" Nitrate of Soda— Guaranteed 96 p.c. nitrate Found
1033	do	do		"E" Muriate of Potash— Guaranteed 80 p.c. chloride of potassium Found
1034	do	do		"F" Mixed Fertilizer— Guaranteed Found
1035		The Steele, Briggs Seed Co., Toronto.		Muriate of Potash— Guaranteed Found
1036		do		Kainite— Guaranteed Found
1037		do		Nitrate of Soda— Guaranteed Found
1038		do		Lawn Dressing— Guaranteed Found
1039		do		Sulphate of Potash— Guaranteed Found
1040	The Nova Scotia Fertilizer Co., Halifax, N.S.	Manufacturers		Potato Phosphate— Guaranteed Found

of Commercial Fertilizers registered for 1899—*Concluded.*

Results of Analysis.									Relative value per ton of 2,000 lbs.	Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.		
Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.	Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
4·96	5·78		3·20	5·11	8·31	8·31	3·95	3·65	24 68	1026
3·92	4·63				12 88			28·38		1027
4·76	5·78	1·28	6·88	7·03	15·19	8·16	0·79	19·35	23 47	
2·39	2·90				10·00			31·85		1028
4·85	5·89	0·80	6·01	2·94	9·75	6·81	0·44	29·10	20 55	
							12·00		12 60	1029
							11·83	7·95	12 42	
		16·00			16·00					1030
		14·23	1·28	Trace.	15·51	15·51	0·17	11·70	18 67	
					16·00					1031
			4·19	9·72	13·91	4·19		0·90	11 41	
	15·00									1032
14 64	17·78							0·10	35 14	
							50·62		53 15	1033
							51·45	0·60	54 02	
2·00		5·00			5·00		3·00			1034
1·70	2·07	3·99	0·74	0·38	5·11	4·73	3·43	8·45	13 39	
							49·04	2 10	51 49	1035
							14·81	3·74	15 55	1036
								0·14	42 09	1037
16·19	19·66									
3·24	4·03	2·45	3·30	1·59	7·34	5 75	3·53	3·30	18 54	1038
							49.12	1·42	57 58	1039
	3·70					7·80	4·70			1040
3·08	3·83	4·19	2·33	2·23	8·75	8·75	3·63	3·30	21 02	

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Dartmouth, N.S.*	*Analyst—M. Bowman Halifax, N.S.*		p. c.	p. c.
April 6	16708	E. M. Walker.....	Pacific Guano Co., Boston, Mass.	Pure Bone Meal :		
				Guaranteed.....	2·47	3·00
				Standard sample.....	2·48	3 01
				Sample as sold.....	2·66	3·23
do 6	16709	do	do	Pacific Guano :		
				Guaranteed..	2·25	2·75
				Standard sample.	2·41	2·93
				Sample as sold.....	1·68	2·04
do 6	16710	do	do	Special Potato :		
				Guaranteed..	2·05	2·50
				Standard sample.....	1·63	1·98
				Sample as sold.....	2·10	2·55
		Kentville, N.S.				
do 11	16711	T. L. Dodge & Co.	Pidgeon & Co., Windsor, N.S.	Ground Bone :		
				Guaranteed..... . .	..... .	4·00
				Standard sample.....	4·21	5·11
				Sample as sold.	4·06	4·83
		Wolfville, N.S.				
do 11	16712	Wolfville Coal Co.	Bowker Fert'r Co., Boston, Mass.	Potato and Vegetable :		
				Guaranteed..... . .	. . .	2·00
				Standard sample.... .	2·40	2·92
				Sample as sold.....	1·93	2·34
do 11	16713	do ..	do	Bone and Potash :		
				Guaranteed..	....	2·00
				Standard sample. . . .	1·67	2·02
				Sample as sold.....	1·68	2·04
do 11	16714	do ..	do	Stockbridge Manure :		
				Guaranteed.....	....	4·00
				Standard sample.... .	3·71	4·50
				Sample as sold.....	3·41	4·15
do 11	16715	do ..	do	Fresh Ground Bone :		
				Guaranteed.....	.....	3·00
				Standard sample. ...	3·02	3·66
				Sample as sold.	2·88	3·50
		Shubenacadia, N.S.				
do 13	16716	J. A. Kirkpatrick.	Albert, England..	Thomas' Phosphate Powder :		
				Guaranteed.....	.....	.....
				Standard sample.	.....	.....
				Sample as sold.....	.....	....
		Truro, N.S.				
do 13	16717	J. H. Kent & Co..	Bowker Fert'r Co., Boston, Mass.	Farm and Garden Fertilizer :		
				Guaranteed.....	. ...	2 00
				Standard sample.....	2·11	2·56
				Sample as sold.....	2·04	2·48

Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	20·00	.....	.....	.....	25 93	16708	Genuine.
0·80	3·84	13·91	18·55	18·55	0·52	7·05	25 59		
Trace.	14·02	7·37	21·39	21·39	.....	3·35	29 17		
7·00	1·50	2·00	10·50	8·50	2·00	15·00	18 15	16709	do
8·09	1·75	2·18	12·02	9·84	2·27	12·42	20 45		
5·85	3·96	2·54	12·35	9·81	2·54	12·78	18 82		
6·00	2·00	1·00	9·00	8·00	3·00	.....	17 77	16710	do
7·51	3·40	1·44	12·35	10·91	4·02	13·75	21 31		
5·40	4·15	2·97	12·52	9·55	2·96	14·24	20 07		
.....	.....	.....	23·50	.....	.....	.....	.....	16711	do
0·31	7·37	16·62	24·30	24·30	.....	5·98	35 20		
Trace.	13·95	8·95	22·90	22·90	.....	7·97	34 03		
9·00	.....	.....	11·00	9·00	4·00	.....	.....	16712	Below standard in soluble phosphoric acid.
7·67	2·06	1·92	11·65	9·73	4·80	14·65	24 19		
4·96	4·10	2·14	11·20	9·06	2·42	11·56	18 27		
5·00	.....	.....	7·00	5·00	2·00	.....	.....	16713	do do
5·05	1·10	1·79	7·94	6·15	3·03	10·65	15 64		
2·12	6·47	4·78	13·37	8·59	2·20	6·54	19 29		
6·00	.....	.....	7·00	6·00	10·00	.....	.....	16714	Genuine.
5·52	0·88	0·64	7·04	6·40	11·89	13·25	29 38		
5·87	2·18	0·93	8·98	8·05	10·50	12·99	28 92		
.....	.....	.....	18·00	.....	.....	.....	.....	16715	do
0·44	6·28	19·12	25·84	25·84	.....	3·95	33 80		
0·81	9·32	13·25	23·38	23·38	.....	4·20	31 38		
.....	.....	.....	16·00	.....	.....	.....	.....	16716	
.....	3·97	11·38	15·35	3·97	.....	0·03	12 34		
.....	.....	.....	19·45	.....	.....	0·27	.....		
8·00	.....	.....	10·00	8·00	2·00	.....	.....	16717	Below standard in soluble phosphoric acid.
5·62	2·21	1·92	10·75	8·83	2·53	14·75	19 34		
1·13	5·71	3·74	10·58	6·84	3·93	21·71	17 76		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*St. John, N.B.*	*Analyst—Dr. M. Fiset, Quebec.*		p. c.	p. c.
April 1	17638	Thos. Reid.....	Vendor.....	Reids Superphosphate of Lime:		
				Guaranteed.....	.....	.....
				Standard sample.....	2·82	3·42
				Sample as sold.....	3·38	4·10
do 3	17639	D. J. Seeley, Walker's Wharf.	Bowker Fert'r Co., Boston, Mass.	Bowker's Potato and Vegetable Phosphate:		
				Guaranteed.....	.....	2·00
				Standard sample.....	2·40	2·92
				Sample as sold.....	1·84	2·23
do 3	17640	Wallace & Frazer, 90 Germain St.	Chemical Works, 150 Leadenhall St., London, Eng.	Thomas' Phosphate Powder:		
				Guaranteed.....	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	0·16	0·20
do 5	17641	C. H. Peters & Sons, Ward St.	Bradley Fert'r Co., Boston, Mass.	XL Superphosphate:		
				Guaranteed.....	2·07	2·50
				Standard sample.....	2·58	3·12
				Sample as sold.....	2·17	2·64
do 5	17642	J. McMulkin, Robertson's Wharf.	E. Frank Coe, 133 Front St., New York.	Ammoniated Bone Superphosphate:		
				Guaranteed.....	1·85	2·25
				Standard sample.....	2·28	2·77
				Sample as sold.....	1·32	1·60
do 5	17643	P. Nase & Son, No. 1 Main St.	Provincial Chemic'l Fert'r Co., St. John, N.B.	Potato Phosphate:		
				Guaranteed.....	3·49	4·24
				Standard sample.....	4·85	5·89
				Sample as sold.....	1·24	1·51
		Sussex, N.B.				
do 7	17644	J. A. McArthur..	Swift, Lowell Fert'r Co., Boston, Mass.	Swift's Animal Brand, complete manure for all crops:		
				Guaranteed.....	.....	2·46
				Standard sample.....	2·71	3·29
				Sample as sold.....	2·73	3·32
do 7	17645	do ..	do ..	Swift's Potato Phosphate:		
				Guaranteed.....	.....	2·46
				Standard sample.....	2·86	3·48
		Fredericton, N.B.		Sample as sold.....	2 64	3·21
do 10	17646	R. Vanbuskirk, Phœnix Square.	Quinnipiac Fert'r Co., Boston, Mass.	Climax Phosphate, for all crops:		
				Guaranteed.....	1·03	1·25
				Standard sample.....	1·66	2·02
				Sample as sold.....	1·05	1·28
do 10	17647	E. Estabrook, Queen St.	Pidgeon Fert'r Co., Windsor, N.S.	Eureka Phosphate:		
				Guaranteed.....	.....	3·00
				Standard sample.....	2·27	2·76
				Sample as sold.....	2·74	3·33
		Kentville, N.S.				
May 4	16718	De Wolf & Lamont	Nova Scotia Fert'r Co., Halifax, N.S.	Potato Phosphate:		
				Guaranteed.....	.....	3·70
				Standard sample.....	2·67	3·24
				Sample as sold.....	3·21	3·90

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Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	.....	.....	.....	.....	17638	No guarantee.
1 60	3·04	6·72	11·36	4·64	.....	25·10	14 09		Genuine.
1·14	4·81	6·38	12·63	6·25	2·48	26·02	19 64		
9·00	.....	.....	11·00	9·00	4·00	.....	.....	17639	Below guarantee in soluble phosphoric acid.
7·67	2·06	1·92	11·65	9·73	4·80	14·65	24 19		
6·88	2·08	2·39	11·35	8·96	3·76	14 02	19 64		
.....	.....	.....	16·00	.....	.....	.....	.....	17640	Adulterated under Act, being deficient in available phosphoric acid.
.....	3·97	11·38	15·35	3·97	.....	0·03	12 34		
0·64	2·14	11·67	14·45	2·78	1·88	0 04	13 64		
8·00	.....	.....	10·00	.....	1·00	.....	.....	17641	Up to guarantee.
6·08	1·86	2·68	10·62	7·94	1·43	1·12	17 84		
6 56	3·04	2·07	11·67	9·60	2·40	14·36	19 56		
7·00	2·00	2·00	11·00	9·00	2·25	.....	18 70	17642	do
7·52	3·20	1·91	12·63	10·72	4·24	9·88	23 70		
8·31	2·25	2·23	12·79	10·56	3·68	14·52	20 15		
11·83	.....	2·48	14·31	.....	5·94	.....	31 30	17643	Adulterated, not being up to guarantee in ammonia, soluble phosphoric acid and potash.
10·07	0·04	2·17	12·28	10·11	6·83	9·30	33 10		
8·79	0·96	8·15	17·90	9·75	4·67	12·58	27 64		
.....	.....	.....	.....	9·00	4·00	.....	.....	17644	A little below guarantee in available phosphoric acid.
7·84	1·44	1·91	11·19	9·28	4·23	11·54	23 84		
7·68	0·64	2·87	11·19	8·32	3·80	10·72	21 32		
.....	.....	.....	.....	8·00	6·00	.....	.....	17645	Up to guarantee.
7·20	2·24	1·91	11·35	9·44	7·20	7·90	27 43		
6·72	1·16	2·67	10·55	7·88	7·90	8·62	24 77		
7·00	1·00	1·00	9·00	8·00	2·00	.....	14 37	17646	do
7·13	2·16	1·53	10·82	9·29	2·93	16·96	18 42		
6·40	4 16	3·67	14·23	10·56	2·70	14·16	18 72		
.....	.....	.....	.....	9·00	2·50	.....	.....	17647	Not up to guarantee in available phosphoric acid.
3·51	1·93	5·43	10·87	5·44	4·55	11·68	18 19		
3·20	3·68	4·31	11·19	6·88	3·00	13·82	18 91		
.....	.....	.....	.....	7·80	4·70	.....	.....	16718	Up to guarantee.
3·65	2·93	2·37	8·95	8·95	3·20	11·64	17 25		
4·32	2·72	2·55	9·59	9·59	4·11	13·64	20 96		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Kentville, N.S.*	*Analyst—Dr. M. Fiset*	Con.	p. c.	p. c.
May 4	16719	De Wolf & Lamont	Nova Scotia Fert'r Co., Halifax, N.S	Bone Meal: Guaranteed	.....	4·53
				Standard sample	2·66	3·23
				Sample as sold	2·88	3·50
do 4	16720	do	do	Ceres Superphosphate: Guaranteed	.....	2·00
				Standard sample	1·76	2·14
				Sample as sold	2·42	2·95
		Windsor, N.S.				
do 4	16721	J. E. Graham	Pidgeon Fert'r Co., Windsor, N.S.	Eureka Potato Manure: Guaranteed	.....	3·00
				Standard sample	2·27	2·76
				Sample as sold	4·33	5·26
do 4	16722	J. F. Hutchison	Lowell Fert'r Co., Boston, Mass.	Swift's Animal Brand: Guaranteed	.....	2·46
				Standard sample	2·71	3·29
				Sample as sold	2·66	3·23
		St. Andrew's, N.B.				
do 4	17648	W. D. Foster, Water St.	Great Eastern Fert'r Co., Rutland, Vermont, U.S.	Great Eastern Grass and Oats Fertilizer: Guaranteed	.....	.....
				Standard sample	0·42	0·52
				Sample as sold	0·00	0·00
		St. Stephen, N.B.				
do 4	17649	F. E. Rose, King St.	E. Frank Coe, New York.	Coe's Grass and Grain Fertilizer: Guaranteed	0·80	1·00
				Standard sample	1·09	1·33
				Sample as sold	1·02	1·24
		Woodstock, N.B.				
do 9	17650	Brewer & Perley, Main Road.	Great Eastern Fert'r Co., Rutland, Vt.	Great Eastern Dissolved Bone: Guaranteed	.....	.....
				Standard sample	0·28	0·34
				Sample as sold	0·00	0·00
do 9	17651	Willard Carr, King St.	Parmenter & Polsey Fert'r Co., Peabody, Mass.	Special Potato Fertilizer: Guaranteed	1·64	2·00
				Standard sample	2·12	2·58
				Sample as sold	3·18	3·87
		Fredericton, N.B.				
do 10	17652	A. H. Vanwart, Campbell St.	Bradley Fert'r Co., Boston, Mass.	Bradley's Niagara Phosphate: Guaranteed	0·82	1·00
				Standard sample	1·38	1·67
				Sample as sold	0·98	1·19

SESSIONAL PAPER No. 7b

Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	22·66	.....	.....	.....	16719	Slightly below guarantee in ammonia.
1·09	9·70	9·60	20·47	20·47	0·68	12·66	28 69		
1·12	8·58	10·77	20·47	20·47	.....	12·90	28 46		
.....	.....	.....	.....	9·20	2·14	.....	.....	16720	Genuine.
4·80	2·49	1·47	8·76	8·76	2·14	11·60	16 44		
3·52	2·88	3·35	9·75	9·75	3·01	12·34	17 37		
.....	.....	.....	.....	9·00	2·50	.....	.....	16721	Not up to guarantee in available phosphoric acid.
3·51	1·93	5·43	10·87	5·44	4·55	11·68	18 19		
2·88	3·05	1·75	7·68	5·93	5·82	12·30	23 83		
.....	.....	.....	.....	9·00	4·00	.....	.....	16722	Up to guarantee.
7·84	1·44	1·91	11·19	9·28	4·23	11·54	23 84		
8·31	2·40	1·28	11·99	10·71	4·36	11·62	23 95		
9·00	2·00	1·00	12·00	11·00	2·00	.....	15 75	17648	do
7·04	3·33	2·43	12·80	10·37	2·16	11·25	16 12		
8 48	5·59	2·40	16·47	14·07	2·62	12·90	19 80		
6·50	2·00	2·00	10·50	8·50	1·50	.....	14 80	17649	do
8·12	1·48	3·19	12·79	9·60	1·89	10·80	18 05		
7·83	3·05	1·75	12·63	10·88	2·00	12·82	17 82		
11·00	3·00	2·00	16·00	14·00	.....	.....	18 50	17650	do
11·83	2·08	Trace.	13 91	13·91	0·05	10·10	17 21		
14·55	3·03	0·64	18·22	17·58	.....	4·78	21 43		
.....	.....	.....	.....	7·00	6·60	5·50	.....	17651	do
3·39	3·43	1·66	8·48	6·82	6·24	8·18	19 93		
6·07	3·21	1·91	11·19	9·28	7·72	12·18	27 12		
5·00	2·00	1·00	8·00	7·00	1·08	.....	11 60	17652	do
3·83	3·33	3·20	10·36	7·16	2·14	0·96	14 78		
6·23	2·57	2·71	11·51	8·80	2·47	15·62	16 06		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Sherbrooke, Que.*	*Analyst—Dr. J. B. Edwards, Montreal.*		p.c.	p.c.
Apl. 3	18923	C. O. Genest	....	Thomas' Phosphate Powder:		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	1·81	2·19
do 3	18924	J. T. Kerr, Wellington St.	Bradley Fert'r Co., Boston, Mass.	B. D. Seafowl Guano:		
				Guaranteed..	2·06	2·50
				Standard sample	2·66	3·23
				Sample as sold	2·66	3·23
do 3	18925	do ..	do ..	Eclipse Phosphate:		
				Guaranteed.....	1·00	1·25
				Standard sample.....	1·29	1·56
				Sample as sold.....	1·26	1·53
		Montreal.				
do 3	18926	Brodie & Harvie, Bleury St.	Standard Chemical Fert'r Company, Smith's Falls, Ont.	Bone Meal:		
				Guaranteed..... ..	.....	4·50
				Standard sample. . ..	4·06	4·93
				Sample as sold.....	4·85	5·17
do 3	18927	do ..	do .	Special Fertilizer:		
				Guaranteed.....	.....	3·50
				Standard sample.	3·52	4·27
				Sample as sold.....	3·22	3·91
do 3	18928	do ..	do ..	Standard:		
				Guaranteed.....	.....	2·50
				Standard sample.	2·68	3·26
				Sample as sold.....	2·93	3·55
		Sutton, P.Q.				
do 15	18935	Boright & Safford, Main St.	Read Fert'r Co., New York.	Leader Guano:		
				Guaranteed.....	.. . .	1·00
				Standard sample.....	1·14	1·38
				Sample as sold.....	1·79	2·17
do 15	18936	do ..	do ..	Fish, Bone and Potash:		
				Guaranteed.....	.....	.....
				Standard sample. ...	.....	.....
				Sample as sold.....	3·00	3·64
do 15	18937	C. O. Smith, Main St.	Pacific Guano Co., Boston, Mass.	Soluble Pacific Guano:		
				Guaranteed.....	2·25	2·75
				Standard sample.... .	2·41	2·93
				Sample as sold.....	2·09	2·53
do 15	18938	do ..	do ..	Nobsque Guano:		
				Guaranteed.....	1·15	1·40
				Standard sample.....	0·88	1·08
				Sample as sold.....	1·40	1·70
do 15	18939	do ..	do ..	Potato Special:		
				Guaranteed.....	2·05	2·50
				Standard sample.	1 63	1·98
				Sample as sold....	2 17	2 64
		Coaticooke, P.Q.				
do 29	18945	C. E. Baldwin, farmer.	Read Fert'r Co., New York.	Superphosphate, Farmer's Friend:		
				Guaranteed.....	.....	2·50
				Standard sample. . ..	1·65	2·01
				Sample as sold.....	2·65	3·21

SESSIONAL PAPER No. 7b

Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	$ cts.		
.....	.....	.....	16·00	.....	.....	.....	...	18923	Adulterated under Act, being deficient in available phosphoric acid.
.....	3·97	11·38	15·35	3·97	.....	0·03	12 34		
Trace.	3·84	11·35	15·19	3·84	0·14	2·25	16 66		
5·00	3·00	2·00	10·00	8·00	1·50	.....	16 42	18924	Genuine.
6·15	1·79	2·68	10·62	7·94	2·16	1·03	18 80		
4·64	2·88	4·16	11·68	7·52	1·78	12·90	18 24		
8·00	2·00	2·00	12·00	10·00	1·50	.....	16 38	18925	Below guarantee in available phosphoric acid.
7·99	1·99	2·30	12·28	9·98	1·70	1·24	17 36		
4·96	2·72	4·48	12·16	7·68	2·05	16·95	15 45		
.....	.....	.....	.....	22·50	.....	.....	.....	18926	Genuine.
0·70	7·24	16·37	24·31	24·31	.....	6·15	34 91		
traces.	2·55	20·79	23·34	23·34	0·27	4·85	35 52		
8·00	.....	.....	10·00	.....	6·00	.....	...	18927	do
6·40	.....	4·73	11·13	6·40	7·30	12.60	26 89		
5·76	1·28	4·80	11·84	7·04	6·88	10·95	26 39		
9·00	.....	...	11 00	...	2·00	.....	.....	18928	do
7·16	0·51	4·35	12·02	7·67	2 95	14·25	21 51		
8·95	2·88	3·52	15·35	11·83	2·43	6·50	25 78		
.....	.....	.....	.....	7·00	2·00	.....	...	18935	do
4·93	3·90	1·09	9·92	8·83	2·20	9·86	15 97		
4·00	3·36	0·96	8·32	7·36	2·90	18·05	16 23		
.....	.....	.....	.....	.....	.....	.....	....	18936	Not registered under this name.
3·04	1·60	1·28	5·92	4·64	5·54	14·05	18 81		Not guaranteed.
7·00	1·50	2·00	10·50	8·50	2·00	15·00	18 15	18937	Slightly below guarantee
8·09	1·75	2·18	12·02	9·84	2·27	12·42	20 45		
5·44	1·43	3·68	10 55	6 87	2·53	15·20	16 88		
5·00	3·00	1·00	9·00	8·00	2·00	.....	14 46	18938	Below guarantee in available phosphoric acid.
6·40	2·07	1·92	10·39	8·47	3·25	17·50	16 06		
4·96	1·97	2·24	9 17	6·93	2·65	17·05	14 93		
6·00	2·00	1·00	9·00	8·00	3·00	.....	17 77	18 39	Up to guarantee.
7·51	3·40	1·44	12·35	10·91	4·02	13·75	21 31		
5·76	3·41	2·18	11·35	9·17	4·33	14·70	21 03		
.....	.....	.....	.....	9 00	2·00	.....	...	18945	do
7·81	2·42	1·41	11·64	10·23	2·30	11·20	19 32		
7·19	2·02	2·28	11·49	9·21	1·74	13·65	19 72		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Coaticook, P.Q.*	*Analyst, Dr. J. B. Edwards, Montreal*—Con.		p. c.	p. c.
April 29	18947	C. E. Baldwin, farmer.	Read Fert'r Co., New York.	Standard : Guaranteed	.....	1·00
				Standard sample.	1·16	1·41
				Sample as sold	2·06	2·50
		Stanstead, P.Q.				
May 1	18948	H. J. Connor, farmer.	Bowker Fert'r Co.	Bowker's Vermont : Guaranteed	.....	2·50
				Standard sample.	2·52	3·06
				Sample as sold	2·35	2·86
do 1	18949	do	do	Bowker's Square Brand : Guaranteed	.....	2·00
				Standard sample.	2·18	2·65
				Sample as sold	1·81	2·19
do 1	18950	H. T. Ball, Rock Island.	Read Fert'r Co., New York.	Samson : Guaranteed	.....	2·00
				Standard sample.	1·75	2·13
				Sample as sold	2·38	2·89
		Granby, P.Q.				
do 3	18951	R. W. Bradford.	Nichols Chem'l Co. Capelton, P.Q.	Capelton Superphosphate : Guaranteed	.....	.....
				Standard sample.	0·22	0·27
				Sample as sold	0·46	0·56
		Montreal.				
do 15	18952	Wm. Evans, McGill St.	W. A. Freeman & Co., Hamilton, Ont.	Tobacco Manure : Guaranteed	.....	6·00
				Standard sample.	5·98	7·27
				Sample as sold	6·07	7·38
May 15	18953	do	do	Pure Bone Meal : Guaranteed	.....	3·00
				Standard sample.	2·23	2·71
				Sample as sold	5·11	6·20
do 15	18954	do	Prov. Chem. Co., St. John, N.B.	Fruit Tree Fertilizer : Guaranteed	4·96	6·02
				Standard sample.	4·48	5·44
				Sample as sold	1·16	1·41
do 16	18955	R. J. Latimer, McGill St.	Nicholas Chem. Co. Capelton, P.Q.	No. 1 Grade : Guaranteed	.....	.....
				Standard sample.	0·24	0 29
				Sample as sold	Trace.	Trace.
do 16	18957	do	do	Royal Canadian : Guaranteed	.....	4·00
				Standard sample.	4·26	5·17
				Sample as sold	3·54	4·28
		Toronto.				
Mar. 30	18156	J. A. Simmers	W. A Freeman Co., Hamilton, Ont.	Potato Manure : Guaranteed	.....	3·00
				Standard sample.	3·51	4·26
				Sample as sold	4·27	5·18
do 30	18157	do	do	Sure Growth : Guaranteed	.....	3·50
				Standard sample.	5·72	6·96
				Sample as sold	4·30	5·22

SESSIONAL PAPER No. 7b

Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.									
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available	Potash.	Moisture.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	8·00	4·00	.....	.....	18947	Up to guarantee.
6·40	2·88	0·64	9·92	9·28	3·90	11·02	18 15		
7·03	1·60	2·08	10·71	8·63	5·83	13·20	21 88		
8·00	.....	.....	10·00	8·00	3·00	.....	.....	18948	do
6·97	2·18	1·47	10·62	9·15	4·10	14·40	22 07		
2·56	5·96	3·15	11·67	8·52	4·81	14·70	21 25		
6·00	.....	.....	12·00	6·00	2·00	.....	.....	18949	do
5·44	4·16	4·09	13·69	9·60	3·01	10·10	22 16		
7·83	.....	3·36	11·19	7·83	3·59	9·10	18 52		
.....	.....	.....	.....	6·00	4·00	.....	.....	18950	Slightly below guarantee in available phosphoric acid.
5·25	1·92	0·96	8·13	7·17	4·13	9·66	17 57		
5·12	0·31	1·92	7·35	5·43	4·04	11·50	17 01		
.....	.....	.....	.....	8·00	.....	.....	.....	18951	Genuine.
3·52	5·75	13·12	22·39	9·27	0·25	3·96	15 17		
8·79	1·56	2·28	12·63	10·35	.....	.....	14 05		
.....	.....	.....	.....	7·00	.....	7·00	.....	18952	Equal to guarantee.
6·08	0·89	0·45	7·42	6·97	8·84	0·45	32 04		
6·71	1·28	0·64	8·63	7·99	8·53	9·50	33 88		
.....	.....	.....	.....	23·00	23·00	.....	.....	18953	Slightly below guarantee in total phosphates and exceeding guarantee in ammonia.
0·23	9·23	17·53	26·99	26·99	.....	5·45	33 31		
Trace.	7·04	14·87	21·91	21·91	0·87	4·65	35 78		
7·01	.....	8·20	15·21	.....	5·04	.....	33 80	18954	Below guarantee in ammonia and soluble phosphates, therefore adulterated under Act.
8·57	1·66	2·56	12·79	10·23	7·01	8·25	32 78		
2·40	1·60	13·11	17·11	4·00	5·60	3·50	17 23		
.....	.....	.....	.....	11·50	.....	.....	.....	18955	Up to guarantee.
10·04	4·03	1·92	15·99	14·07	0·50	12·48	18 16		
10·07	3·46	1·76	15·29	13·53	0·95	13·10	17 42		
7·48	2·63	1·73	11·84	9·00 10·11	5·00 5·05	8·82	27 89	18957	do
6·87	3·36	2·08	12·31	10·23	6·26	10·90	27 63		
.....	.....	.....	.....	8·00	.....	5·00	.....	18156	do
6·27	1·15	1·66	9.08	7·42	8·11	0·45	26 02		
7·35	0·96	2·08	10·39	8·31	4·46	7·70	25 43		
.....	.....	.....	.....	8·00	.....	3·00	.....	18157	do
6·91	0·94	1·15	9·00	7·85	5·60	0·65	30 08		
6·56	0 63	1·12	8·31	7·19	4·52	3·45	24·74		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Adress of Vendor.	Name and Adress of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Toronto.*	*Analyst, Dr. J. M. Edwards, Montreal*—Con.		p. c.	p. c.
Mar. 30	18158	J. A. Simmers....	W. Faint, Peterboro'.	Bone Meal :		
				Guaranteed	.....	.....
				Standard sample.....	3·01	3·66
				Sample as sold.....	3.86	4·69
do 30	18159	The Steele Briggs Seed Co.	Standard Fertilizer Co., Boston.	Plant Food :		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	4·68	5·68
do 30	18160	do ..	Harris & Co., Toronto.	Bone Meal :		
				Guaranteed	.....	.....
				Standard sample.....	4·04	4·90
		Hamilton.		Sample as sold.....	4·27	5·18
do 30	18161	R. Evans & Co....	Milsom Rendering and Fert. Co., Buffalo, N.Y.	Cyclone Bone Meal :		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	4·05	4·91
		Ottawa.	*Analyst, Dr. F. X. Valade, Ottawa.*			
do 6	18124	Graham Bros., florists.	W. Faint, Peterboro'.	Bone Meal :		
				Guaranteed	.....	.....
				Standard sample.....	3·01	3·66
				Sample as sold.....	3·29	3 85
do 6	18125	W. Grey, George St.	.....	Thomas' Phosphate Powder :		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	.....	.....
do 7	18126	Standard Fertilizer Co., Smith's Falls	Vendors	Superphosphate of Lime :		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	.....	.....
do 7	18127	do ..	do	Special Fertilizer ;		
				Guaranteed	.....	3·50
				Standard sample.....	3·52	4·27
				Sample as sold.....	2·94	3·52
do 7	18128	do ..	do	No. 1 Fertilizer :		
				Guaranteed	.....	1·50
				Standard sample.....	1·66	2·02
				Sample as sold.....	1·26	1·48
do 7	18129	do ..	do	Standard Fertilizer :		
				Guaranteed	.....	2·50
				Standard sample.....	2·68	3·26
				Sample as sold.....	2·11	2·17
do 14	18130	K. McDonald, Market Square.	Bradley Fertilizer Co., Boston, Mass	Bradley's Potato Fertilizer—		
				Guaranteed.....	2·06	2·50
				Standard sample.....	2·24	2·72
				Sample as sold.....	1·91	2·24
do 14	18131	do ..	do ..	Bradley's B. D. Sea-fowl Guano—		
				Guaranteed.	2·06	2 50
				Standard sample.	2·66	3·23
				Sample as sold.....	1·94	2·27

SESSIONAL PAPER No. 7b

Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	.....	.....	.....	.....	18158	Genuine.
0·75	3·90	14·23	18·88	18·88	.....	5·30	26·64		
Trace.	8·58	13·97	22·55	22·55	.....	1·45	32·67		Not guaranteed.
.....	.....	.....	.....	.....	.....	.....	.....	18159	Not registered under this name.
2·28	2·68	2·88	7·84	4·96	2·26	4·10	20·14		Not Guaranteed.
.....	.....	.....	.....	.....	.....	.....	.....	18160	Genuine ; no guarantee.
0·45	10·62	11·64	22·71	22·71	0·14	5·40	33·71		
Trace.	6·72	16·31	23·03	23·03	0·27	2·75	34·23		
.....	.....	.....	.....	.....	.....	.....	....	18161	Not registered.
Trace.	6·72	15·44	22·23	22·23	0·29	3·85	32·86		
.....	.....	.....	.....	.....	.....	.....	.....	18124	Genuine ; no guarantee furnished.
0·75	3·90	14·23	18·88	18·88	.....	5·30	26·64		
0·43	5·92	15·01	22·36	22·36	.....	7·43	29·94		
.....	.....	.....	16·00	.....	.....	.....	.....	18125	Adulterated under Act, being deficient in available phosphoric acid.
.....	3·97	11·38	.....	3·97	.....	0·03	12·34		
0·15	4·96	10·84	15·95	5·11	.....	0·16	13·23		
.....	.....	.....	16·00	13·00	.....	.....	.....	18126	Genuine.
9·60	0·90	4·60	15·10	10·50	.....	16·35	13·89		
13·13	0·82	3·04	16·99	13·95	0·23	7·00	18·88		
8·00	.....	.....	10·00	.....	6·00	.....	.....	13127	do
6·40	.....	4·73	11·13	6·40	7·30	12·60	26·89		
8·63	0·66	2·97	12·26	9·29	7·88	11·36	28·36		
9·00	.....	.....	12·00	.....	1·00	.....	.....	18128	do
8·64	1·00	4·30	13·94	9·64	1·83	15·85	20·17		
7·53	1·28	4·03	12·84	8·81	1·63	15·62	17·80		
9·00	.....	.....	11·00	.....	2·00	.....	.....	18129	do
7·16	0·51	4·35	12·02	7·67	2·95	14·25	21·51		
8·91	2·51	2·69	14·11	11·42	1·96	14·60	22·32		
6·00	3·00	2·00	11·00	9·00	3·25	.....	18 25	18130	do
6·71	1·73	2·18	10·62	8·44	3·90	1·19	20 08		
6·66	3·28	2·83	12·77	9·95	3·20	17·68	20 39		
5·00	3·00	2·00	10·00	8·00	1·50	.....	16 42	18131	do
6·15	1·79	2·68	10·62	7·94	2·16	1·03	18 80		
6·99	3·45	2·64	11·08	8·44	1·62	15·56	19 34		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Ottawa.*	*Analyst—Dr. F. X. Valade, Ottawa*—Con.		p. c.	p. c.
Mar. 14	18132	K. McDonald, Market Square.	Bradley Fertilizer Co., Boston, Mass	Bradley's Dissolved Bone with Potash—		
				Guaranteed	0·82	1·00
				Standard sample	1·88	2·28
				Sample as sold	1·19	1·44
		Quebec.				
April 7	18929	J. B. Renaud & Co., 122 St. Paul Street.	Provincial Chemical Fertilizer Co., St. John, N.B.	Potato Phosphate—		
				Guaranteed	3·49	4·24
				Standard sample	4·85	5·89
				Sample as sold	1·40	1·70
do 7	18930	do ..	do ..	Victor Guano—		
				Guaranteed	1·40	1·70
				Standard sample	2·80	3·40
				Sample as sold	1·54	1·87
do 7	18931	do ..	do ..	Imperial Superphosphate		
				Guaranteed	3·19	3·87
				Standard sample	3·75	4·55
				Sample as sold	1·61	1·96
do 7	18932	P. T. Legare, 273 St. Paul Street.	Nichol's Chemical Co., Capelton, Que.	Victor—		
				Guaranteed	....	2·00
				Standard sample	2·52	3·06
				Sample as sold	1·75	2·13
do 7	18933	do ..	do ..	Royal Canadian—		
				Guaranteed	.....	4·00
				Standard sample	4·26	5·17
				Sample as sold	3·92	4·48
April 7	18934	do ..	do ..	Reliance—		
				Guaranteed	.....	2·00
				Standard sample	1·98	2·41
				Sample as sold	1·54	1·87
		Richmond, Que.				
do 20	18940	J. D. Smith, Main Street.	Bradley Fertilizer Co., Boston, Mass	Eclipse Phosphate—		
				Guaranteed	1·00	1·25
				Standard sample	1·29	1·56
				Sample as sold	1·96	2·38
do 20	18941	J. H. Taylor	Pacific Guano Co., Boston, Mass.	Soluble Pacific Guano—		
				Guaranteed	2·25	2·75
				Standard sample	1·78	2·81
				Sample as sold	2·03	2·47
do 20	18942	A. McKenzie	Bowker Fertilizer Co., Boston, Mass	Bone and Potash—		
				Guaranteed	.....	2·00
				Standard sample	1·67	2·02
				Sample as sold	1·82	2·21
		St. Catharines, Ont.	*Analyst—Dr. W. H. Ellis, Toronto.*			
Mar. 31	18162	Titterington & Co.	Bradley Fertilizer Co., Boston, Mass	Bradley's B. D. Sea-fowl Guano—		
				Guaranteed	2·06	2·50
				Standard sample	2·66	3·23
				Sample as sold	2·90	3·60

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Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
5·00	3·00	2·00	10·00	8·00	2·15	.....	15 53	18132	Genuine.
5·75	2·32	2·68	10·75	8·07	2·76	1·27	19 59		
6·92	3·57	1·05	11·54	10·49	1·93	17·93	17 44		
11·83	.....	2·48	14·31	.....	5·94	.....	31 30	18929	Deficient in ammonia and therefore adulterated.
10·07	0·04	2·17	12·28	10·11	6·83	9·30	33 10		
9·94	2·70	2·27	14·91	12·64	4·98	11·32	24 17		
8·24	.....	7·46	15·70	...	3·59	...	19 26	18930	A little below guarantee in potash.
7·83	1·64	6·65	16·12	9·47	1·41	10·80	21 41		
7·10	1·56	6·96	15·62	8·66	1·04	12·22	17 10		
12·10	.....	2·56	14·66	....	1·02	....	25 83	18931	Deficient in ammonia and therefore adulterated.
6·55	1·12	5·12	12·79	7·67	7·53	7·00	31 11		
8·52	2·80	2·88	14·20	11·32	2·41	11·27	20 56		
.....	.....	.....	.....	7·00	3·00	....	....	18932	Up to guarantee.
7·42	3·82	2·36	13·60	11·24	3·21	12·12	23 23		
7·10	0·71	3·55	11·36	7·81	4·17	12·75	18 93		
.....	.....	.....	.....	9·00	5·00	.....	.....	18933	Slightly deficient in available phosphoric acid and potash.
7·48	2·63	1·73	11·84	10·11	5·05	8·82	27 89		
8·52	0·42	1·71	10·65	8·94	4·14	9 42	24 95		
.....	.....	.....	.....	6·00	2·00	.....	.....	18934	Genuine.
4·16	3·00	9·92	17·08	7·16	2·14	6·44	18 27		
4·26	0·95	4·73	9·94	5·21	2·15	9·55	13 54		
8·00	2·00	2·00	12·00	10·00	1·50	... .	16 38	18940	Up to guarantee.
7·99	1·99	2·30	12·28	9·98	1·70	1·24	17 36		
9·98	1·07	2·45	13·50	11·05	1·63	19·69	20 32		
7·00	1·50	2·00	10·50	8·50	2·00	15·00	18 15	18941	do
5·12	3·20	3·20	11·52	8·32	2·28	15·34	17 28		
5·68	3·12	2·56	11·36	8·80	1·83	14·18	17 81		
5·00	.....	....	7·00	5·00	2·00	.....		18942	do
5·05	1·10	1·79	7·94	6·15	3·03	10·65	15 64		
4·26	2·06	7·88	14·20	6·32	2·15	6·62	16 37		
5·00	3·00	2·00	10·00	8·00	1·50	....	16·42	18162	Up to standard and guarantee.
6·15	1·79	2·68	10·62	7·94	2·16	1·03	18·80		
7·00	0·22	1·20	8·42	7·22	1·92	13·06	17·98		

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia
1899.		*St. Catharines, Ont*	*Analyst—Dr. W. H. Ellis, Toronto*—Con.		p.c.	p.c
Mar. 31	18163	Titterington & Co.	Bradley Fertilizer Co., Boston, Mass	Bradley's Potato Fertilizer		
				Guaranteed	2·06	2·50
				Standard sample	2·24	2·72
				Sample as sold	2·08	2·54
do 31	18164	Standard Fertilizer Co., Smith's Falls, Ont.	Vendors	Bone Meal—		
				Guaranteed		4·50
				Standard sample	4·03	4·93
				Sample as sold	4·10	5·10
do 31	18165	do	do	Corn and Grass Fertilizer:		
				Guaranteed		2·00
				Standard sample	2·61	3·17
				Sample as sold	1·75	2·18
		Stratford, Ont.	*Analyst—Prof. E. B. Kenrick, Winnipeg.*			
do 8	19242	W. R. Marshall	Bradley Fertilizer Co., Boston, Mass	Bradley's Bone and Potash—		
				Guaranteed	0·82	1·00
		Ingersoll, Ont.		Standard sample	1·88	2·28
				Sample as sold	0·92	1 12
do 9	19243	W. F. Markham		Thomas' Phosphate:		
				Guaranteed		
				Standard sample		
				Sample as sold		
do 9	19244	Ingersoll Packing Co.	Vendors	Flesh and Blood:		
				Guaranteed		7·00
				Standard sample	7 77	9·41
				Sample as sold	6·99	8·49
do 9	19245	Ingersoll Packing Co.	Vendors	Bone:		
				Guaranteed		
				Standard sample		
				Sample as sold	4·79	5·82
		London, Ont				
do 10	19246	A McInnis	do	Crown Jewel Fertilizer:		
				Guaranteed		
				Standard sample		
				Sample as sold	7·56	9·18
		St. Thomas, Ont.				
do 11	19247	J. Marlott	Bradley Fertilizer Co., Boston, Mass	B. D. Seafowl Guano:		
				Guaranteed	2·06	2·50
				Standard sample	2·66	3·23
				Sample as sold	1·98	2·40
do 11	19248	Stacey Hardware Co.	Provincial Fertilizer Co., St. John, N.B.	Potato Fertilizer:		
				Guaranteed	3·49	4·24
				Standard sample	4·85	5·89
				Sample as sold	0·85	1·03
do 11	19249	do	do	Floral Life Fertilizer:		
				Guaranteed		
				Standard sample		
				Sample as sold	2·98	3·62

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Samples of Fertilizers as sold in 1899.

Results of Analysis.									
Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	$ cts.		
6·00	3·60	2·00	11·00	9·00	3·25	...	18 25	18163	Up to standard and up to guarantee.
6·71	1·73	2·18	10·62	8·44	3·90	1·19	20 08		
6·55	3·13	2·02	11·80	9·78	3·19	13·95	20 25		
...	...	...	22·50	...	...	...	...	18164	Genuine and up to guarantee.
0·70	7·24	16·37	24·31	24·31	...	6·15	34 91		
0·29	10·34	12·13	22·47	22·47	...	4·63	33 69		
...	...	...	9·00	7·00	4·00	...	...	18165	do
7·99	0·71	4·35	13·05	8·70	4·59	14·95	24 28		
7·51	1·31	3·99	12·81	8·82	3·71	14·72	21 15		
5·00	3·00	2·00	10·00	8·00	2·15	...	15 53	19242	Genuine.
5·75	2·32	2·68	10·75	8·07	2·76	1·27	19 59		
4·79	4·25	2·73	11·77	9·04	1·76	9·83	15 40		
...	...	...	16·00	...	...	...	...	19243	do
...	3·97	11·38	15·35	3·97	...	0.03	12 34		
...	6·92	9·62	16·54	6·92	...	0·35	14 34		
...	...	...	8·00	...	...	...	...	19244	do
0·64	4·74	6·65	12·03	12·03	0·38	1·17	31 68		
Traces.	6·02	8·35	14·37	14·87	0·31	7·26	32 06		
...	...	...	...	...	...	...	...	19245	Not registered.
Trace.	7·57	11·27	18·84	18·84	0·24	5·87	31 35		Not guaranteed.
...	...	...	...	...	...	...	...	19246	Not registered.
Trace.	3·53	5·42	8·95	3·53	0·21	8·10	23 87		Not guaranteed.
5·00	3·00	2·00	10·00	8·00	1·50	...	16 42	19247	Genuine.
6·15	1·79	2·68	10·62	7·94	2·16	1·03	18 80		
4·18	4·37	3·69	12·24	8·55	1·14	11·04	16 89		
11·83	...	2·48	14·31	...	5·94	...	31 30	19248	Adulterated.
10·07	0·04	2·17	12·28	10·11	6·83	9·30	33 10		
5·60	5·72	3·41	14·73	11·32	0·36	13·04	16 45		
...	...	...	...	...	...	...	...	19249	Not registered.
13·27	None.	Trace.	13·27	...	5·87	13·46	29 23		Not guaranteed.

TABLE II.—RESULTS of the Examination of 96

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher, as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1899.		*Guelph, Ont.*	*Analyst—Prof. E. B. Kenrick, Winnipeg.*		p. c.	p. c.
April 29	19251	From Agricultural College.	Standard Fertilizer Co., Smith's Falls, Ont.	Nitrate of Potash:		
				Guaranteed		
				Standard sample		
				Sample as sold		
		Barrie, Ont.				
May 1	19252	J. Henderson, Hardware merchant.	Bradley Fertilizer Co., Boston, Mass.	Bradley's Complete Manure for Potatoes and Vegetables:		
				Guaranteed	3·30	4·01
				Standard sample	3·47	4·20
				Sample as sold	2·97	3·62
do 1	19253	J. H. Willis	Provincial Chemical Co., St. John, N.B.	Fruit Tree Fertilizer:		
				Guaranteed	4·96	6·02
				Standard sample	4 48	5·44
				Sample as sold	0·90	1·09
		Collingwood, Ont.				
do 1	19254	Colllngwood Packing Co.	Vendors	Tankage:		
				Guaranteed		
				Standard sample		
				Sample as sold	7·32	8·89
		Paris, Ont.				
do 1	19255	O'Neil & Davidson	Bradley Fertilizer Co.	Dissolved Bone and Potash:		
				Guaranteed	0·82	1·00
				Standard sample	1·88	2·28
				Sample as sold	1·15	1 40
do 1	19256	do	do	Bradley's Potato Fertilizer:		
				Guaranteed	2·06	2·50
				Standard sample	2·24	2·72
				Sample as sold	2·83	3·44
		London, Ont.				
do 1	19257	John S. Pearce	Michigan Carbon Works, Detroit.	Homestead Potato Grower		
				Guaranteed		
				Standard sample	1·92	2·33
				Sample as sold	2·57	3·12
do 1	19258	do	do	Homestead Bone Black:		
				Guaranteed		
				Standard sample	2·67	3·24
				Sample as sold	2·45	2·98

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Samples of Fertilizers as sold in 1899.

Results of Analysis.							Relative value per ton of 2,000 lbs.	No. of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Reverted or Citrate Soluble.	Insoluble.	Total.	Total available					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
.....	.....	.....	.....	.. ..	.....	.. ....	. ..	19251	Not guaranteed. (Potassium chloride—contains no nitrate of potash.)
.....	.....	.....	.....	.....	.....	.....	.....		
.....	.....	.....	.....	.....	52·19	..... .	54 80		
6·00	2 00	1·00	9·00	8·00	7·00	.....	24 97	19252	Below guarantee in potash.
7·20	.....	2·39	9·59	7·20	8·10	10·16	26 19		
3·45	4·12	3·21	10·78	7·57	2·94	11·54	19 84		
7·01	.....	8·20	15·21	.....	5·04	... .	33 80	19253	Adulterated.
8·57	1·66	2·56	12·79	10·23	7·01	8·25	32 78		
3·56	5·33	5·89	14·78	8·89	3·51	10·47	21 87		
.... ..	.....	.....	.....	....	.....	.....	..	19254	Not registered.
.....	.....	.....	.....	.....	.....	.....	.....		
Trace.	6 35	5·14	11·49	11·49	.....	6·66	29 69		Not guaranteed.
5·00	3·00	2·00	10·00	8·00	2·15	....	15 53	19255	Genuine.
5·75	2·32	2·68	10·75	8·07	2·76	1·27	19 59		
3·12	3·95	3·43	10·50	7·07	1·53	11·53	15 88		
6 00	3·00	2·00	11·00	9·00	3·25	.....	18 25	19256	Below guarantee in available phosphoric acid and potash.
6·71	1·73	2·18	10·62	8·44	3·90	1·19	20 08		
2·95	3·92	3·44	10·31	6·87	2·50	14·92	18 11		
... ...	.....	.....	.....	.....	.....	. .....	..	19257	Not guaranteed.
8·80	1·11	0·32	10·23	9·91	5·61	15·18	22 37		
7·44	1·01	1·32	9·77	8·45	.....	12·42	16 60		
.....	.....	...	.. .. ..	... ...	.....	....	....	19258	do
8·00	1·28	1·28	10·56	9·28	2·18	10 00	20 99		
8·13	0·91	2·33	11·37	9·04	....	10 42	17 43		

MEMORANDA ON MANURES.

Since this publication is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared, regarding the application of natural manures and artificial fertilizers.

It is nearly fifty years since Stoeckhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarrassment and possibly ruin.

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for, when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it, As regards the best way of doing this, Hellriegel, in a recent publication,* has related his experience. He recognizes how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to *see* a distinct difference between the unmanured plots and manured field, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the development of the grains. In the event of such a distinct difference being invisible the manure is justly discredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every year would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of the fertilizers afterwards applied.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

* Düngung's versuch und Vegetations versuch ; Berlin, 1897.

In many of the fertilizers described in this and former reports their, cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the nitrogen of the atmosphere. Nevertheless, the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from $8 to $14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables, or produce upon his own farm.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable-yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff, this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The latter experiments of Heiden and Holdefleiss place it at 23·4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when, as is very frequently the case in Canada, the manure is treated with the grossest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the bard-yard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 lbs. is produced in fresh condition annually by each animal, and that it contains 0·4 per cent of nitrogen, it follows that a loss of 72 pounds of nitrogen, worth $8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with 2 lbs. of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about $2.50 annually for each 1,000 lbs. live weight, but, by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg in 1859, entitled "Ein Pfund Stickstoff kaum einen Groschen" which may be freely translated "a pound of nitrogen for a penny," Dr. Meyer-Altenberg maintained that ground gypsum is the very best preservative of barn-yard manure when applied in the stable, because it secures "certainty and completeness of effect, ease of execution, and the lowest possible cost." He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition, without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out that the use of gypsum, without subsequent careful treatment of the dungheaps, does not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. König's prize essay "How can the farmer preserve and increase the stock of nitrogen on his property?" (Berlin, 1887). In a special chapter of this work the author discusses "The evolution of free nitrogen during the fermentation and storage of stable manure," describes the experiments which were made from 1860 to 1885 regarding its treatment and gives finally the results of the discussion from which the following sentences may be translated with advantage:—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.

2. This loss is the greater the more the atmosphere has access to the decomposing mass.

3. Too much moisture is just as hurtful as too little. Stable manure requiries such a degree of humidity as permits its components to lie close to each other.

4. The addition of substances which fix the ammonia (such as gypsum, kainie and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little or no value if care is not taken at the same time to prevent as much as possible the access of air.*

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

One thing in connection with this question is perfectly certain and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further, if the work from which the foregoing quotations have been made, be carefully studied and also the experiments and writings of Holdefleiss, Vogel and others, it appears to be quite certain that the use of the same article, or of the gypsum produced in the manufacture of "acid-phosphate," completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure after treatment with gypsum, on to the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past, at the Central Experimental Farm by Director Saunders (See Reports for 1898).

Not only has the addition of substances which have the faculty of fixing ammonia, been recommended for stable manure but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessmann, Chemist for that institution :—

"*The practice of adding to the manurial refuse materials of the farm as stable manure, "vegetable compost, etc., such single commercial manurial substances as will enrich them "in the direction desirable for any particular crop to be raised, does not yet receive that "degree of general attention, which it deserves.*" (The italics are in the original.) An "addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid "in the form of fine ground South Carolina or Florida soft phosphate, etc., will in many "instances not only improve their general fitness as complete manure, but quite fre-"quently permit a material reduction in the amount of barn-yard manure ordinarily "considered sufficient to secure satisfactory results.

" Average composition of seventy five samples of barn-yard manure :—

	Per cent.	Lbs. per ton.
" Moisture	67·00	1,340·0
" Nitrogen	0·52	10·4
" Potassium Oxide	0·56	11·2
" Phosphoric Acid	0·39	7·8

" The average barn-yard manure contains, it will be noticed from the above state-" ment, a larger percentage of nitrogen, as compared with its potash and phosphoric acid " than is generally considered economical. An addition of from thirty to forty pounds " of muriate of potash, and of one hundred pounds of fine ground natural phosphate " (soft Florida or South Carolina floats) per ton of barnyard manure would greatly "increase its value as an efficient and economical general fertilizer."

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents in which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be

found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous No better application can be made of the wood ashes produced in the farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps, by a judicious course of crop rotation. For more than a century agricultural chemists have discussed the question as to whether free atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosæ, such as beans, peas, lentils, vetches, clovers, alfalfa, serradella, &c. Even the great English agriculturists, Sir J. B. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891. Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says: "Lupines require so little manure that they in fact replace it; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land."

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without result up to the present hour.

Professor König, of Münster, gives the following summary of Schultz's experience:—

"Schultz acquired the farm Lupitz in the year 1855; its soil consisted of a poor, cold diluvial sand; the profit in working it was very small. Lupines yielded indeed as fodder tolerable results, but when used as green manuring for rye or oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total result was not satisfactory.

"Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation, and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine "sick." Schultz made his first trial on this field, manuring it with 300 lbs. kainite per morgen (1 Prussian morgen=0·631 acre); the sickness was at once cured, and for twenty-five years afterwards Schultz has has grown lupines on this ground without interruption, always with the application of 300 lbs. kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, the 300 lbs. kainite were applied here and ploughed in in the fall, the ground was cured, although an application of phosphates had not produced the desired results.

"The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results according to the nature of the crops which preceded the grain. For instance, while grain sowed after lupines and manured with potash and phosphates yielded very good and remunerative harvests, these were not to be obained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way; that lupines as deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops; that, on the other hand, the application of potash and phosphates to grain, after a preceding grain crop, is without effect, for the reason that the latter had consumed the stock of nitrogen. Grain crops always reduce this stock; never increase it. Schultz has given the name 'nitrogen collectors' to the lupines and similar plants, while grains are called 'nitrogen consumers.' His system of rotatiou is therefore the following:—Sow first nitrogen collectors (lupines, peas, beans, vetches, clover, lucerne, serradella, &c.,) or, as they have been called, renovating crops, and give them 300 lbs. kainite per morgen, with perhaps an adition of 20 lbs. phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 lbs. kainite and 20 lbs. phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element."

The foregoing description is taken from Professor König's "Stickstoff Vorrath," published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel, and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work:—

1. "Peas, alfalfa, serradella, lupine, clover in all probability, and appearently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

2. "There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.

3. "That there is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.

4. "The cereals with which the experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.

5. "In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro-organism or their spores were floating in the air and were deposited in the pots in which the plants grew.

6. "As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.

7. "In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where there were no root tubercles; it was especially large with oat plants, and largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the

legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.

"Practical inferences:—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, peas, beans, vetches and cow peas as renovating crops, and enforces the importance of these crops to restore fertility to exhausted soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care to collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder."

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in appropriating and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebigs teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses is fertilizing material which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric acid and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be in the highest degree imperfect. At Berlin it has been proved, that of the nitrogen contained in its sewage, at the very most only 13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a source of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds, several feet in thickness lying above the peat. The following tests have been made in the Inland Revenue Laboratory, of moss litter from various localities in the Dominion :—

—	Moisture.	Ash.	Nitrogen.
	p. c.	p. c.	p. c.
Sphagnum moss from Shippegan, N.B.	12·45	1·55	0·55
Light coloured moss litter from Lincoln Parish, N.B.	11·55	1·40	1·79
Dark coloured sample from the foregoing locality	10·95	0·80	1·06
Light coloured moss litter from Caledonia Springs	10·00	1·60	2·95
Dark coloured moss litter from same locality	11·60	2·70	2·23
Peat from the same locality	10·95	3 90	2·94
Surface moss from the Mer Bleu at Eastman's	10·85	2·80	0·71
Moss litter from bog in Welland County, Ont.	3·85	4·70	1·51
Peat lying underneath the foregoing	5·30	4·85	1·41
Peat from the same locality, lying 4½ feet below surface	3·25	41·25	1·52
Moss litter from Musquash, N.B., upper layer	11·50	0·95	0·82
Moss litter from same locality, lower layer	12·50	0·90	0·72
Peat from St. Bridget, Prov. Quebec	13·30	2·50	1·48

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also practised in Congleton, Cheshire, England.* It, of course, at once recalls the dry earth system regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purposes in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss little will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is valueless from an agricultural point of view, but this is not the case with moss litter, which as the above analysis show, often contains as much nitrogeu as ordinary barn-yard manure. Numerous analysis have been made of moss litter manure as produced in Germany, and its average contents from seven different towns may here be stated.

	p. cent.	lbs. per ton.		Value per ton
Nitrogen	0.664	13·28	at 13c.	$1 72
Phosphoric acid	0·350	7·00	5	0 35
Potash	0·285	5·70	5¼	0 30
Water	83·00			$2 37

* In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs.

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and it is now being produced in Welland County, Ontario. From the latter locality I was supplied with several bales of the moss litter for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reports that 100 lbs of moss litter were sufficient for drying 800 lbs. of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in my office without attracting notice, and indeed it was quite devoid of odour. Its analyses gave the following results:

	p. c.	lbs. per ton.		Value per ton
Nitrogen	1·31	26·2	at 13c.	$3 41
Phosphoric acid	0·90	18·0	" 5	0 90
Potash	0·14	2·8	" 5¼	0 15
Water	65·47			$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about $2 per ton; with 67 per cent water, as in the case of the average given above by Dr. Gossmann, the value is nearly $2.25. Therefore, much better results might be expected agriculturally from a "moss manure" of the composition just described.

Moss litter might also be applied with great advantage in public urinals. When a sample of it was supersaturated with urine and dried, and this process repeated several times, no offensive odours were developed and the product was found on analysis to contain 12·41 per cent of nitrogen which is equal to a valuation of $29.78 per ton.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great advantage on agriculture.

APPENDIX U.

BULLETIN NO 66.—BELLADONNA PLASTERS—1899.

OTTAWA, July 29, 1899.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—On June 16, 1898, I had the honour of addressing a report to you on Belladonna plasters, which you caused to be published as Bulletin No. 58 of this branch. Exception was afterwards taken to some of the results stated in it by Messrs. Johnson & Johnson, New Brunswick, N.J., who addressed a communication on the subject to the Minister of Inland Revenue, which was received on the 26th January last. To the complaints which Messrs. Johnson & Johnson make concerning the bulletin, I have to remark as follows :—

1. It is said that the samples being of American manufacture should have been compared with the standard of the United States Pharmacopœia. Considering how indefinite that standard is, and that our district analysts have a better acquaintance with the British Pharmacopœia, they are surely to be excused for comparing the samples only with the requirements of the latter. As regards what the United States standard really is, I have to refer to the remarks of my assistant, Mr. A. McGill, on the matter, which will be found fully discussed in his report, also herewith submitted.

2. A charge of inaccuracy is based upon the circumstance that the reports of different analysts vary as regards the quantity of total alkaloids or tropeines contained in samples bearing the same numbers. Each sample, however, consisted of several plasters designated by the same number, and as a rule one of these was used for each assay. It is not to be assumed, however, that the plastermass on each was identical. In fact, it will be shown in this report that plasters purchased at one and the same time and place and said to be of the same manufacture were not in all cases identical as regards their contents in total alkaloids. It is further to be remembered that the district analysts in the Dominion are independent officials, who may possibly practice different methods of analysis, and who are not in the habit of receiving instructions, but only suggestions, from this laboratory.

3. It is characterized as a gross error on the part of some of the analysts that they have identified the alkaloids of *Scopolia carniolica* as tropeines. Without admitting this to be the case, it would, however, if true, seem to be very excusable, since hyoscyamine, the principal alkaloid of *Atropa Belladonna*, is also present in many varieties of *Scopolia*. It is quite certain that our district analysts did not try to ascertain whether extracts from the last named genus had been used in preparing the various plasters. Whether this has been done, or rather whether such determination is possible will be shown in Mr. McGill's report.

Subsequent to presenting the complaint above mentioned, the agent of Messrs. Johnson & Johnson, Mr. Gilmour of Montreal, obtained an interview with the Minister of Inland Revenue, who ultimately decided that another collection of belladonna plasters should be made, that duplicates of the samples collected of the Johnson & Johnson manufacture should be sent to that firm, that as far as possible the examinations should be made by one of the district analysts, and that an agreement should be

arrived at as regards the method of analysis to be employed. After correspondence with Messrs. Johnson & Johnson concerning the latter point, it was agreed that the following process should be followed :—

PROCESS OF ASSAY OF BELLADONNA PLASTERS, SUGGESTED BY RESEARCH COMMITTEE D, COMMITTEE OF REVISION, UNITED STATES PHARMACOPŒIA.

If the plaster to be assayed approximates the United States Pharmacopœia standard of strength, one plaster, or about 8 grammes of mass, is sufficient for each determination; if weaker, correspondingly more should be taken, if accurate results are expected. The quantities of solvents, &c., given are suitable for one plaster of ordinary size. Weigh the plaster after removing all cloth except that upon which the mass is spread, cut it into strips, and place it into a beaker of 100cc. capacity with 50cc. of chloroform and 10 drops of 10 per cent ammonia water. Stir with a glass rod until the mass is entirely removed from the cloth, which usually requires five to ten minutes. Heating is unnecessary, and is apt to cause loss of alkaloid by saponification. Decant the chloroform mixture into a beaker of similar size and add to it 40cc. of 91 per cent (by weight) alcohol. Stir gently until all rubber has separated in compact form, then leave it undisturbed for a few minutes and pour off the supernatant liquid into a separator of at least 250cc. capacity. Wash the cloth in the first beaker with 25cc. of chloroform and 5 drops of ammonia water, decant the washings into the second beaker, and redissolve with them the precipitated rubber. Stir this mixture until it is perfectly free from lumps, then precipitate the rubber by addition of 20cc. of alcohol and proceed as before, adding the chloroform-alcohol solution to that in the separator. Repeat this procedure once more, or until all mass is removed from the cloth and beaker. Dry the cloth at a low heat, cool, and weigh it. The chloroform-alcohol solution is of a light yellowish or brownish colour, the depth of colour depending mainly on the proportion of extract of belladonna (or scopolia) present. If the plaster contains leaf extract, the solution is, of course, green. It is nearly always more of less turbid from minute particles of rubber held suspended, which do not settle to the bottom except upon standing for some time. This suspended matter separates out during the next stage of the process and introduces complications. Filtration is impracticable, as the filter soon becomes covered with an impervious layer of rubber. When the chloroform mixture and alcohol are shaken vigorously in a stoppered flask, instead of stirring in a beaker with a rod, the supernatant solution will, as a rule, be nearly clear, but a portion of the precipitated rubber will be in a light flocculent condition, so that only a part of the liquid can be decanted without carrying a considerable quantity of rubber with it. The other plan was, upon the whole, considered the best, particularly as the presence of this small amount of rubber does not materially affect the accuracy of the method, but merely necessitates a little more care in the manipulation. The quantity depends, to some extent, on the proportion of alcohol used to precipitate the rubber from the chloroform. Although nearly all of the rubber is precipitated by a volume of alcohol one-half that of the chloroform, it was found that practically 4 volumes of alcohol are required to insure a maximum precipitation from 5 volumes of chloroform. When this proportion of alcohol is used, the rubber carried over into the next stage of the process is too small in amount to influence the result.

To the combined chloroform-alcohol solutions in the separator add 20cc. of water containing 2 per cent of sulphuric or hydrochloric acid, and agitate by a gentle rotatory motion and inversion of the separator during five minutes. Vigorous shaking causes emulsification. After complete separation of the liquids, draw off the chloroform solution into another separator, together with any solid matter that may have separated during the agitation, and collected at the line of contact of the two liquids. Pour out from the top into a third separator, or any other convenient receptacle, the acid solution, which contains most of the alkaloid. Wash out the empty separator with 10cc. of water containing a few drops of dilute acid, draw the washings off into the seconp separator and agitate this as before. Draw off the chloroform-alcohol into the first

separator and add the water solution to the first portion. If the contact line of the two liquids is perfect, so as to permit a complete separation of them, only a third portion of acidulated water will be required to remove all alkaloid from the chloroform, notwithstanding the presence of a large proportion of alcohol; but if any considerable amount of solid matter collects at the line of contact, a fourth or even fifth portion will be necessary.

Make the combined acid solutions alkaline with ammonia-water and wash out the alkaloid in a separator with successive portions of 20, 10, and 10cc. of chloroform, observing the same precautions to avoid emulsions as before. Wash the combined chloroform solutions with 10cc. of water to remove any adhering ammonium salts or other impurities drawn off with the chloroform, and after complete separation transfer the chloroform solution to a small flask. Agitate the water in the separator with 10cc. of chloroform and after separation add the latter to that in the flask.

Evaporate or distil off the chloroform. If distilled great care must be taken that the tube and cork connecting the flask with the condenser are perfectly clean, as the estimation would be vitiated by the presence of even minute quantities of acids or alkalies If the chloroform is to be evaporated, precautions are necessary, in view of the observations of Dieterich, that alkaloids may become partially neutralized by hydrochloric acid, which is formed through the action of the gas flame on chloroform vapours. It is advisable, therefore, not to conduct the evaporation in shallow vessels, unless it can be done through a source of heat not necessitating the use of a flame. It is considered safe, however, to evaporate on a water bath over a gas flame, if the chloroform solution is contained in a flask having a narrow neck, and evaporation carried on rapidly by boiling.

To the alkaloidal residue add 4cc. $\frac{N}{20}$ acid and agitate by rotation until all alkaloid is dissolved. This is not always easy to decide, as there is nearly always more or less of an insoluble residue. This usually remains on the bottom of the flask as a semifluid layer, which may be brought in thorough contact with the acid by inclining the flask so that different surfaces of the residue are always exposed to the action of the acid. When the residue no longer visibly diminishes in size, agitate about 5 minutes longer, to insure perfect solution of the alkaloid. Solution should be effected in the cold, as heating with the excess of acid might partially saponify the alkaloid. Add 50cc. of neutral distilled water, then 0·5cc of a 1 per cent solution of haematoxylin in neutral alcohol and add $\frac{N}{20}$ alkali until the colour of the solution changes from yellow to a dull red. Subtract the number of cubic centimetre, required from 4, multiply the remainder by 0·0145 (the $\frac{N}{20}$ factor for atropine and its isomers) and by 100, and divide the product by the net weight, in grammes of the plaster mass taken for assay. To illustrate, a plaster weighing 12·25 grammes, with cloth, and the cloth weighing 3·55 grammes, requires 1·58cc. of $\frac{N}{20}$ alkali to neutralize the excess of acid, then:

$$\frac{(4-1{\cdot}58) \times 0{\cdot}0145 \times 100}{12{\cdot}25-3{\cdot}55} = 0{\cdot}404 \text{ per cent alkaloid.}$$

The separated alkaloid is always too impure to admit of gravimetric estimation, and further purification entails too much loss for quantitative purposes. The impurities may, under conditions, also interfere in the volumetric estimation. If the alkaloid is dissolved with the aid of alcohol in the standard acid, the impurities will become diffused throughout the liquid, making a very turbid solution. Under these conditions the end reaction is not sharp. The change of colour is not simply masked, as the impurities are nearly always of a light colour, but, in some way not understood, they prevent a decided change of colour until a considerable excess of alkali has been added. A rapid and convenient mode of dissolving the alkaloid for titration is the addition of about 0·5cc. of chloroform at the time of adding the standard acid. The chloroform dissolves a portion of the impurities and admits of a rapid solution of the alkaloid in the acid, at the same time leaving the acid solution practically clear. The end reaction is then quite sharp, but the red colour partially fades upon shaking, as the liberated alkaloid is taken up by the chloroform. If this is not kept in mind, the

neutral point may be overstepped. The end reaction should be placed at the point where the colour changes throughout the liquid, although it may disappear after further shaking or stirring. This ends the description of the process.

In accordance with the decision of the Minister of Inland Revenue, 34 samples of belladonna plasters were collected during January and February of this year. The particulars as to where these were purchased, by whom they were manufactured, by whom analysed, the results of the analysis, &c., are given in the tabular statement appended to this report. The analysts' names are also given and it will be seen that although many of the samples were examined by my assistant Mr. A. McGill, most of those manufactured by Johnson & Johnson were submitted to Mr. F. T. Harrison, district analyst, London, Ont. As previously arranged the vendors' duplicates of 14 of these samples were, on the 22nd February, sent to Messrs. Gilmour Bros. & Co., the agents in Montreal of Messrs. Johnson & Johnson. On the 27th April I communicated the percentage of total alkaloids found by Mr. Harrison in the same samples to Messrs. Gilmour Bros. & Co., and on the 4th May I received from the firm a copy of a report by Mr. J. Bemrose of Montreal, giving the result of his analysis of the samples which had been submitted to him by Messrs. Gilmour.

The following is a comparison of these results with those obtained by Mr. Harrison :—

Percentage total alkaloids according to

Sample No.	F. T. Harrison.	J. Bemrose.
18906	0·332	0·323
18907	0·137	0·229
18908	0·148	0·245
18912	0·150	0·203
18914	0·123	0·335
18920	0·354	0·367
18113	0·233	0 252
18115	0·246	0·203
18117	0·254	0·207
18118	0·234	0·215
18120	0·155	0·291
18121	0·312	0·259
18122	0·282	0·205
18123	0·323	0·328

In making these analyses Mr. Harrison used the same method as above given, with the slight modification of continuing the shaking, both with the dilute acid and chloroform, longer than the time stated to be necessary. Further, in the treatment with the dilute acid, he used five successive portions of it, and after making the acid solution alkaline, he used successive portions of 20, 10, 10 and 10 cb. cm. chloroform to wash it out. Then the chloroformic solution was washed out with 10 cb. cm. of water, and the latter washed with 10 cb. cm. additional chloroform which was added to the chloroformic solution.

It will be observed that in at least one-half of the samples there are very considerable differences between the results of Mr. Harrison and those of Mr. Bemrose. It must not, however, be supposed on that account that the analyses are defective or that the analysts have not exercised sufficient care. It is quite possible that the coating material of the different plasters of one purchase may vary in composition. On reference to the table and to the samples numbered 18905, 18910, 18914, 18118 and 18903 it will be found that the analysis of a second plaster from the same sample sometimes gives very differens results from the one first examined From this it is evident that the plasters in one purchase cannot be regarded as identical or as duplicates. The only way of obtaining true duplicates from the plasters of one sample is by the method of combining two plasters described by Mr. McGill in his report.

With reference to the percentage of total alkaloids or tropeines obtained by Mr. Harrison in analysing the fourteen samples above mentioned, it varies from 0·354 to

0·123, the latter figure being only one-fourth of the quantity required by the British Pharmacopœia (0·500 per cent). Of course these differences may be owing to variations in the strength of the drug employed. The recorded assays of Belladonna, both leaf and root, show such great variations in alkaloidal strength as to prove the necessity of standardizing, with reference to alkaloid contents, all preparations made from them. Provision is made for this in the British Pharmacopœia, and it is to be regretted that the Belladonna Extract (and consequently Belladonna Plaster) of the United States Pharmacopœia is not similarly standardized. Manufacturers under that Pharmacopœia may place on the market plasters having less than half the strength of the British Pharmacopœia plaster, and still claim for their product that it fulfils the requirements of the United States Pharmacopœia.

So far as the plasters of the four manufacturers named in the table are concerned, the average showing of Bulletin No. 58 (omitting the Montreal figures) is not essentially different from that exhibited in this report. The following is the comparison:—

Mean percentage of alkoloids:

	From Bulletin No. 59.	From present Report.
Seabury & Johnson	0·421	0·446
Johnson & Johnson	0·182	0·222
Bauer & Black	0·101	0·081
Davis & Lawrence	0·060	0·052

It is to be remembered that a maximum error of 0·020 per cent is inherent in the method.

A large amount of the work detailed in the table was carried out by Mr. McGill, and I have to direct your attention to his report and memoranda, in which he gives details of the method employed by him, which is, however, in its main features the same as that used by Mr. Harrison. The results reported by Mr. McGill of examining twenty-seven samples will be found in the tabulated statement, as well as his opinions regarding them. Mr. McGill also furnishes an able and exhaustive discussion of the whole subject, which will be of the utmost interest and advantage to all druggists or persons engaged in pharmaceutical studies. I beg to recommend the publication of Mr. McGill's report and memoranda, as well as of this report with the subjoined table.

I have the honourr to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

Results of the Examination of 34 Samples of Belladonna Plasters.

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Constituents found in the Plasters. Total weight of Plaster Mass.	Weight of Total Alkaloids.	Weight of Total Alkaloids.	Name of Analyst.	Analyst's Remarks.
1899.		Plasters.	$ cts.	*Montreal.*		Gram's.	Gram's.	p. c.		
Feb. 3.	18903	6	0 60	Messrs. Lyman, Sons & Co., St. Paul St.	Seabury & Johnson, New York City.	8·120	·0362	·445	McGill...	Slightly below B. P. standard.
" 3.	18904	6	0 60	do do ..	Bauer & Black, Chicago, Ill.	5·363	·0079	·128	do ...	Chlorophyll. The adhesive matter of the plaster mass does not seem to be perfectly soluble in chloroform.
" 3.	18905	6	1 00	John T. Lyons, 1 Bleury St ..	Bauer & Black.... ..	5·975	·0041	·068	do ...	Far below B. P. standard, as well as the apparent standard of U. S. P.
					Second plaster.....	6·063	·0058	·096	do ...	
" 3.	18906	6	1 00	T. E. Huot, 1934 St. Catherines St.	Johnson & Johnson, New York City.	8·017	·0258	·322	Harrison .	Below standard prescribed by B. P. Alkaloids gave reaction for atropia.
" 6.	18907	6	1 20	Dr. A. A. Bernard, 3627 Notre Dame St., St. Henri.	do do ..	7 125	·01225	·137	do .	Below standard required by B., P., also below the strength apparently required by the U. S. P. Alkaloids gave reaction for atropia.
" 7.	18908	6	1 20	A. Veilleux, Côte de passage, Lévis, Que.	do do ..	7·355	·01094	·148	do .	do do
				Quebec.						
" 7.	18909	6	1 08	T. E. Gasevreau & Frère, 336 St. John St.	Seabury & Johnson	8·193	·0344	·420	McGill...	Slightly below B. P. standard.
" 7.	18910	6	1 00	W. Brunet & Co., St. Joseph St.	Bauer & Black.....	6·832	·0032	·047	do ...	Chlorophyll.
					Second plaster ...	6·302	·0069	·110	do .	Much below B. P. standard, also below apparent standard of U. S. P.
" 7.	18911	6	0 75	Edmond Giroux & Bros., 37 St. Peter St.	Bauer & Black.....	4·731	·0045	·095	do ...	Chlorophyll present.
						5·220	·0029	·056	do ...	Far below B. P. and U. S. P. standards.
" 7.	18912	6	1 25	Henry Willis, 4 St. John St....	Johnson & Johnson	6·990	·0105	·150	Harrison .	Below strength required by B. P. and below the strength apparently required by the U. S. P.
					Second plaster	7·490	·0099	·133	do .	Alkaloids gave reaction for atropia.
" 7.	18913	6	1 20	J. J. Veldon, 122 St. Joseph...	Bauer & Black....	6·590	·0041	·062	McGill...	Chlorophyll present.
						7·120	·0042	·059	do ...	Far below B. P. and apparent U. S. P. standards.

RESULTS of the Examination of 34 Samples of Belladonna Plasters—*Concluded.*

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Constituents found in the Plasters. Total weight of Plaster Mass.	Weight of Total Alkaloids.	Weight of Total Alkaloids.	Name of Analyst.	Analyst's Remarks.
1899.		Plasters.	$ cts.	*Quebec*—Continued.		Gram's.	Gram's.	p. c.		
Feb. 8.	18914	6	1 00	L. A. Hoerner, Desforges St., Three Rivers.	Johnson & Johnson.. ..	7·120	·00575	·123	Harrison	Below strength required by B. P. and below the strength apparently required by the U. S. P.
				Montreal.	Second plaster ..	7·182	·0188	·261	do	Alkaloids gave reaction for atropia.
„ 10.	18915	6	1 25	J. G. Laviollette, 1605 Notre Dame St.	Seabury & Johnson	7·469	·0338	·453	McGill...	Slightly below B. P. standard.
„ 10.	18916	6	1 00	Henri Lanclot, St. Lawrence and Prince Arthur Sts.	do do	8·082	·0343	·424	do ...	do do
				Richmond, P.Q.						
„ 15.	18971	6	0 90	H. P. Wales	Davis & Lawrence, Montreal.	7·125 6·420	·0029 ·0022	·041 ·041	McGill.. do ..	Far below B. P. and apparent U. S. P. standards.
„ 15.	18918	6	1 20	J. C. Sutherland & Co.....	Seabury & Johnson.. ..	9·000 8·630	·0448 ·0410	·498 ·476	do .. do ..	Up to B. P. standard.
„ 15.	18919	6	0 75	L. Jutras.....	Davis & Lawrence	7·873	·0032	·010	do ..	Far below B. P. and apparent U. S. P. standards.
„ 15.	18920	6	1 20	D. J. McNanamy, Sherbrooke.	Johnson & Johnson. ...	8·650	·0306	·354	Harrison .	Below standard required by B. P. Alkaloids gave reaction for atropia.
„ 16.	18921	6	1 00	A. W. Sanborn, Coaticook.....	Seabury & Johnson	*a* 7·957 *b* 7·720	·0332 ·0295	·418 ·382	McGill ... do ..	Below B. P. standard.
„ 17.	18922	6	1 00	L. A. Bernard, Montreal	Bauer & Black....	6 311	·0055	·085	do ..	Far below B. P. and apparent U. S. P. standards.
				Smith's Falls, Ont.						
Jan. 18.	18112	5	1 00	Dr. J. S. McCallum.	Johnson & Johnson....	*a* 7·976	·0142	·178	Harrison .	The alkaloid was not tested qualitatively in this sample.
					Second plaster... .	*b* 8 160	·0158	·193	do ..	Alkaloids gave test for mydriatic alkaloid. Below standard prescribed by the B. P.

" 18.	18113	6	1 50	Wm. Johnston, druggist	Johnson & Johnson.....		7·888	·01822	·233	do ..	Alkaloids gave reaction for atropia. Below standard prescribed by the B. P.
				Brockville, Ont.							
" 18.	18114	6	1 25	F. R. Curry	Davis & Lawrence..		7·092	·0075	·106	McGill...	Much below B. P. and apparent U. S. P. standards.
" 18.	18115	6	1 25	Adam Fullerton	Johnson & Johnson... .		8·944	·022	·246	Harrison .	Alkaloids gave reaction for atropia. Below strength prescribed by the B. P.
				Port Hope, Ont.							
" 19.	18116	6	1 25	R. Deyell....	do do	*a*	6·876	·0118	·171	do ..	Alkaloids gave test for mydriatic alkaloid. Below standard prescribed by the B. P.
					Second plaster....	*b*	6·823	·0123	·180	do ..	
" 19.	18117	6	1 25	T. E. Watson.....	Johnson & Johnson.....		6·054	·0165	·254	do ..	Alkaloids gave reaction for atropia. Below standard required by the B. P.
				Peterboro', Ont.							
" 19.	18118	6	1 00	Ormond & Walsh.....	do do ...		7·235	·0169	·234	do ..	Alkaloids gave reaction for atropia. Below strength prescribed by B. P.; also below the U. S. P. strength.
					Second plaster...		7.422	·0094	·127	do ..	
" 19.	18119	6	1 25	J. D. Tully.....	Davis & Lawrence		7·766	·0024	·031	McGill...	Far below B. P. and apparent U. S. P. standards.
				Toronto.							
" 19.	18120	6	1 40	A. E. Walton, 78 Queen St. E.	Johnson & Johnson....		8·276	·0128	·155	Harrison .	Alkaloids gave reaction for atropia. Below strength prescribed by B. P.; also below the strength apparently required by the U. S. P. of 1890.
" 19.	18121	6	1 50	G. E. Gibbard, 287 King St. W.	do do		7·870	·0246	·312	do ..	Alkaloids gave reaction for atropia. Below standard prescribed by B. P.
" 19.	18122	6	1 25	Hooper & Co., 43 King St.....	do do ..		6·976	·01969	·282	do ..	do do
" 19.	18123	5	1 00	S. T. Hopper.....	do do		8·120	0262	·323	do ..	do do
					Second plaster....		9·465	·0295	·312	do ..	do do
Feb. 1.	18901	.....	.....	Gilmour Bros., Montreal.....	Johnson & Johnson.....	*a*	8·833	·0217	·246	McGill. ..	Below B. P. standard.
						b	9·002	·0217	·241	do ..	do do
" 1.	18902	.	.....	Leeming, Miles & Co., Montreal	Seabury & Johnson		8·850	·0376	·425	do ..	do do
					Second plaster		8·850	·0462	·522	do ..	Up to standard B. P. strength.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, July 26, 1899.

THOMAS MACFARLANE, Esq., F.R.S.C.,
Chief Analyst.

SIR,—I have the honour to submit to you herewith the result of the assay of twenty-seven samples of belladonna plasters, together with memoranda concerning certain questions raised during the progress of this examination. The work involved in the study of methods has mainly been done in this laboratory; but much has also been done in the laboratory of Mr. F. T. Harrison, Public Analyst, at London. Some portions of the work have been checked by both Mr. Harrison and myself, and I am indebted to that gentleman for many valuable suggestions and for much helpful criticism.

Many processes, including a recent one published by Mr. F. C. J. Bird in the *Analyst*, for the current month have been tried, with more or less satisfactory results. The process described in the sequel is that which, in my hands, has proved least imperfect. It is essentially that recommended by the revision committee of the United States Pharmacopœia.

The questions which I have undertaken to examine and discuss are:

I. The elaboration of a method of working with plasters, having rubber as a chief component of their base, which shall permit of the alkaloids being completely separated in a pure state.

II. The question as to what are the alkaloids of belladonna leaf and root.

III. An inquiry as to the probable intended strength of the United States Pharmacopœia belladonna plaster.

IV. The value of such tests as claim to distinguish between *Atropa* and other genera of Solanaceæ as sources of the alkaloids present in belladonna plasters.

I cannot claim that the first of these questions has been decided finally, or to my own perfect satisfaction. A method which admits of possible error to the extent of 0·02 per cent of alkaloids (calculated on the plaster mass) cannot be described as ideally perfect. On a plaster mass of 10 grammes this loss would correspond to two (2) milligrammes of alkaloid, or about 0·7 cc. of $\frac{N}{100}$ soda. I think that so complete a separation of rubber as is effected by the use of sand, is a step in advance, since it permits the most thorough shaking without danger of emulsionizing. It is possible that some other precipitant than alcohol may be found for rubber. Alcohol is objectionable as being soluble both in chloroform and in water, and for other reasons.

The second question has, of necessity, been treated historically, rather than experimentally.

The third question seems to hinge upon the fact that belladonna leaf was employed as an application to the skin before plasters were used; that the first modification seems to have been in the direction of adding an emollient to prevent local irritation and that, from this, has developed the plaster of the pharmacopœia. It seems reasonable to infer that, as the plaster has replaced the natural leaf, it should contain the average amount of alkaloid contained in the leaf. I am greatly indebted to Professor Lloyd of Cincinnati and to Dr. J. M. Francis of Detroit for valuable assistance in this connection.

Lastly, the discrimination between plasters made from *Atropa* and those made from *Scopolia* seems to have assumed that the former contained atropine, the latter hyoscyamine exclusively. This assumption is without foundation. The discrimination by means of accidentally associated substances, such as fluorescent bodies, cannot be considered trustworthy, first because so little is definitely known about these bodies that they cannot be certainly identified, and, second, because their non-essential character makes it quite possible for them to be removed in process of manufacture, without injury to the product.

I have the honour to be, sir,
Your obedient servant,
A. McGILL.

(Memoranda to No. 1. of preceding letter.)

METHOD OF ASSAYING BELLADONNA PLASTERS, AS USED IN THE LABORATORY OF THE INLAND REVENUE DEPARTMENT, OTTAWA.

1. Use one plaster for each essay.
2. Work in duplicate.

1	2
2	1

3. Prepare duplicates by taking two plasters and, after stripping off the face muslin, placing them with their faces together. Divide, as indicated by the dotted lines in the diagram, and use sections (1 and 1) and (2 and 2) for the respective duplicates.

4. Weigh, and cut into strips about half an inch wide. Place in an ordinary 8 oz. phial, and add 75cc. chloroform and 15 drops ammonia solution (strong ammonia and water 1 vol. to 1 vol.), and shake vigorously for 15 minutes.

5. Pull out the strips of cloth with a hooked wire, and wash them in a small beaker with 25cc. of chloroform, and add this to the larger quantity in the bottle.

6. Dry the strips, and weigh. The difference between this weighing and the former one gives the weight of plaster mass worked on.

7. To the chloroform in the bottle add about 25 grammes of clean sand, and 80 cc. of alcohol, and shake vigorously for 15 minutes.

8. Transfer, through a filter, the rubber—free liquid to a 10 oz. phial; add 25 cc. of 2 per cent sulphuric acid, and shake vigorously for 10 minutes.

9. Pour into a separating funnel; allow to stand 'till a clean separation occurs, and run off the lower (chloroformic-alcohol) layer into the bottle. The upper (watery) layer is transferred to a centrifuge separator funnel.

10. Repeat the above process, using 15cc. and then 10cc. of dilute acid. In at least one of the assays of each duplicate, repeat the shaking out to five times.

11. The centrifuge-separator contains a small quantity of chloroform-alcohol, and the supernatant watery liquid is not perfectly clear. Ten minutes' rapid rotation effects a clean separation.

12. The acid, watery layer is run into a pear-shaped separator; made alkaline with ammonia, and shaken out with four, (or fivt) successive portions of chloroform, using 25cc. the first time, and 10 cc. afterwards. A gentle motion, continued for periods of 10 to 15 minutes, is given by means of a mechanical shaker.

13. The chloroformic solutions are run off into a glass capsule, and evaporated to dryness, at a low temperature, by a current of warm air.

14. The residue is rubbed out with 5cc. of hydrochloric acid (decinormal) using a rubber-tipped glass rod, and titrated back with centinormal (or one-fiftieth normal) soda, using cochineal as indicator.

Factor.—1cc. $\frac{N}{100} = 0{\cdot}00289$ atropine.

Notes.—(The numbers correspond to the preceding sections.)

1. The weight of mass on each plaster varies from about 7 to 9 grammes. When 0·4 per cent of alkaloid is present, the amount for one plaster is 0·032 gramme equivalent to about 11cc. of $\frac{N}{100}$, or 5·5cc. of $\frac{N}{50}$ acid. Since the titration error is nearly 0·2cc $\frac{N}{100}$, it is evident that less than one plaster cannot be profitably used in assay.

3. It has been repeatedly observed that plasters collected at the same time, and known by the same number, have given quite different results on assay. This can only be accounted for by their having been made from different batches of material.

When duplicates, prepared as above described are assayed, the error seldom exceeds 0·020 per cent of alkaloid. The following illustrative numbers are taken from my note-book :—

Sample 1	(*a*) ·424	(*b*) ·479
" 2	(*a*) ·173	(*b*) ·173
" 3	(*a*) ·241	(*b*) ·246
" 4	(*a*) ·498	(*b*) ·476
" 5	(*a*) ·295	(*b*) ·277

The following illustrative duplicates are from Mr. Harrison's note-book :—

Sample 6	(*a*) ·137	(*b*) ·137
" 7	(*a*) ·148	(*b*) ·135
" 8	(*a*) ·150	(*b*) ·137
" 9	(*a*) ·123	(*b*) ·113
" 10	(*a*) ·254	(*b*) ·254
" 11	(*a*) ·155	(*b*) ·153

4. The shaking is performed mechanically by a small machine driven by water power. Not only is this apparatus a labour-saving device, but it acts very uniformly and efficiently.

6. The strips of cloth, if dried in the oven, are exposed to the atmosphere for some time before being weighed, to ensure their being in the same hygroscopic condition as when first weighed. As a rule, the strips are very clean. A trace of plaster material adhering to them is, however, of no consequence, since it is allowed for by taking difference of weighings.

7. The addition of the sand is a great help in effecting the complete separation of rubber. The chloroformic solution filters quite readily, and I have never been troubled by any emulsion forming at the later stages of work. In order to ascertain whether alkaloids are left in the separated rubber, I have, in three instances, re-dissolved this in chloroform and treated as above. The recovered alkaloids amounted respectively to 0·003, 0·010 and 0·007 per cent, calculated on the plaster mass. As these numbers are less than average experimental error, I consider it unnecessary to repeat the solution and separation.

10. Experience has shown this to be the most critical state of the process. The presence of so large a quantity of alcohol is, no doubt, the reason why such difficulty is met in dissolving the alkaloids (as sulphates) out of the chloroform. The following numbers illustrate this point :—

No. 1.

25cc + 10cc. of 2 p. c. H_2SO_4 gave	·090 p. c.
25cc. additional gave	·041 "
25cc. " "	·011 "
	"
Total	·142 "

No. 2.

25cc. + 10cc. of 2 p. c. H_2SO_4 gave	·063 p. c.
25cc. additional gave	·037 "
25cc. " "	·018 "
	"
Total	·118 "

No. 3.

25cc. + 10cc. of 2 p. c. H_2SO_4 gave	·390 p. c.
25cc. additional gave	·072 "
25cc. " "	·018 "
	"
Total	·480 "

11. The centrifugal machine referred to is a large one, carrying glass funnels holding 200cc. It is driven by an electro-motor at the rate of 1,700 revolutions per minute, and effects a clean separation of immiscible liquids with a great saving of time.

13. A current of air is driven by an electric fan through a steam-heated cylinder, and is directed downwards upon the surface of the liquid to be evaporated.

14. The alkaloids are usually crystalline, if the evaporation has been conducted slowly, and only the merest traces of impurities occur. The following residues were weighed before titration :—

	Tropeines by Weight	Calculated as Atropine by Titration.
No. 1	0·385	0·369
" 2	0·475	0·425

When evaporation is rapidly conducted, a gummy mass is obtained. This is also the case if a trace of rubber has escaped separation. I find that more rapid and certain solution of the alkaloid is obtained with deci-normal than with a weaker acid.

MEMORANDUM ON QUESTION NO. II.

The therapeutic value of Belladonna plaster is due to the presence of certain alkaloids in it.

The British Pharmacopœia (edition of 1898) directs that it shall be made from the liquid extract of belladonna—(which is itself made from belladonna root)—and adds :—"This plaster contains 0·5 per cent of the alkaloids of belladonna root."

The United States Pharmacopœia of 1880—which was official until January, 1894,—directed that 100 parts of the plaster should contain the alcoholic extractive from 100 parts of belladonna root. The revised edition of this pharmacopœia, official since 1894, prescribes the use of 200 parts of the alcoholic extract of belladonna leaves, to make 1,000 parts of plaster mass.

It is evident that the letter of these instructions requires not only that the alkaloids of belladonna should be present, but that these alkaloids should have been derived from belladonna. Whether the last point raised is more than a mere hair-splitting distinction, I shall not attempt to decide; but I may say that, in my opinion, it is of infinitely greater importance that the alkaloids in question be present in the plaster than that they should have come from one particular genus of solanaceæ rather than from another.

The question, what *are* the alkaloids of belladonna root, and belladonna leaf, is of very great importance.

The three best known of the natural tropeines (mydriatic alkaloids) are atropine, hyoscyamine and hyoscine. These alkaloids have the same chemical percentage composition, and practically the same physiological characters, especially as regards the first two named. (Flückiger and other authorities.) They differ in certain physical properties, chiefly crystallization, melting point of their double gold chlorides, and in the relation of their alcoholic solutions to polarized light. The first two alkaloids are present, throughout the order Solanaceæ, in very much larger amounts than the third. Besides atropine, hyoscyamine and hyoscine, there are found, in smaller amount,

belladonine and atropamine, which are anhydrides of the former, and may not actually exist as such in the plant, but result from changes in the members of the first group, induced by the operations necessary to isolate these.

The following citations from recognized authorities, will help us to answer the question as to the characteristic alkaloids of belladonna.

"It is now generally recognized that the greater portion of the alkaloid existing in belladonna, both leaves and root, is hyoscyamine rather than atropine."—Squires' Companion to the British Pharmacopœia, 17th edn., p. 135.

"As in the case of belladonna leaves, the alkaloid of the root is almost wholly hyoscyamine."—*Op. cit.*, p. 137.

"The young roots of Atropa belladonna contain only hyoscyamine; older roots (8 and 10 years) also atropine."—Maisch, Organic Materia Medica, 1895, p. 76.

"Hyoscyamine is sometimes the predominating alkaloid in the leaves."—*Op. cit.*, p. 223.

"Atropine is the characteristic alkaloid of *Atropa belladonna*, though it appears sometimes to be wholly, or in great part, replaced by its isomer hyoscyamine."—Allen: Commercial Organic Analysis, Vol. III., part II., p. 247.

"With regard to the alkaloids of Belladonna, O. Hesse (Annalen, CCLXI., 87) states that in his experience the herb of cultivated belladonna contains atropine almost exclusively, but that it is associated with other alkaloids in the leaves of wild plants, and especially in the roots of both kinds. In an old root Hesse found much hyoscyamine, but no atropine. E. Schmidt, (Pharm. Zeit., 1889, p. 583) found hyoscyamine, but no atropine, in full-grown roots that had been kept for years. In roots of one year's growth he found both atropine and hyoscyamine, but the latter alkaloid alone in fresh old roots. The leaves of wild belladonna contained much hyoscyamine and a little atropine, while the ripe berries contained atropine only."—*Op. cit.*, p. 263.

As I have already stated, atropine and hyoscyamine do not differ in chemical composition, nor physiologically from each other. Further than this, hyoscyamine is easily converted into atropine, so that, "It is even possible that this base may not always pre-exist in belladonna."—Allen: *Op. cit.*, p. 244.

"Ladenburg holds that atropine is an optically inactive base, standing in the same relation to the active hyoscyamine as racemic acid to lævo-tartaric acid."—Allen: *Op. cit.*, p. 250.

"Hyoscyamine is converted into atropine by heating for five or six hours above its melting point. The optical activity of hyoscyamine may likewise be diminished by allowing its alcoholic solution to stand in the cold after an addition of a trace of alkali. But, if Ladenburg is correct in holding atropine to be optically inactive, the conversion of hyoscyamine into atropine is incomplete."—Watt's Dictionary of Chemistry—Revised Edition, Vol. II, p. 745.

The foregoing quotations seem to justify the conclusion that hyoscyamine and not atropine, is the chief alkaloid present in Belladonna plasters, when these are made from the root of *Atropa belladonna*; and that hyoscyamine may still be the chief alkaloid when the leaf extract is used. This alkaloid is found in other members of the order Solanaceæ, particularly in Hyoscyamus—(from which it derives its name)—and in Scopolia and Datura. The following is quoted from Allen's Commercial Organic Analysis, Vol. III., part II., p. 250:

"Hyoscyamine occurs in the seeds, leaves and roots of henbane and other species of *Hyoscyamus*, in association with hyoscine. It accompanies atropine in atropa belladonna, in which it is sometimes present to the exclusion of atropine; which, according to Will, is not unfrequently formed from the hyoscyamine during the process of isolation. Hyoscyamine also occurs in association with atropine in the seeds of *Datura stramonium* with hyoscine in the root of *scopolia japonica* and *S. atropoïdes*; and almost alone in the root of *S. carniolica* and the leaves and twigs of *Duboisia myrapoïdes*. According as commercial hyoscyamine has been prepared from one or other of the above sources, it is liable to contain more or less of the associated alkaloids."

Such of the above named plants as contain hyoscine along with hyoscyamine, are evidently questionable sources of the last named alkaloid, since the physiological

properties of hyoscine are, to some extent, different from those of hyoscyamine. But scopolia carniolica would seem to be particularly available as a source of hyoscyamine. Maisch, in the Organic Materia Medica, p. 76, says: "The rhizome of scopolia carniolica contains the same alkaloids" as atropa belladonna. Allen (*Op. cit.*, p. 263) says: "Dunstan and Chaston found the alkaloid of scopolia carniolica to consist of hyoscyamine, with a possible trace of hyoscine."

MEMORANDUM ON QUESTION NO. III.

The amount of the alkaloid of belladonna in the plaster mass is fixed by the British Pharmacopœia at 0·5 per cent.

The alkaloidal strength of the U. S. P. plaster is not so definitely fixed; and, indeed, there is much disagreement among manufacturers as to what should be the percentage of alkaloids present. The United States Pharmacopœia of 1890 gives the following formula for Emplastrum Belladonnæ:—

Alcoholic extract of belladonna leaves	200 grammes.
Resin plaster	400 "
Soap "	400 "
To make	1,000 "

Thus, 1,000 parts by weight of the plaster-mass contain 200 parts (= 20 per cent) by weight of belladonna extract.

The formula for Extractum Belladonnæ Foliorum Alcoholicum, is as follows:—

Belladonna leaves	1,000 grammes.
Alcohol, Water	of each a sufficient quantity

producing 1,000 cubic centimetres of concentrated percolate, to be "further evaporated at or below 50° C. to a pilular consistence."

It is hence evident that the alkaloidal strength of the plaster-mass is fixed by the percentage of alkaloids present in the extract. This will vary, first, with the variable strength of the leaves: second, with the interpretation received by the term "pilular consistence."

The percentage of alkaloids present in the leaves of atropa belladonna, varies between very wide limits, as shown by the following quotations:—

ALKALOIDS in Belladonna Leaves.

Minimum.	Maximum.	Mean	Authority.
		0·500	Maisch—Org. Mat. Med. p. 263.
		0·431	Wild plant, 2 years old
		0·407	" 3 "
		0·510	" 4 "
		0·320	Cultivat d, 2 "
		0·451	" 3 "
		0 491	" 4 "
0·690	0·410		A. B. Lyons—Quoted by Allen.
0·500	0·200	0·350	" " Handbook, p. 108.
		0·580	R. Kordes.
0·830			Von Gunther.
		0·436	Lefort
0·870	0·300		Farrand Wright— "
0·900	0·300	0·490	
0·480	0·440		Lefort:—From leaves picked during the flowering period.
0·830			Dragendorff:—Quoted by Flückiger and Hanbury.

A. W. Gerrard—Year Book of Pharmacy, 1884.

Quoted by Allen, Vol. III., part II., p. 264.

So far as published results go, the average alkaloidal strength of belladonda leaves would seem to be about 0·450 per cent. In a private communication from my friend Dr. Francis, of Detroit, the following criticism occurs:—"The statement in Pharmacographia that belladonna leaf contains from 0·44 to 0·83 per cent of atropine, is open to criticism for the simple reason that the methods employed at that time (1872) were so crude as to be very inaccurate. I have not the slightest doubt but that the same drug assayed by the modern methods would yield a considerably lower percentage of active principles. The same criticism is permissible in large measure of many of the results which have been published within recent times, and when an estimate of mydriatic alkaloids is accepted a statement of the process of assay should also be considered. I am led by my experience in assaying hundreds of samples of belladonna leaves to conclude that the *average* drug, as it is found on the American and European markets will assay about 0·35 of mydriatic alkaloids by the acid titration process."

Dr. Francis has a very large experience in alkaloid work and has favoured me with the following list of actual assays of belladonna leaf, together with the statement that he regards them as being "on the whole a little above the average market quality."

Percentages of total mydriatic alkaloids as determined by acid titration process:—

0·40	0·38	0·40	0·32	0·40	0·34	0·35
0·40	0·35	0·40	0·24	0·40	0·38	0·45
0·31	0·35	0·34	0·38	0·32	0·36	0·35
0·35	0·40	0·30	0·31	0·27	0·48	0·30
0·37	0·38	0·34	0·46	0·42	0·36	0·33
0·42	0·35	0·41	0·24	0 27		
0·37	0·31	0·36	0·35	0·45		

And he adds, "The highest results which I find noted among 60 assays, representing 28,368 lbs. of belladonna leaves, are 0·60 per cent and 0·59 per cent, but such drug I regard as very exceptional."

In answer to my question regarding the alkaloidal strength of belladonna extract, Dr. Francis has kindly given me the following:—"The United States Pharmacopœia" directs the use of 62½ per cent alcohol (approximate), and my experience has been that, following the method outlined in this authority, you will obtain about twenty pounds of extract from every 100 pounds of drug, which would make the extract five times drug strength. As the drug averages 0·35 per cent of alkaloids, the extract will assay 1·75 per cent total alkaloids."

As has been already pointed out, the plaster mass contains twenty per cent of the extract. It follows from what Dr. Francis says, that the plaster mass represents its own weight of belladonna leaf; and, in order to represent the average alkaloidal value of belladonna leaf, it should contain 0·35 per cent of alkaloids. This is a particularly interesting view of the matter, from the historical consideration that the direct application of the leaf preceded the use of plasters. This is distinctly stated in the "United States Dispensatory," 17th edition, page 259.

The subjoined information bearing upon the early history and application of belladonna leaves, was obtained from the Lloyd Library, Cincinnati, Ohio, through the kindness of Prof. J. U. Lloyd.

1. "Belladonna Extract, when applied externally, should be mixed with a fatty or an emollient substance, in order to prevent irritation of the spot where it is applied." (2)

3. "The internal administration of belladonna appears to have been suggested by the advantages resulting from its external application. Cullen, De Haen, Junker and others have found it very serviceable in scirrhous and cancerous affections.... Externally used either as a fomentation, or the dried leaves powdered and sprinkled over the parts. It is of singular efficacy in diminishing the pain of cancerous and ill-conditioned sores."

4. "Belladonna was first employed as an external application in the form of fomentation for scirrhous and cancer. It was afterwards administered internally in the same affections."

5. "The berries are nowadays omitted in our list of medicines. Experiments are principally made with the leaves, which possess narcotic virtues even to a higher degree,

so that upon careful internal use they produced some of the symptoms proper to the berries, only to a lesser degree, and could easily be remedied by the proper antidotes. Also, upon external application, their power becomes evident. For a small piece of fresh leaf placed upon a cancerous ulcer below the eye, has produced a notable dilatation of the pupil; an experiment that could be successfully repeated in one and the same person." (8) "Fresh leaves placed upon breasts that had become hard and tumerous from cancer, produced softening and disintegration of the growth. (6a) Bœcler applies them externally in hæmorrhoids, cancer, gangrene and carcinomous ulcers. Gradually they were put to internal use in cases of indurated and scirrhous glands, and even in cases of cancer of the breasts."

The Theologian, Münnich, a resident of the Electorate of Hanover, is the author of the statement (7) "that the leaves were used for these purposes as early as 1683, by a peasant woman in the Electorate of Hanover, and that a hundred years ago (1667) an ointment was made of them in that locality, as an arcanum for cancer."

Authorities for the above.

(1.) J. H. Dierbach. Die Neuesten Entdeckungen in der Materia Medica. Vol. 2—C. Heidelburg and Leipzig, 1843, p. 784—contains reference No. 2.

(2.) Lembert. Essai sur la méthode endermique. Paris, 1838—p. 120.

(3.) A. T. Thomson. The London Dispensatory. London, 1824—p. 189.

(4.) John Murray. A system of Materia Medica and Pharmacy, 4th edition, Edinburgh, 1822—I. p. 166.

(5.) John Andr. Murray. Apparatus Medicaminum. 5 vols. Venetiis, 1795. Vol. I., p. 230.

(6.) Rayus—Hist. Plautar. Tome I., p. 680—1686.

(6a.) Rayus (*ibid*) credits Percival Willughby with the discovery.

(7.) Münnich—Hannov—Magazin, 1767—p. 1011 and 1769, p. 1495.

Professor Lloyd comments thus upon the above: "These data tend to establish beyond doubt that the precursors of belladonna plasters were external applications of belladonna leaf, the recorded use of which dates back at least as far as the year 1686. The external application preceded the internal administration. The salve form was probably devised after the value of the leaf was known, to mitigate the irritating effect which a direct local application of the leaf would produce.

There appears, therefore, to be a historic basis for concluding that the proper alkaloidal strength of the plaster mass is the average alkaloidal strength of belladonna leaf. Modern methods of assay place this at 0·35 per cent according to Dr. Francis, and I beg to submit this as a reasonable interpretation of the intent of the U. S. Pharmacopœia.

In connection with the suggestion that the alkaloidal strength of the plaster should be that of average belladonna leaf, it is interesting to note that the U.S.P. of 1880, distinctly aimed at producing a plaster which should contain the alkaloids of an equal weight of belladonna root. The only difference between the plasters of 1880 and 1890 would then be that corresponding to a substitution of belladonna *leaf* for belladonna *root*.

Since writing the above, I note that Carl E. Smith, in the American Journal of Pharmacy, 1898, p. 293, adopts the same view, in these words: "As the officinal plaster is intended to be equal in strength to its own weight of belladonna *leaf*, and the average alkaloidal strength of this is 0·3 or 0 4 per cent, a plaster containing at least 0·3 per cent might be insisted on."

I may say that, in this study my object has been merely to discover what is the intended standard of alkaloidal strength for U. S. P. plaster; and not to question the propriety of the standard fixed by the British Pharmacopœia at 0·5 per cent.

MEMORANDA ON QUESTION NO. IV.

For the purpose of distinguishing between a plaster mass made from Atropa and one from Scopolia, it is evident that we cannot altogether depend upon the distinctive

properties of the alkaloids atropine and hyoscyamine since the last named alkaloid is always present in Atropa, and is frequently present to the almost entire exclusion of atropine. We are, therefore, forced to have regard to associated constituents of these drugs; and the constituent most insisted on for this purpose is a fluorescent substance largely present in scopolia, and by some believed to be peculiar to it. Unfortunately for this reaction, a fluorescent substance is also found in Atropa belladonna, which may or may not be identical with that occurring in scopolia, but is at least indistinguishable from the latter by its fluorescence alone. With regard to this substance, Allen (Commercial Org. Analysis Vol. III., part II., p. 262) says: "The fluorescent substance contained in belladonna root, and present also in the leaves and stalk, is called by H. Kunz, Chrysatropic Acid, and is said to have the formula $C_{12}H_{10}O_5$.—H. Paschkis has isolated what is apparently the same body from the berries of ripe belladonna. He considers it identical with the scopoletin obtained by Eykman from scopolia japonica."

My own experience with extracts of *atropa* and *scopolia*, as well as with solutions of plaster mass containing tropeines, justifies me in saying that, under proper conditions, fluorescence is always observed; and that the differences of colour and distinctness are not such as to warrant any conclusions regarding the origin of the extract.

Some stress has been laid upon the optical activity of solutions of hyoscyamine as contrasted with the optical inactivity of atropine in solution. Since *atropa* contains hyoscyamine as well as atropine, it is questionable how far we may trust the indications of the polarimeter, even when these are decided.

From the plasters of one manufacturer I separated 53·2 milligrammes of alkaloids in a fairly pure state. On dissolving to 10cc, and observing the rotary power in a 1 decimeter tube, I found it to be — 0° 30′ —.

In the case of another brand of plaster I separated 143·9 milligrammes of alkaloids, and found the rotation, observed as above, to be + 0° 40′ —.

In the case of hyoscyamine $[a]_D = -21°$, while atropine is either optically inactive or but feebly lævorotatory. In the case of a plaster yielding ·050 gramme of hyoscyamine, the solution of this weight of alkaloid in 10cc. would give a rotation (in a 1 decimeter tube) amounting to less than — 0° 10′. An angular measurement so small as this is, in practical work, of doubtful value, and where the chemical purity of the substance is not assured, has no value whatever. The alkaloids, as separated from belladonna plasters, for titration are never absolutely pure, and, since in the extract from which the plasters are made, they are associated with substances which have marked optical activity, the trifling rotation shown by their solutions is of very doubtful value to the analyst. If the identification of the separated alkaloids as atropine or hyoscyamine settled the question of their origin in *Atropa* or *Scopolia*, it would of course be possible, by using larger amounts of the plaster mass and by determining the melting points of the aurochlorides of the alkaloids, to ascertain in each case with what alkaloids we were dealing. But it has already been shown that hyoscyamine is common both to *Atropa* and *Scopolia*, and further that hyoscyamine is very easily converted into its isomer atropine.

REPORT

OF THE

MINISTER OF AGRICULTURE

FOR THE

DOMINION OF CANADA

FOR THE

YEAR ENDED OCTOBER 31

1899

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
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1900

[No. 8—1900]

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REPORT

OF THE

MINISTER OF AGRICULTURE

1899

To His Excellency the Right Honourable Sir GILBERT JOHN ELLIOT, *Earl of Minto and Viscount Melgund of Melgund, County of Forfar, in the Peerage of the United Kingdom, Baron Minto of Minto, County of Roxburgh, in the Peerage of Great Britain, Baronet of Nova Scotia, Governor General of Canada.*

MAY IT PLEASE YOUR EXCELLENCY—

I have the honour to submit to Your Excellency the annual report of the Department of Agriculture, for the year ended October 31, 1899.

I.—GENERAL REMARKS.

Under the respective headings is laid before Your Excellency a synopsis of the operations of the various branches of my Department; and the work in each has been efficiently carried on.

By Orders approved by Your Excellency in Council, under dates August 18, 1898, and April 4, 1899, in virtue of Chapter 68, Revised Statutes of Canada, intituled: "An Act Respecting Quarantines," revised and amended regulations respecting quarantine were authorized and published and will be found as an appendix hereto. (See Appendix No. 22.)

During the year just past, I was able to attend the following important agricultural gatherings:

The Ontario Fat Stock Show at Brantford, November 30, December 1 and 2, 1898; the Convention of the Provincial Dairy Association of Quebec, held at Valleyfield in December, the Convention of the Eastern Dairy Association of Ontario, held at Kingston, in January, 1899; that of the Western Dairy Association, at Guelph; that of the Farmers' Association of Nova Scotia, at Annapolis, and the Annual Meeting of the Nova Scotia Fruit Growers' Association, held at Wolfville.

In the fall of 1899, I was present at the Eastern Townships Exhibition at Sherbrooke, the Canada Central Exhibition at Ottawa, and the British Columbia Provincial Exhibition at New Westminster.

I was thus able to meet a large number of the leading men engaged in Canadian agriculture from all the provinces. I am pleased to state that I found them universally satisfied with the year's work, confident in their industry, and hopeful of its great progress and expansion.

Production was great, prices good, with a ready sale for all commodities. The enormous increase of the export trade in agricultural and animal products is noticeable, but not more so than the great improvement in the local or home market consequent on the development of the country everywhere and in all lines.

I was struck with the great interest shown in all branches of live stock and much pleased to note the increased prices obtained for almost all classes. This has had the effect of stimulating importation of the best class of pure bred stock and more than ever turned the attention of breeders to careful selection of stock, and has encouraged them to unusual investment with this object in view.

I attended the Spring Horse Show in Toronto and was as much surprised as delighted with the excellent quality of the animals shown. No doubt this exhibition held annually will conduce much to a decided improvement in quality, and particularly the training of horses for pleasure purposes, now undoubtedly one of the most profitable branches of the horseman's business.

In connection with these remarks on the live stock industry, I would refer to my appointment of Mr. F. W. Hodson, of Toronto, to the new office of live stock commissioner in the branch of the Commissioner of Agriculture and Dairying. I am sure that there is much work which can be profitably done to better organize and stimulate the live stock interests which Mr. Hodson's experience, knowledge and enthusiasm in these lines well fit him to perform. This work so far has not been systematically attempted or prosecuted in Canada as a whole. I look for important results to accrue from this appointment, and feel that I am fortunate in the addition of this gentleman to the effective staff of my department.

On the Experimental Farm at Ottawa I have inaugurated some changes by which the purely experimental cultivation of certain parts of the land has been separated from the management of the farm proper. I have appointed an additional officer in the person of Mr. J. H. Grisdale, as agriculturist, and have set apart about 200 acres of the land to be conducted under him as a stock farm, and have given Mr. Grisdale also especial charge of the live stock on the farm, in which branch of work he is especially expert. In connection with this plan, sheep have been added to the stock, the land has been laid off into fields for a regular rotation of crops and much fencing has been done, so that portions of the land can be pastured as required by the system of rotation and stock keeping adopted. A series of important, lengthy and somewhat complicated experiments has been carried on for the purpose of determining some points in pork production which have required much addition to the stock of hogs and various improvements in the accommodation for swine at the farm. In connection with the erection of a new root cellar a spacious wagon shed has been provided. There has never been any such place on the farm. The chemist's branch of the experimental work at the central farm has been changed into a

new and complete laboratory building, and Mr. Shutt has had another assistant provided for his work.

In the month of October I made a trip across the continent to British Columbia, and made a careful investigation into the condition of farming in that province. I found the problems of agriculture there very difficult of solution on account of the great diversity of conditions in the various localities I visited. Experiment carried on or advice tendered by the staff of my department suitable for one small section of this great province might be quite useless or harmful in another section, even comparatively near. This interferes much with the utility to the British Columbia farmers of the general work of the department. I feel, however, that it is due to the farmers of this province to as much as possible overcome this difficulty, and therefore I have made a special effort to secure the presence of my officers at as many as possible of the various gatherings of the farmers of British Columbia. During this trip I made my first official visits to the branch farms at Agassiz, Indian Head and Brandon. I found these farms a most interesting study, and was pleased with the condition in which I found them. The stock at Indian Head and Brandon was in most satisfactory condition and nearly all of it of high class. I regret to say that I was obliged to order the immediate disposal of all the stock at Agassiz, as I did not consider it calculated to be an effective object lesson to the farmers who might visit the farm. My visits to these farms gave me a better insight into the conditions and needs of the respective provinces in which they are and my consultation with the managers will, I trust, lead to such arrangements as will make the branch farms still more efficient.

During the past year a good deal of time has been devoted to preparations for the Paris Universal Exposition, which opens on April 14, 1900. On January 1 was organized a board of commissioners under my own chairmanship, whose duties it would be to secure and prepare the Canadian exhibits.

Messrs. A. H. Gilmor, J. X. Perreault, Jas. G. Jardine and W. D. Scott were named to represent respectively the Maritime Provinces, Quebec, Ontario and the West, while Dr. G. M. Dawson, Director of the Geological Survey, Professor Saunders, Director of the Experimental Farms, Professor Robertson, Commissioner of Agriculture and Dairying, and Major Gourdeau, Deputy Minister of Marine and Fisheries, were joined with them. This board has collected and arranged a comprehensive and representative exhibit of Canadian products and manufactures. Fine collections have been made of agricultural and horticultural products, and our food products. The forest, mineral and fishery wealth of our country are also all well represented.

Great difficulties were found in procuring sufficient space for the adequate representation of Canada's wealth and industries. These have been overcome, and now sufficient space has been secured though, unfortunately, owing to the arrangement of the classes of exhibits, not all in one portion of the exposition. The charge for space is very high and the fact that Canada's exhibits are scattered, will add much to the expense of care and attendance, and make the work of the commissioners more onerous. Everything, however, now points to a successful representation of Canada on this great occasion.

The following circular was issued by the Commissioner of Customs with my concurrence:

CUSTOMS DEPARTMENT, CANADA,
OTTAWA, October 11, 1899.

To Collectors of Customs in Manitoba, North-west Territories and British Columbia:

ALL HORSES FOR GENERAL PURPOSES, RANCHES, ETC., SUBJECT TO INSPECTION AT PORT OF ENTRY.

Referring to the Order in Council of January 25, 1897, containing Regulations relating to Animals' Quarantine, this Department is informed that the Minister of Agriculture has ordered sections 40, 41 and 42 of said regulations to be put in force at all points in Manitoba, North-west Territories and British Columbia, requiring the inspection of the following horses, by competent veterinarians authorized by the Minister of Argriculture, at the port of entry, when imported into Canada from the United States, viz. :—

(a) Horses admitted for general purposes.
(b) Horses for sale.
(c) Horses for stocking ranches.
(d) Horses or cow ponies for cattle ranches.
(e) Horses forming part of settlers' effects.
(f) Horses for racing, show, exhibition or breeding purposes.
(g) Horses for pasturing or winter feeding.

Customs officers will be governed accordingly, and see that the foregoing orders are duly enforced.

In the case of settlers' horses and horses for breeding, the inspection fees are paid by the Department of Agriculture.

A list of the fees to be collected by veterinarians for inspection of animals, is shown on schedule A hereto.

JOHN McDOUGALD,
Commissioner of Customs.

SCHEDULE A.

Fees for the Inspection of Animals are as follows :—

HORSES.

For 1 horse	$1.00
From 2 up to 10 inclusive	0.75 each.
" 11 " 20 "	0.50 "
" 21 upwards	0.25 "

SHEEP AND SWINE.

For 1 animal	0.25
From 2 up to 5 inclusive	0.10 each.
" 6 " 10 "	0.06 "
" 11 " 20 "	0.04 "
" 21 " 50 "	0.02½ "
" 51 upwards	0.02 "

CATTLE.

For 1 animal	$1.00
From 2 up to 5 inclusive	0.50 each.
" 6 " 10 "	0.30 "
" 11 " 20 "	0.20 "
" 21 " 50 "	0.12 "
" 51 upwards	0.10 "

FEES FOR TESTING CATTLE WITH TUBERCULIN.

$5.00 for the first animal.
1.00 per head for the next 9 (in other words $14 for the first 10).
0.50 per head for any number over 10.

In every case the owner of the cattle pays cost of tuberculin, which is supplied by the Department of Agriculture at 10 cents per dose.

II.—ARTS AND AGRICULTURE.

COMMISSIONER'S BRANCH.

The department continues its efforts to help the farmers by those means which have been used successfully in past years. One of the main objects is to furnish information which will be directly helpful to those engaged in farming, and which will at the same time have an educational value through developing intelligence and skill and promoting such co-operation as will lead to the further advancement of their interests. About forty-five per cent of the population are in families whose heads and members are engaged in farming. A large number more are employed in industries arising out of agriculture. Among those are millers of flour and oatmeal, curers and packers of meats, makers of cheese and butter, and persons occupied in the transportation and commerce of grain, hay, live stock, meats, butter, cheese, milk, eggs, fruit and various other products. It is estimated that the value of all farm crops and products in Canada is not less than $600,000,000 yearly.

While the growing of large crops of good quality at as little expense as possible is a prime essential of profitable farming, it is none the less important that the products of the farm should be of such a sort as will suit the markets to which they can be sent. Much information of practical value has been obtained from time to time from those engaged in the commerce of agricultural products and from those who manufacture what may be called the raw products of the farm. Curers of bacon, exporters of cheese and butter, shippers of live stock, flour millers and others, have greatly assisted the department by specific information on the qualities of products which are in demand for the home and export trades. Farmers are becoming more and more alive to the benefits that result from co-operating with such men in those matters.

Improvements are being made in field cultivations, particularly in a more general following out of some systematic rotation of crops, in the growing of clover, and in the greater attention being given to the selection of seed grain adapted to the soils and climate of different localities.

A large portion of the bulky products of the farms is consumed by live stock. A marked improvement is evident in the stabling of horses, cattle and swine. Numerous buildings are constructed every year, well lighted, comfortable and convenient. Sufficient attention has not yet been paid to the ventilation of stables.

On the whole the live stock is fed with greater economy as the relative values of feeding stuffs become better known among farmers. In that respect the practices of the best farmers are readily copied by others.

Every branch of live stock has suffered more or less from want of continued attention year after year to the formation of a definite type of body suited to the main

purpose of each breed of every sort of live stock. The climate of Canada and its suitability for growing large crops of wholesome nutritious forage plants, make it possible for this to be a breeding ground for the best types of live stock. To succeed it is evident that educational work must be pushed wisely and energetically. If that be done there does not appear any reason why the breeding of horses, the breeding of beefing types of cattle, the breeding of sheep and the breeding of poultry for fattening, should not make proportionately as much advance per year as has been made in the development of the cheese, butter and bacon trades.

Mr. F. W. Hodson, formerly superintendent of the Farmers' Institutes of Ontario, and secretary of several live stock associations, has been appointed Live Stock Commissioner, to assist in advancing the live stock interests in those and other respects.

The chief matters to which attention was given in this branch in 1899 were : the cold storage service, the extension of markets, trial shipments of tender fruits, an examination into the condition of apples being exported from Montreal, Que., St. John, N.B., and Halifax, N.S., the carrying on of illustration stations for the fattening of chickens and the exportation of the same to Great Britain, the curing of cheese at a controlled cool temperature, and general dairying service.

COLD STORAGE ON STEAMSHIPS.

Contracts were entered into with agents of steamship companies to provide a regular cold storage service for the carriage of butter and other perishable products from Montreal to points in Great Britain.

Messrs. Elder, Dempster & Co. agreed to provide cold storage on five steamships to give a weekly service between Montreal and Avonmouth for Bristol.

Messrs. H. & A. Allan agreed to provide cold storage on two steamships to ply between Montreal and Liverpool ; three steamships to ply between Montreal and London ; and on one steamship to ply between Montreal and Glasgow.

Messrs. R. Reford & Co., for the Thomson Line, agreed to provide cold storage on three steamships to ply between Montreal and London ; and, on behalf of the Donaldson Line, on one steamship to ply between Montreal and Glasgow.

Messrs. David Torrance & Co., for the Dominion Line, agreed to provide cold storage on two steamships to ply between Montreal and Liverpool.

Sailings of the steamships of the Allan and Dominion lines between Montreal and Liverpool were to be so arranged as to give as nearly as practicable a weekly service between these two ports ; and the sailings of the steamships of the Allan and Thomson lines were to be so arranged as to give as nearly as practicable a weekly service between Montreal and London ; and the sailings of the steamships of the Allan and Donaldson lines were to be so arranged as to give as nearly as practicable a fortnightly service between Montreal and Glasgow.

These contracts, which were for three years, expire at the end of navigation from Montreal in 1899.

Messrs. Furness, Withy & Co., Limited, agreed to provide cold storage on two steamships to ply between St. John, N.B., Halifax, N.S., and London.

The Manchester Liners, Limited, agreed to provide cold storage on three steamships to ply between Montreal and Manchester during the season of navigation on the St. Lawrence River, and to ply between St. John, N.B., Halifax, N.S., and Manchester during the remainder of the year. These contracts were for the seasons of 1898, 1899 and 1900.

The contracts provide that the steamship companies shall carry in cold storage butter, cheese and other perishable products, as demand for space may arise, at a charge not exceeding ten shillings per ton of 2,240 pounds of butter and cheese, and at the same charge for an equivalent space occupied by other products, in addition to the current charge for freight on butter and cheese not in cold storage.

Messrs. Pickford & Black agreed to provide cold storage on the steamship *Beta*, to ply between Halifax, N.S., and the West Indies.

The following is a statement of the quantities of some Canadian products carried in cold storage from the port of Montreal during the seasons of navigation of 1898 and 1899, respectively :

		1898.	1899.
Butter	packages	209,172	429,734
Cheese	"	5,514	1,406
Meats	"	7,668	6,039
Fruits	"	25,564	16,381

COLD STORAGE ON RAILWAYS.

Arrangements were continued for the running to Montreal of refrigerator cars fully iced from sixteen starting points on the Canadian Pacific Railway, from thirteen starting points on the Grand Trunk Railway, from two starting points on the Quebec Central Railway, and from one starting point on the Intercolonial Railway. Four of these ran once a fortnight, the others ran weekly.

The railway companies provided the refrigerator cars, and every car was iced to receive butter and other products requiring cold storage, at stations between the starting point and destination. Shippers who made use of these refrigerator cars were charged the regular 'less than carload rates,' and no extra charge was made to them for the cold storage services.

COLD STORAGE WAREHOUSES.

Cold storage warehouses of sufficient capacity for the trade are provided in Montreal as private business concerns. For the protection of perishable products intended for export and for the extension of business, it is desirable to have cold storage buildings at other centres. As the volume of trade at first would not likely be sufficient to induce business men to put up such buildings for the accommodation of products intended for export, a grant was offered to those who would provide cold storage buildings at central points. The grants were to be in the nature of guarantees that the earnings from the cold storage business at these points would yield at least 5 per cent on the cost of the buildings and plant.

The rates to be charged were to be satisfactory to the Department of Agriculture, and the grants from the Government were not to be called upon, except to make up any

deficiency between the net earnings and the sum of five per cent on the cost as mentioned. Advantage was taken of this offer at Quebec only.

An agreement was made with Messrs B. and M. Rattenbury, the owners of a cold storage building at Charlottetown, P.E.I., to provide cold storage there for the use of the public at reasonable rates.

COLD STORAGE AT CREAMERIES.

To encourage the owners of creameries to provide cold storage accommodation at them to protect the butter in cold storage from one day after it is made, I caused it to be announced that the Government would, subject to ratification by parliament, grant a bonus of fifty dollars ($50) per creamery for every creamery at which the owner would provide and keep in use a refrigerator room according to the plans and regulations, during the season of 1897; and further bonuses of twenty-five dollars ($25) per creamery for 1898, and of twenty-five dollars ($25) per creamery for 1899, if and when the refrigerator room was provided and kept in use according to the plans and regulations during these years.

Plans showing the style of construction to be adopted for the insulation of old cold storage rooms and the methods of constructing new cold storage buildings and ice houses were furnished on application.

When the bonus was made available for that year, a great many of the owners of creameries did not appear to understand the benefits which would result to themselves from providing cold storage; and some did not learn of the offer of the Government bonus in 1897 in time to construct the cold storage for use during that summer. To encourage the owners of creameries to provide the cold storage which is so necessary, I intimated that the Government would extend the provisions of the bonus offered in the circular published October 26, 1896, for one year:

'To the owners or lessees of creameries who did not obtain the bonus of fifty dollars ($50) for 1897, the Government will grant a bonus of fifty dollars ($50) per creamery if and when they provide and keep in use a refrigerator room according to the plans and regulations during the season of 1898, and the further bonuses of twenty-five dollars ($25) each for the seasons of 1899 and 1900 if and when the refrigerator room has been kept in use according to the regulations during these two seasons.

'Thus the owner of a creamery who provides the necessary refrigerator room and keeps it in use according to the regulations during the three years ending 1899 or 1900, as the case may be, may receive altogether a bonus of one hundred dollars per creamery.'

The owners of 300 creameries have provided cold storage in accordance with the regulations.

COLD STORAGE INSPECTORS.

An inspector of cold storage visited creameries which had provided cold storage rooms through Ontario and part of Quebec. He also visited places where cold storage buildings were being put up for the protection of general food products of a perishable character. Another cold storage inspector, with headquarters in Montreal, inspected the refrigerator cars on their arrival, examined the cold storage chambers on steamships, and looked after any through shipments of butter or other perishable products intended for cold storage, when notified by the shippers to do so.

EXTENSION OF MARKETS.

By my direction the Commissioner of Agriculture and Dairying visited Great Britain during the summer. He continued inquiries on the existing conditions of the markets for perishable farm products there, sought to learn the preferences for styles of packages and qualities of goods, and gave information to merchants concerning the arrangements made by the Government for providing a cold storage service for the carriage of these products. An agent of the department also continued his work in Great Britain for the extension and improvement of trade in Canadian farm products.

The Commissioner again reports to me that the superior qualities of Canadian flour for bread-making are not generally known by bakers or those who are directly interested. For sweetness, whiteness and strength, Canadian flour is unsurpassed. Bakeries for the sale of bread, made from Canadian flour would doubtless be a profitable commercial venture for some business men in Great Britain, and would be of direct benefit to Canadian producers.

An independent analysis of various flours showed the Canadian flour to contain ten per cent more albuminoids than the flour imported into Great Britain from European countries.

The export trade in Canadian oatmeal is growing, and the fine qualities which it has from the soil and climatic conditions of Canada, are causing it to be preferred wherever it is introduced. A beginning has been made in exporting it in 2-lb. packages.

Inquiries and examination of Canadian cheese in several of the large commercial centres revealed the fact that most of it had been landed in Great Britain in a better condition than in some of the previous years. However, a large proportion of the boxes had been broken in transit. That tells against it in the markets. An investigation was begun at two cheese factories in Canada as to the effect on the quality of the cheese of curing them during the summer months in a controlled cool temperature continuously under 65 degrees Fahr. It is evident that through the improvement in curing rooms at cheese factories, and by improved cool chambers in the steamships, it will be possible to deliver Canadian cheese in Great Britain with the flavour and quality as fine as those of the best English and Scotch.

There has been a great development in the Canadian butter trade. The exports have increased in value from $697,476 for the year ending June 30, 1895, after which the cold storage service was provided, to $3,700,873 for the year ending June 30, 1899, and there has been still further increase in the exports since July, 1899. Not only has there been growth in the volume of trade, but Canadian butter has taken a relatively higher place in the British markets than ever before.

There has been substantial increase also in the exports of bacon, hams and pork. Canadian brands are now among the best known in the United Kingdom and the quality is winning for them a steadily growing demand. Some complaint was again made about the quality of some Canadian bacon. A little of it was complained of as being too fat, and a proportion of it as being somewhat soft. Soft sides often fetch from four to eight shillings per hundred weight less than firm sides of similar weight and otherwise apparently equal quality.

It was learned from dealers in eggs that Canadian eggs were gaining in favour. The Canadian package is preferred to all others, and the Canadian eggs in size, con-

dition and flavour are generally giving satisfaction. When the eggs were carried in cold storage on the steamships, the surface was so cold that moisture from the humid and warm air of Great Britain, was deposited on the outside of each egg. That brought about a 'mussy' condition and prevented the egg from keeping well. Consequently the importers prefer to have the eggs delivered in a cold condition to the steamship, and then carried in ccol, ventilated chambers across the ocean. That leaves them with bright, dry shells when the cases are opened.

FATTENING CHICKENS.

A year ago an investigation was made of the method followed for the artificial fattening of chickens in Great Britain. The demand for well fattened chickens is growing rapidly and extensively. In 1898 I authorized the establishment of two poultry-fattening stations, to test the process of poultry-fattening in Canada and to illustrate how it could be applied. Trial shipments of these fattened poultry were forwarded to Liverpool and London. The reports received state that the poultry arrived in fine condition, pleased the trade well in every way and were sold at good prices.

In 1899 I authorized the establishment of eight additional illustration stations for the fattening of chickens. Reports of those which have been shipped to Great Britain indicate that there is an opening for the growth of a large trade. The chickens have been landed in good condition, have pleased the consignees, and have been sold at relatively good prices.

TRIAL SHIPMENTS OF FRUIT.

Special provision was continued for making trial shipments of tender fruits, such as pears, tender apples and peaches. A small cold storage building was provided at Grimsby, Ontario. Growers of fruit there had agreed to furnish a quantity of these fruits per week. The information which has been gained by the trial shipments for three years shows that pears and the early tender varieties of apples can be shipped in cold storage, landed in good condition and sold readily at satisfactory prices. It is important that the fruit should be picked in the right condition of ripeness for the particular variety. Only fruit of large size, good shapes and fine colour should be exported. Peaches which were packed in cotton batting were carried safely and delivered in London in good condition.

CREAMERIES IN THE NORTH-WEST TERRITORIES.

The department has continued to manage the creameries in the North-west Territories. During 1899, butter was manufactured at 20 creameries; and 15 cream-separating or cream-collecting stations tributary to those were also under the charge of the department. A charge of 4 cents per pound for manufacturing was made. In cases where loans had been made to the manufacturing association, an additional charge of 1 cent per pound was made for a loan fund. The highest average price at which the butter was sold for the summer season at any one creamery was 22·40 cents per pound; and the lowest average price for any creamery was 20·04 cents per pound. The total quantity of butter manufactured from May 1 to October 31 was 501,907 pounds, and the average price for which it was sold f.o.b. at the creameries was 20·62 cents

per pound. It was sold for the account of the patrons, and after the charges had been deducted, the net proceeds were distributed among them in proportion to the quantities of butter made from the milk or cream supplied.

Two of the creameries in Alberta were continued in operation during the winter of 1898-9, and four of them are to be continued during the winter of 1899-1900.

The butter-makers at most of the creameries in Alberta report that there are good prospects for an increase in the output of butter from them next season.

GENERAL DAIRYING SERVICE IN THE PROVINCES.

The following paragraphs indicate the other principal work which was carried on during the year in the different provinces.

In the province of Quebec, the Assistant Dairy Commissioner held meetings during the year; and during the winter he delivered a series of lectures to each class of students at the dairy school of St. Hyacinthe.

In the province of Nova Scotia a dairy station was conducted at Nappan. Cheese has been made there during part of the summer, and butter during the winter.

The Dairy Superintendent of Nova Scotia has travelled throughout the province, visiting cheese factories and creameries and addressing meetings of farmers at various points.

He also assisted in carrying on the dairy school at Sussex, N.B., and addressed meetings in other places in New Brunswick.

The department has withdrawn entirely from the management of the dairy stations in Prince Edward Island. I am informed that the cheese factories and creameries on the island which had been under the management of this department, are now conducted by the directors of the several dairying companies with economy, efficiency and success.

It is reported that over 52,000 boxes of cheese were exported from the island for the season of 1899. The winter butter-making movement has been extended; and I am informed that at nineteen factories in Prince Edward Island winter butter-making was carried on during the winter of 1898-9. This shows a rapid development of co-operative dairying in that province from 1892, when there was but one factory taken charge of by the department.

In the province of British Columbia, an expert attended a few meetings and gave further help in the establishment of co-operative creameries and cheese factories and in the extension of dairying. The development of mining in British Columbia and in the Klondike region is opening new and profitable markets for butter and other dairy products from British Columbia and the North-west Territories.

In the provinces of Ontario, New Brunswick and Manitoba, superintendents of dairying are employed by the provincial governments, and consequently no work of direct instruction, except the attendance at conventions, and the distribution of bulletins and reports from this department was undertaken in them.

BRANDING AND REGISTRATION BILL.

Under the Act passed 'to provide for the Registration of Cheese Factories and Creameries, and the Branding of Dairy Products, and to prohibit misrepresentation as to

the dates of Manufacture of such Products,' certificates of registration have been issued to over 900 cheese factories and creameries, and applications are being received occasionally.

EXPORTS OF BUTTER AND CHEESE.

The magnitude and growth of the export trade of Canada in dairy products is shown by the following tables (year ended June 30) :—

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

Year.	Quantity.	Value	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1869	10,649,733	1,698,042	534,707	1,015,702	.....	1,496	14,870	95,777	26,986
1880	18,535,362	3,058,069	2,756,064	111,158	.....	.....	24,710	163,290	2,847
1881	17,649,491	3,573,034	3,333,419	58,522	.....	.....	30,574	143,935	6,584
1882	15,161,839	2,936,150	2,195,127	529,169	.....	.....	32,052	169,270	10,538
1883	8,106,447	1,705,817	1,330,585	206,154	.....	.....	29,446	131,341	8,291
1884	8,075,537	1,612,481	1,395,652	46,618	.....	.....	16,455	151,224	2,532
1885	7,330,788	1,430,905	1,212,768	16,695	.....	15,172	21,473	161,862	2,835
1886	4,668,741	832,355	652,863	17,545	.....	.....	17,577	142,485	1,885
1887	5,485,509	979,126	757,261	17,207	.....	.....	23,789	180,238	631
1888	4,415,381	798,673	614,214	13,468	.....	.....	5,226	164,329	1,431
1889	1,780,765	331,958	174,027	7,879	.....	.....	22,921	124,349	2,782
1890	1,951,585	340,131	184,105	5,059	.....	.....	29,342	119,989	1,636
1891	3,768,101	602,175	440,060	10,054	.....	20,447	24,021	101,649	5,944
1892	5,736,696	1,056,058	877,455	6,038	.....	5,160	27,207	133,770	6,428
1893	7,036,013	1,296,814	1,118,614	7,539	.....	1,175	35,042	127,412	7,032
1894	5,534,621	1,095,588	936,422	6,048	1,125	.....	25,560	109,263	14,170
1895	3,650,258	697,476	536,797	5,365	.....	267	35,028	108,439	11,580
1896	5,889,241	1,052,089	893,053	2,729	.....	9,370	34,299	105,472	7,166
1897	11,453,351	2,089,173	1,912,389	6,233	.....	8,513	33,490	115,754	12,794
1898	11,253,787	2,046,686	1,915,550	3,738	.....	17,574	31,619	51,045	27,160
1899	20,139,195	3,700,873	3,526,007	3,984	.....	12,384	41,810	74,813	41,875

CHEESE.

Year.	Quantity.	Value.	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1868	6,141,570	620,543	548,574	68,784			891	1,954	340
1880	40,368,678	3,893,366	3,772,769	114,507			170	5,710	210
1881	49,255,523	5,510,443	5,471,362	28,500			14	10,027	540
1882	50,807,049	5,500,868	5,571,076	18,436			242	8,196	2,318
1883	58,041,387	6,451,870	6,409,859	24,468			202	15,490	1,863
1884	69,755,423	7,251,989	7,207,428	24,866			188	19,248	262
1885	79,655,367	8,265,240	8,178,953	86,978			205	15,899	1,207
1886	78,112,927	6,754,626	6,729,134	15,478	80	90	156	9,139	546
1887	73,604,448	7,108,978	7,065,983	30,667			211	11,982	165
1888	84,173,267	8,928,242	8,834,997	83,153	5		828	9,087	172
1889	88,534,887	8,915,684	8,871,205	31,473			1,582	11,208	216
1890	94,260,187	9,372,212	9,349,731	6,425		370	2,154	12,777	755
1891	106,202,140	9,508,800	9,481,373	13,485			1,954	9,104	3,884
1892	118,270,052	11,652,412	11,593,690	39,558	2		2,124	12,942	4,096
1893	133,946,365	13,407,470	13,360,237	23,578			2,689	18,679	2,297
1894	154,977,480	15,488,191	15,439,198	9,552		173	3,036	21,948	14,284
1895	146,004,650	14,253,002	14,220,505	5,058		16	5,463	9,785	12,175
1896	164,689,123	13,956,571	13,924,672	10,359	299		4,861	7,509	8,871
1897	164,220,699	14,676,239	14,645,859	4,486	94	24	5,365	11,954	8,457
1898	196,703,323	17,572,763	17,522,681	14,604		1,428	6,889	12,784	14,377
1899	189,827,839	16,776,765	16,718,418	17,739			11,701	13,293	15,614

IMPORTS OF GREAT BRITAIN.

The following table, from the Board of Trade returns of Great Britain for thirteen years (ended December 31), shows the total quantities and value of butter and cheese imported into Great Britain :—

BUTTER.			CHEESE.		
Year.	Quantity.	Value.	Year.	Quantity.	Value.
	*Cwt.	£ stg.		*Cwt.	£ stg.
1886	1,543,566	8,141,438	1886	1,734,890	3,871,359
1887	1,513,134	8,010,274	1887	1,836,789	4,514,382
1888	1,671,433	8,913,045	1888	1,917,616	4,546,408
1889	1,927,842	10,244,636	1889	1,907,999	4,490,970
1890	2,027,718	10,598,848	1890	2,144,074	4,975,134
1891	2,135,607	11,591,181	1891	2,041,317	4,815,369
1892	2,183,009	11,965,190	1892	2,232,817	5,416,784
1893	2,327,474	12,753,593	1893	2,007,462	5,160,918
1894	2,574,835	13,456,699	1894	2,226,145	5,474,940
1895	2,825,662	14,245,230	1895	2,133,819	4,675,130
1896	3,037,718	15,344,364	1896	2,244,525	4,900,342
1897	3,217,802	15,916,917	1897	2,603,178	5,885,521
1898	3,209,153	15,961,783	1898	2,339,452	4,970,805

*Cwt. = 112 lbs.

The export commerce of the country in most of the farm products is increasing at a very rapid rate. The following comparative statement of the value of the exports of some of the farm products of Canada during the years 1896 to 1899, shows the growth in that short period and indicates somewhat of the great possibility for further expansion of this trade:—

VALUE OF SOME CANADIAN FARM PRODUCTS EXPORTED IN YEARS 1896, 1897, 1898 AND 1899.

(Years ending June 30.)

——	1896.	1897.	1898.	1899.
	$	$	$	$
Wheat	5,771,521	5,544,197	17,313,916	7,784,487
Flour	718,433	1,540,851	5,425,760	3,105,288
Oats	273,861	1,655,130	3,041,578	3,268,388
Oatmeal	364,655	462,949	554,757	396,568
Pease	1,299,491	2,352,891	1,813,792	1,955,598
Cattle	7,082,542	7,159,388	8,723,292	8,522,835
Cheese	13,956,571	14,676,239	17,572,763	16,776,765
Butter	1,052,089	2,089,173	2,046,686	3,700,873
Pork, bacon and hams	4,446,884	5,871,988	8,092,930	10,473,211
Eggs	807,086	978,479	1,255,304	1,267,063

CROPS.

RESULTS OF THE PAST SEASON.

The year 1899 has, on the whole, been a favourable one for the farmer, and in most parts of the Dominion the crops have been above the average.

In Ontario the oat crop—by far the largest grain crop grown—has been particularly good, and the grain unusually plump and heavy. The yield of barley has also been above the average and the quality in most localities good. Spring wheat has given a crop fully equal to that of 1898, which was well above the average of previous years. Winter wheat suffered from winter-killing and this with unfavourable conditions during the later growing period, reduced the crop to a point considerably below the average. Pease have given an average yield. The crop of hay, although somewhat less than that of 1898, stands a little above the average in weight and the quality is satisfactory. Field roots and Indian corn have given less than average returns, but potatoes have produced a larger crop than usual.

The apple crop in this province although good in some localities has on the whole been disappointing, and the fruit more variable in quality than usual. Most other fruits have given fair returns.

Owing to drought, pasturage has not been quite as good as usual, but in all lines of stock there has been an increase, and the animals are reported as in a healthy condition. The dairy industry has flourished under the stimulus given by good prices, and the production of swine is rapidly increasing.

In the province of Quebec farm crops generally have given satisfactory returns. The yield of hay has been well up to the average, while the grain crops have been

unusually good, and the quality of the product above the average. Roots and potatoes have also given encouraging returns. The growth of grass has been good, pasturage has been satisfactory, and the stock interests are prospering. There has been a further increase in dairy products and the returns from sales have been gratifying. The fruit crop in the western part of this province has been fairly satisfactory and the quality of the specimens good.

In the Maritime Provinces the season has been an encouraging one. Notwithstanding a cold and backward spring, hay has given more than an average return, and with fair harvest weather the crop has been generally well saved. Oats, wheat and barley in all the three provinces have yielded satisfactorily and in many localities the crops have been unusually large. Rust, which prevailed to an alarming extent in 1898, has given comparatively little trouble this year. Field roots have produced an average crop, while the yield of potatoes is somewhat above the average. Buckwheat has given fair returns. Owing to unfavourable weather the crop of Indian corn has been light.

In the Annapolis and Cornwallis valleys the crop of apples has been unusually heavy, and good crops of this fruit have been had in other parts of Nova Scotia, also in New Brunswick and Prince Edward Island. Favourable climatic conditions and good prices are bringing about a rapid extension of the fruit industry in this part of the Dominion.

Pasturage has been generally good and a satisfactory increase in live stock is reported. The output of dairy products is increasing, and considerable quantities are now exported, especially from Prince Edward Island.

Farmers in Manitoba have had a favourable season. The wheat crop has averaged well, the grain is of excellent quality, has been well saved and is realizing good prices. Oats have given unusually heavy returns ; the crops of barley also have been very satisfactory. More attention is being paid to the raising of stock, and the production of pork is increasing. Much attention is given in this province to the cultivation of Brome grass for hay and pasture, and the area devoted to the growing of this useful grass is rapidly extending.

In the North-west Territories the season has in most parts been a favourable one, especially in Eastern Assiniboia, where the wheat crop has been very good, has been well saved and is of fine quality. The area under wheat in this division of the territories is rapidly increasing, and the output this year will be much in excess of that of any previous season. Oats and barley have also given excellent returns. In parts of Saskatchewan the latter portion of the season was unfavourable for the grain crops. Excessive rains produced a very heavy growth of straw, and this with unusually cool weather delayed ripening so much that in some localities frost occurred before the grain had matured. Since stock raising has become so important a branch of farming in that part of the Dominion such a heavy growth of straw has supplied so much nutritious food for cattle that the injury to the grain has thus been largely compensated.

In Alberta the stock industry is making good progress and is said to be giving satisfactory returns. Much enterprise has been shown in that part of the territories in the construction of irrigation ditches to supply water to growing crops, and good results are anticipated from these efforts.

In the coast climate of British Columbia the season has been unfavourable. In the early growing months the weather was cold and wet, and it rained almost daily during the blossoming period of the fruit trees. Hence very little fruit set and much of that which did mature was below the usual quality. There was warm dry weather during the latter part of June, when much of the hay crop was saved in good condition. Wet weather prevailed during the grain harvest and the crop lay so long in the fields under unfavourable conditions that much of the grain was discoloured, and in some instances it sprouted. On the whole the hay crop was fairly heavy, and the yields of grain and roots have been above the average. Indian corn has produced a lighter crop than usual, and potatoes have also fallen short of an average yield. The cool wet season has also been unfavourable for stock. Owing to the large demand in the mining districts, farm produce of all sorts has met with a ready sale at good prices, and notwithstanding the unfavourable conditions, farming has been fairly profitable.

In the drier interior regions of this province, the grain crops have been good, and the yields of fruit have been fairly satisfactory.

CATTLE TRADE.

IMPORTATION OF LIVE STOCK.

The importation of horses and mules, cattle, sheep and swine into the Dominion reported during the past season was as follows:—

Horses and mules	3,260
Cattle	3,178
Sheep	13,925
Swine	1,589

The above were brought in at various points as shown in detail in the reports of the Chief Veterinary Inspector (See Appendix No. 14).

EXPORTATION OF LIVE STOCK TO EUROPE.

The exportation of live stock from Canadian ports for the year ended October 31, 1899, was as follows:—

Horses	4,980
Cattle	97,014
Sheep	62,308
Swine	174

(For details see Appendix No. 14.)

EXPORTATION OF CATTLE TO THE UNITED STATES.

The numbers of Canadian cattle exported to the United States during the three previous years, were as follows:—

1896	1,646
*1897	57,857
*1898	88,605
*1899	85,240

* For the years ended September 30.
The quarantine was removed February 1, 1897.

The figures of the last three years indicate that the removal of the old regulations which required a quarantine detention of ninety days on cattle entering the United States from Canada, has enabled the farmers and stock-raisers of the Dominion to find a large market in the United States for their live stock. The total value of the last year's export to the United States of Canadian cattle amounted to $1,269,020.

EXPERIMENTAL FARMS.

These useful Dominion institutions which have now been in successful operation for twelve years, continue to do good work. From the beginning, many experiments have been conducted to gain information as to the best methods of increasing the profits of farming. Ten years' experience in sowing grain at different dates has shown the great advantage and economy of early sowing. To produce the best results, the necessity of thorough cultivation of the soil in preparing for seeding has also been demonstrated. Many practical object lessons have been given bearing on methods of maintaining the fertility of the land by the ploughing under of green clover, also in demonstrating the economy of using barn-yard manure, as far as is practicable, in the fresh or unrotted condition. It has also been shown with all crops that, under similar conditions, some varieties are more productive than others, and the necessity urged of care in the choice of seeds, so that those sorts may be sown which are likely to produce the largest yield. The importance of selecting only plump and well matured grain for seed has also been frequently referred to, and the teaching and example of the experimental farms on all these points, supported by the results showing increased growth and larger crops, have awakened much interest in the minds of all thoughtful farmers, and many have been led to adopt the best practices.

LARGE DEMAND FOR INFORMATION.

The demand for the publications issued by the experimental farms, in which are recorded particulars of the work conducted, has increased to that extent that sixty thousand copies of each issue are now required. The large volume of correspondence conducted with farmers in all parts of the Dominion furnishes further proof of the general desire for information. Such correspondence occupies the larger part of the time of all the officers on the farm staff during the winter months. They are thus consulted in reference to the many difficulties which beset agricultural pursuits, and use their best efforts to give the fullest information. The officers have also, as heretofore, attended a large number of the more important meetings of agricultural, horticultural and stock-breeding associations, and have thus had frequent opportunities of bringing under the personal notice of a large number of farmers fuller particulars of many of the important branches of work which have been carried on at the experimental farms and giving much practical information.

THE TESTING OF VARIETIES.

The systematic testing of varieties of cereals, fodder corn, field roots and potatoes, grown under similar conditions of cultivation in the different climates of the Dominion, has been continued. These include varieties brought from many different countries, to test their usefulness in Canada, as well as varieties produced in this country. The results

obtained have been reported on promptly in a special bulletin issued early in each year, so that farmers might have the opportunity of studying the particulars furnished before choosing their seeds for sowing.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

Distribution of Samples of Grain for the Improvement of Seed.

This good work, which has now been carried on for a series of years, and through which many improved sorts are being rapidly brought into cultivation, has, under my instructions, been continued. To all those who have applied within the limits of the time named (not later than March 15) samples of three pounds weight have been forwarded in each case. Most of the varieties sent out have been grown on the experimental farms, and have been selected with special reference to their superior quality and productive habit.

NEW FEATURE IN SEED DISTRIBUTION.

Under my instruction, a new feature has been introduced in connection with this useful work. It has been found impracticable to obtain accurate information as to the relative yield per acre of each sort of grain distributed where the samples sent out were limited to three pounds. To overcome this defect, a select list of farmers was prepared early in the year, chosen from among those who had shown by their reports on the results obtained from the three-pound samples that they were much interested in this subject. Some of the best sorts of oats, wheat and barley were chosen for this special work and in arranging a list of those who were to conduct the tests, care was taken to have every rural constituency in the Dominion represented. The farmers had the opportunity of choosing the varieties they preferred, and sufficient seed was sent in each case to sow one-tenth of an acre, instructions were also sent for sowing. More than 4,300 farmers were thus supplied. By this means many useful object lessons have been furnished in every rural constituency, illustrating the value of the best and most productive sorts, and a very general interest has been awakened in this important work. Arrangements have been made for the publication of the results of this extended trial as soon as the reports have been compiled.

NEW FRUITS FOR THE NORTH-WEST.

The persistent efforts which have been made for some years past to procure useful fruits sufficiently hardy to endure the climate of the Canadian North-west have reached a very interesting stage. Thirty-six of the new crosses between a thoroughly hardy wild Siberian crab and some of the larger cultivated apples have borne fruit during the past season, and on five of these the fruit was of such quality as to warrant propagation for extended trial. Arrangements have been made to send out a limited number of these new sorts to be tested under different conditions and at widely distant points in the North-west country, so that the fullest information may be had as early as possible. The results already obtained justify the hope that this special line of experimental work in plant breeding will prove of much value.

FOR THE PARIS EXPOSITION.

An excellent collection of agricultural and horticultural products has been brought together at the Central Experimental Farm, consisting of many varieties of cereals in the straw, and of cleaned grain. Samples have also been forwarded of Indian corn, beans, flax, tobacco and other products. A large number of varieties of the more perishable fruits and vegetables have been put up in bottles and preserved in antiseptic fluids. This collection will do much to illustrate the character of the climate in eastern Ontario.

THE FARM.

In order to give some exact information as to the cost of running an average farm, an area of about 200 acres of arable land has been set apart and will be put under a regular rotation. The usual field crops were cultivated this year, but owing largely to unfavourable weather conditions the returns have been rather below the average.

DAIRY CATTLE.

Some experimental work has been incepted along the line of feeding for milk production, and to determine the values of certain feeding stuffs.

STEERS.

A large number of steers have been fed experimentally to gain information as to the beef-producing values of various feeding stuffs, both concentrates and roughage. Some work has also been done to ascertain the effect of dehorning upon the capacity of steers to put on flesh economically as well as to determine, approximately, the cost of the operation, judging by immediate results.

SHEEP.

Sheep have been introduced upon the Central Experimental Farm, the chief purposes in view being the demonstration of their great value as economic flesh-producers, and the value of pure-bred sires upon grade ewes in the production of superior wool and mutton.

SWINE.

A large number of swine have been fed experimentally during the year, for the purpose of determining the values of different feeding stuffs, ascertaining the causes of soft bacon, and solving certain other feeding problems.

IN THE DAIRY.

Many samples of milk have been received from farms to be tested during the year. Some experiments have been conducted in cream ripening, using pure culture and home-made starters.

DIVISION OF HORTICULTURE.

The horticultural division includes the fruit and vegetable department, the arboretum and botanic garden and the forest belts. In all of these branches of the work experiments are being conducted, and knowledge gained, which, when published from time to time, must prove of value to the farmers and fruit growers of Canada.

Fruits and Vegetables.—In the orchards, vineyard and small fruit plantations experiments are being conducted with a large number of varieties of fruits, in order to ascertain their relative hardiness, productiveness, quality, freedom from disease and any other matters concerning them which will be likely to prove useful to the public. Experiments in top grafting the tenderer but best varieties of apples on hardy stocks was a prominent feature of the work this year, and good results are expected. The testing of vegetables has also received considerable attention, and the best varieties are reported on from year to year.

Spraying.—Since 1890 spraying has been an important part of the work, and many experiments have been tried to demonstrate or determine the value of different spraying mixtures and solutions in preventing the growth of fungous disease, and in destroying or preventing the depredations of injurious insects on trees, shrubs and plants. This year interesting results were had from the use of whitewash on apple trees, which was found to destroy the oyster-shell bark-louse affecting the trees.

Tobacco.—During this season an acre and a half of tobacco, consisting of three varieties, was grown on the farm for the purpose of finding out how these succeeded at Ottawa, and also to supply material for experiments in curing. A curing house constructed on the most improved plans and having the latest system of ventilation, was erected last summer and will be used for conducting experiments in different methods of curing. Many additional varieties of tobacco have also been grown for comparison as to date of ripening, quality and yield.

Forest Belts.—The trees in the forest belts continue, for the most part, to make good growth. The annual measurements of a large number of them have been taken this year, and a table showing the growth they have made will be published in the report of the horticulturist. In certain parts of the belts, where the trees originally planted have not succeeded, new plantations were made.

Arboretum and Botanic Garden.—The arboretum and botanic garden, which occupies about 65 acres, contains a large collection of trees, shrubs and perennial plants, and is growing in value and interest to Canadians every year. This year a catalogue of the trees and shrubs growing there was published, in which are given the common and scientific names, their native country, the date when they were planted, and their relative hardiness. Up to the present time 3,071 species and varieties have been tested, of which 1,434 have been found hardy; 361, half hardy; 232, tender; 307, winter killed, and 737 have not been planted long enough to admit of an opinion being given as to their hardiness.

DIVISION OF ENTOMOLOGY AND BOTANY.

The division of entomology and botany has been kept busy during the past season. The interest in fruit insects which has been stirred up by the excitement

caused by the work of the San José Scale, in the province of Ontario, has drawn the attention of fruit growers to the various insect pests which year by year injure their fruit crops, in too many instances without much effort on the part of the fruit growers to check them. The San José Scale Act remains in force, and there has been much correspondence with regard to the different classes of plants which were prohibited from importation by this Act. Everything has been done to prevent fresh introductions of this injurious insect into the Dominion. The correspondence during the year has been large and covers a wide range of subjects in entomology and botany. Many specimens of insects and plants have been sent in by correspondents for identification, and several valued additions have thus been made to the collections. During the summer large collections have been made of insects, in all orders, for the special purpose of fitting up cases for exhibition to visitors at the Experimental Farm. In these cases it is proposed to show some of the commonest injurious and beneficial insects, and to give illustrations of the life histories of the common crop pests. During the year the entomologist and botanist has attended many farmers' institute meetings in various parts of the Dominion, including three series of meetings during the summer. Leaving Ottawa in the middle of June, he made an investigation at the request of the Manitoba Government of locust injuries in southern Manitoba. Subsequently a series of eighteen very successful meetings was held in southern Assiniboia, in company with the Honourable O. H. V. Bulyea, the Commissioner of Agriculture for the North-west Territories. Returning to Winnipeg, assistance was given in connection with the weed tent at the Winnipeg summer exhibition. This was a feature of great interest to farmers as was shown by the large number who came to examine the bundles of weeds exhibited and to ask questions concerning their eradication. Reaching Vancouver on July 20, another series of meetings was held in company with the Deputy Minister of Agriculture for British Columbia in different parts of Vancouver Island and on the mainland of British Columbia. These meetings were well attended and a keen interest evinced in the subjects treated of, viz., weeds and their eradication, and injurious insects and the best remedy to use for those which were most noticeable at the time in the different districts visited.

Special subjects which have required particular attention of the division during the past season, are :—The San José scale and allied scale insects ; the Hessian fly, of which there has been a serious outbreak in Manitoba ; the asparagus beetle, a European pest first noticed in the United States forty years ago, but which only spread over our borders during the past season ; the pea aphis, an insect which has been very injurious in pea fields and upon the flowering sweet pease in gardens, and has also done enormous injury in the United States. Although so abundant and destructive this year, this insect was previously unknown to naturalists. The tent caterpillars of the forest and orchard were again abundant in many parts of Ontario and Quebec, and were the subject of a great deal of correspondence. Early spraying, while the caterpillars were still young, with a weak mixture of Paris green and water, was again proved to be the best remedy.

The studies of the life histories of insects have been continued with valuable results, as well as many experiments for the discovery of the best remedies for well-known pests.

CHEMICAL DIVISION.

As in past years, the work of the chemical division of the experimental farms during 1899 has been of a varied character ; in nearly every branch of agriculture there

have been problems that called for chemical aid in their solution. It is, therefore, believed that the results obtained in the farm laboratories will prove of wide interest and value to Canadian farmers.

Priority of attention, as heretofore, has been given to original investigations and to the chemical work in connection with experiments conducted by the other divisions, both of the central and branch farms. As far as time permitted, samples of an agricultural nature, such as soils, cattle foods, well waters, &c., sent in by farmers, have been examined and reported upon.

The correspondence with farmers on matters pertaining to the occupation and needs continues to increase. This phase of the work is much appreciated.

Soils.—Particular attention has been paid to the examination of impoverished soils, with a view to furnishing information that may be of assistance towards their economical improvement. This important subject is treated of at some length in the report of the chemist for the current year, and examples given which illustrate, by chemical data, the exhaustion of plant food which has taken place by continuous cropping without adequate return of manurial substances. Probably the chief fact of value that has been brought to light by this research is the diminution of *readily available* mineral plant food and the reduction in the percentages of humus and nitrogen.

Soft Pork Investigation.—This work, begun in February last, is still in progress. Already, the fatty tissue of some 75 pigs has been submitted to chemical and physical examination. It has been established by this research that 'softness'—a quality in the pork of certain pigs that makes it undesirable for the English market—is due to a preponderance of olein. The fat of pork consists of palmitin, stearin, and olein, the two former being solid and the latter fluid, at ordinary temperatures. The increase in olein in the soft or tender bacon is necessarily accompanied by a corresponding decrease in palmitin and stearin.

In the early months of the present year a very comprehensive investigation was commenced on the central farm to ascertain what effect the character of food, exercise, &c., had upon the quality of the pork. The fatty tissue of each pig is being analysed, and it is expected that this work, when completed, will give valuable data towards the solution of this very difficult and, from a commercial standpoint, important problem.

Fertilizers.—An instructive piece of work for the maritime provinces accomplished in the past year consists in the detailed analysis of a sample of 'marsh mud' from the Habitant river, N.S. The analysis clearly shows that its fertilizing value does not depend upon large percentages of plant food, but rather upon the comparatively large proportion of such which exists in a more or less readily assimilable condition. We have in this an explanation of the experience of many farmers in the maritime provinces, respecting the immediate though transient or temporary character of the results from the application of such deposits. The rational use of these tidal deposits demands that they should not be employed solely, but that manures supplying organic matter and nitrogen should also be applied to the soil. It is not to be expected that these so-called marsh muds will give on all soils uniformly good returns, for there are several factors,—prominent among which are the character and physical condition of the soil and the nature of the crop to be sown, that will affect their usefulness as suppliers of plant nourishment.

The work of the year has also included the examination of many samples of naturally-occurring fertilizers, such as swamp-muck, marl, sea-weed, &c.; of well waters from farm homesteads; of native grasses, and various forms of cattle food, both coarse and concentrated. The results of these analyses published in the report of this division for the current year furnish much instructive reading for those engaged in one or other of the various branches of agriculture.

For several seasons experiments have been made with *Nitragin*, a culture of the germs that live in the nodules of the legumes, with a view of ascertaining knowledge as to the practical value of this preparation for encouraging the growth of clover on the farm. The results obtained this year are very encouraging, more particularly in showing a marked increase in the yield of the second year's crop from the inoculated seed compared with that from untreated seed.

In August of the present year the new chemical building on the farm was completed. It contains two laboratories, in addition to offices, rooms for storage, photographic purposes, &c. The increased accommodation furnished by this building will aid very much in the prosecution of the chemical work of the farms. The laboratories are commodious and conveniently arranged, and have been equipped with the necessary apparatus for conducting research work in agricultural chemistry. In order to meet the increased demands upon this division, a second assistant chemist has been apppointed. This appointment will allow a still further advance in this important branch of the experimental farm system.

The tuberculin supplied to the Government Veterinary Inspectors for the diagnosis of tuberculosis in cattle, is prepared and sent out from the Farm laboratory. From December 1, 1898, to November 30, 1898, 17,179 doses have been so forwarded. This amount is a marked increase on that supplied during the same period of the previous year.

POULTRY.

In this department a number of the standard breeds of poultry are kept, with a view of ascertaining by experiment the best winter layers and most rapid flesh formers. From the experience of past years the farmers have received much benefit from the data obtained, and which give no uncertain sound as to breeds best adapted to fill the dual requirements. During the past year experimental work in the artificial hatching and rearing of chickens, the fattening of chickens, and the feeding and treatment of laying stock of different ages, so as to ascertain at what age the greatest output of eggs may be had, have been carried on and afforded scope for interesting and useful investigation.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

A full series of experiments, planned with special reference to the needs of the farmers of the maritime provinces has been conducted during the past season at the experimental farm at Nappan, N.S. Further tests have been made as to the varieties of cereals, fodder plants, field roots and potatoes, best suited to the climate, also the proper time for sowing to produce the best results, and the methods of cultivation and treatment most successful in each case. A considerable number of samples of grain and potatoes have been distributed among farmers residing in those provinces for test, with

the object of extending the cultivation of the better sorts. Some trial plots have also been devoted to testing the effects of fertilizers.

Experiments have been conducted in the feeding of steers, some well bred animals having been selected for this purpose. Some very fine beef animals were produced, which were readily disposed of at a good figure. The efficiency of the dairy herd has been well maintained and its milking capacity improved. Many experiments have been conducted with swine, and the stock in this line has been made more generally useful by the introduction of additional boars of good quality and breeding.

In the branch of horticulture further attention has been paid to improved varieties of small fruits. Many of the larger fruits are also under trial to ascertain which are best adapted to the climate. Many experiments have been conducted with vegetables to find out which are best suited to supply the needs of the farmers in the maritime provinces.

Considerable attention has been given during the year to the selection of samples of grain and other agricultural products to be shown at the forthcoming Paris Exposition. The more perishable fruits and vegetables have been bottled in suitable preserving fluids, and some good samples of apples grown in the Nappan district have been placed in cold storage to preserve them for showing in a fresh condition at the opening of the exposition.

EXPERIMENTAL FARM FOR MANITOBA.

Further tests have been conducted at the experimental farm at Brandon with many different varieties of wheat, oats and barley, to gain additional information concerning those sorts best adapted to the climate. Tests have also been continued with different methods of sowing, with different quantities of seed per acre, and in sowing the seed at various depths. The effect of sowing grain early and late in the spring has been again tried and further information gained, showing the value of early sowing. Additional experiments have been made with flax, Indian corn, field roots and potatoes, and much valuable experience gained. Tests have been continued with grasses, millets, soja beans, horse beans, &c., and a considerable area of land has been seeded with the Awnless Brome grass, which has given excellent crops. A fine collection of agricultural products has been prepared at this farm and forwarded for display at the Paris Exposition.

The herd of cattle has been improved by the introduction of additional male animals, and experiments have been conducted in the feeding of steers, swine and poultry, and also with bees.

Further trials have been made in the growing of vegetables and small fruits, with the object of finding out those best adapted to the climate of Manitoba. Experiments have been continued with forest trees and shrubs planted for shelter and ornament, and some useful additions have been made to the list of hardy species.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

The results of the annual trials of all the more important farm products on this prairie farm at Indian Head have been very instructive to the settlers on the North-

west plains and are very much appreciated. The experiments of the past season have as heretofore covered a wide area, and have included all the more valuable field and garden crops. The different sorts of grain have been tested to find out which are the most productive, early, medium and late sowings have been made to ascertain the best time for sowing, and comparisons have been instituted as to the relative results of seeding with the hoe and press drills. The effect of the ploughing under of different sorts of green crops has been tried to add humus to the soil and otherwise enrich the land. The effect of rotation of crops on the yield of grain is also being tested. Other trial plots have been devoted to sowing of different quantities of seed per acre, to the testing of different sorts of clover, buckwheat, lupins, millets, sorghum tares, horse beans and soja beans.

Further experiments have been conducted with the Awnless Brome grass and Western Rye grass with much success. Extensive trials have been made with a number of different sorts of vegetables and much experience gained regarding the varieties most suitable to the climate. The number of forest plantations have been increased, and the cost of planting per acre and of the subsequent care is carefully kept and reported on. Additional experience has also been gained with many varieties of trees and shrubs, also with small fruits and with perennial and annual flowers.

A considerable quantity of the most promising sorts of grain has been sent out in small sample bags among farmers for test, and larger quantities of those varieties which have succeeded best at the Experimental Farm have been sold to farmers for seed in lots of two bushels or more. A fine collection of samples of many varieties of grain, both in the straw and cleaned, which have been grown at this farm, has been prepared and forwarded to Paris for the coming exposition. This collection also contains samples of many sorts of grasses, both native and cultivated, also some of the smaller vegetables and wild and cultivated small fruits bottled in preserving fluids.

The cattle composing the herd, which consists chiefly of Shorthorns, Ayrshires and grades, are all in good condition, and the male animals are proving very useful to farmers in the neighbourhood. Feeding experiments have been conducted with steers to gain information as to the most economical methods of producing beef.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

The success of the work of this farm has been much interfered with during the past year by unfavourable weather. The spring was cold and backward, and during all the period of the blossoming of the fruit trees there was a succession of rainy days, which so interfered with the setting of the fruit that the crop has been very small, and many of the trees have failed to give any returns. The collection of fruit trees at this farm at Agassiz is very large, and hence the orchards are among the chief features of interest, and a season so unfavourable as this has proven to be necessarily interferes for a time with the success of the work. Most of the trees, however, have made excellent growth and will be likely to produce heavily during the coming year. Many new varieties have been added to the list of those under trial, and the work of the farm in this direction has been of much interest and of great value to the fruit-growers. The several orchards on the sides of the mountain have made excellent progress, and notwithstanding the unfavourable character of the season many of the trees were fairly well laden with fruit.

Considerable success has attended the growing of small fruits, and the results in crop of the many different sorts tested will prove very instructive.

The extensive series of experimental plots of grain have given returns above the average, and further experience has been gained regarding the different sorts which do best in the coast climate of British Columbia. The weather has been suitable for field roots, and most of the varieties of turnips, mangels and carrots tested have given remarkable crops—larger than those at any of the other experimental farms. Many different sorts of potatoes have been tested and useful information gained as to the best and most productive sorts. Many experiments have also been tried in the early and later sowing of grain and roots and much valuable information gained.

Many experiments are being tried with grasses and very successfully; also with clovers, all of which produce heavy crops in that moist climate. Many sorts of garden vegetables have been under trial and many useful facts gleaned as to their quality and relative productiveness as grown in that province. Further experiments have been tried with flax, particularly to gain information as to the best time for sowing and the quantity of seed most profitable to sow per acre. Experimental trials have also been made with buckwheat, millet and many other fodder crops.

The contributions from this farm for the Paris Exposition have been large and interesting, and include a good collection of cereals and a large display of fruits.

Much valuable information is supplied by the tests which have been made in the growing of forest trees for timber and for ornamental planting, and each year's experience adds many facts to our stock of knowledge on this subject.

Full particulars of the results obtained for the year from all the different lines of experimental work in progress at all the farms will be found in the annual report of the Experimental Farms, copies of which may be had by application to the Director at Ottawa.

ARCHIVES.

The work continues to be done actively and uninterruptedly as already noted. The transcription of state papers in London and Paris is systematically conducted. The Archivist's report for this year will contain, besides the usual calendar, documents relating to the clergy reserves, to education in Upper and Lower Canada, and other subjects of interest down to the year 1831.

17 VICTORIA STREET,
LONDON, S.W.
February 16, 1900.

The Honourable
The Minister of Agriculture,
Ottawa.

SIR,—I beg to submit herewith a few general remarks upon the work of the staff employed under the control of this office at the Public Record Office in London during the year ended December 31, 1899.

There is little variation in the duties from year to year, and as Mr. Douglas Brymner deals so thoroughly with the whole subject of archives in his annual report, I think it will not be necessary for me to go fully into details of the work performed.

I append, however, a summary of the various matters dealt with at the Public Record Office, British Museum and Colonial Office, which will give an idea of the nature and extent of the year's work.

Several subjects have arisen from time to time, the papers connected with which it has been impossible to obtain through the ordinary channels, and I have frequently had to make application to the Colonial Office for the desired information. I am pleased to testify to the courtesy invariably extended to me by the Imperial authorities on such occasions.

The duties, as you will be aware from reports in past years, consist of copying, comparing and correcting the sundry documents, copies of which are intended for deposit among the archives of the Dominion, the compiling of large tabular returns, map tracing, &c.; and I am glad to be in a position to say that with the great diligence and care devoted to their work by the copyists, very satisfactory results are obtained.

With regard to the composition of the staff, no change has taken place, the number remaining at six, as formerly.

There is still a large amount of interesting and valuable records yet to be transcribed under the direction of your department. This work shall receive my best attention, and I need scarcely add that every economy is exercised compatible with efficiency in conducting it.

The amount of my estimate for the financial year 1900-1901, transmitted to you on January 8, remains the same as in previous years, viz., $4,000, and I trust that you will be able to place this sum at my disposal for the continuance of this important service.

With regard to the work performed in France, the accounts received by me from Mr. Victor Tantet, and duly transmitted to your department, will give an idea of its nature and extent during the year 1899.

I may add that the work is inspected and checked monthly by Mr. A. W. Reynolds, of this office.

I am, sir, your obedient servant,

STRATHCONA,
High Commissioner.

MEMORANDUM of work done at the Record Office and Colonial Office during the year 1899.

L. C.	252–267	16 Vols.
	270–273	4 "
U. C.	407–412	6 "
	416–422	7 "
	426–427	2 "
Quebec, 1777–1797		2 "
L. C.	1792–1296	1 "
	1820–1826	3 "
Copied and compared		41 Vols.

There remain eight volumes to complete the series of despatches from the Governors of Upper and Lower Canada, commencing from the year 1763-1840.

The work of copying the despatches from the Secretary of State to the Governors is progressing at the Colonial Office.

The papers relating to the Maritime Provinces will shortly be put in hand, as well as some admiralty papers relating to the war of 1812.

A list has been made of all maps touching British North America to be found in the British Museum, the Public Record Office and the Colonial Office. Those of historical interest relating to Canada will be traced.

III.—PATENTS OF INVENTION.

The following comparative tables show the transactions of the Patent Branch of the Department of Agriculture, from the calendar year 1888, to the year ending October 31, 1899:—

Years.	Applications for Patents.	Patents and Certificates Granted.			Caveats.	Assignments of Patents.
		Patents.	Certificates.	Total.		
1888	2,747	2,257	282	2,539	240	1,159
1889	3,279	2,725	356	3,081	221	1,437
1890	3,560	2,428	369	2,797	248	1,307
1891	3,233	2,343	393	2,736	215	1,231
1892	3,176	3,417	415	3,832	242	1,500
*1893	2,614	3,153	292	3,445	229	1,345
1894	3,291	2,756	462	3,218	301	1,445
1895	3,387	3,074	422	3,496	343	1,550
1896	3,728	3,488	413	3,901	306	1,420
1897	4,300	4,013	284	4,297	377	1,551
1898	4,200	3,611	262	3,873	363	1,657
1899	4,305	3,151	412	3,563	311	1,467

* For 10 months only.

Detailed Statement, Patent Office Fees.

Years.	Patents.	Assignments.	Caveats.	Copies.	Subscription to *Patent Record*.	Notices to Apply for Patent.	Sundries.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1888	60,436 78	2,562 22	1,257 40	971 98	.....	.....	18 13	65,246 51
1889	72,411 30	3,027 90	1,205 47	1,267 60	.....	.....	134 45	78,046 72
1890	78,192 61	3,202 00	1,320 15	931 83	.....	.....	504 19	84,150 78
1891	72,664 26	2,411 95	1,124 60	782 29	.....	.....	340 53	77,723 63
1892	71,840 84	2,794 66	1,270 13	793 32	236 52	89 96	195 33	77,216 76
*1893	58,441 81	2,633 71	1,244 70	796 15	285 18	337 81	110 73	63,850 19
1894	73,061 77	3,142 74	1,793 40	764 07	347 21	1,449 80	123 57	80,682 56
1895	78,223 52	3,194 00	1,854 35	761 54	245 98	1,951 30	129 79	86,358 48
1896	85,060 61	3,130 56	1,790 65	898 27	420 60	2,245 79	57 04	93,532 52
1897	93,298 16	3,250 23	2,108 57	969 33	252 53	2,110 89	128 21	102,117 92
1898	91,176 44	3,641 00	1,935 74	706 50	266 44	1,463 10	172 73	99,361 95
1899	98,669 92	3,781 71	1,533 25	1,028 80	198 05	1,912 00	137 83	107,261 56

* For 10 months only.

The Patent Office fees received during the year ended the October 31, show a surplus of $69,546.51 over the working expenses of the office as per subjoined table.

Receipts.		Expenditure.	
	$ cts.		$ cts.
Cash received	107,261 56	Salaries	27,345 93
Cash refunded	1,906 96	*Patent Record*	8,462 16
			35,808 09
		Receipts over expenditures	69,546 51
Net cash	105,354 60		105,354 60

The following is a table of the countries of residence of the patentees for the years named :—

Countries.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.
Canada	565	609	620	606	671	685	661	707	740	756	710	601
England	152	203	116	122	298	206	177	179	215	266	261	205
United States	1,425	1,788	1,623	1,519	2,227	2,061	1,731	1,980	2,270	2,666	2,312	2,038
France	21	18	10	10	26	24	24	21	24	26	39	36
Germany	33	51	23	36	106	88	108	102	117	126	124	112
Other countries	61	56	36	50	89	89	55	85	122	173	165	159
Total	2,257	2,715	2,428	2,343	3,417	*3,153	2,756	3,074	3,488	4,013	3,611	3,151

The Canadian patentees were distributed among the provinces of the Dominion as follows :—

Provinces.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1 897.	1898.	1899.
Ontario	354	383	425	394	464	437	404	451	430	464	383	310
Quebec	128	129	125	140	131	151	162	177	201	178	171	140
New Brunswick	19	22	20	16	19	23	13	13	12	20	26	7
Nova Scotia	35	30	17	22	16	29	15	19	32	22	27	18
Prince Edward Island	2	2	3	1	1	3	2	6	2	2	4	8
Manitoba and the North-west Territories	18	32	14	28	22	26	38	18	28	36	45	50
British Columbia	9	11	16	5	18	16	27	23	35	34	54	48
Total	565	609	620	606	671	*685	661	707	740	756	710	601

* For ten months only.

Statement of the number of Patents issued under the Act of the session of 1892, 55-56 Vic., chap., 24, on which the fees are paid for periods of six, twelve or eighteen years, at the option of the patentee; and of patents on which certificates of payments of fees were attached after the issue of Patents originally granted for periods of five and ten years.

Year.	Periods for which the Fees were paid on first issue.			Patents on which Certificates were attached after issue.			
	6 yrs.	12 yrs.	18 yrs.	6 yrs.	12 yrs.	5 yrs.	10 yrs.
1892 (Six months ended December 31)	2,141	3	35		3	387	25
1893 (Ten months ended October 31)	3,068	9	46		3	279	10
1894 (Twelve months ended October 31)	2,701	9	46		4	433	25
1895 " "	3,049	5	20			416	6
1896 " "	3,443	11	34	2		401	10
1897 " "	3,981	8	24	15	3	262	4
1898 " "	3,586	3	22	176	9	77	0
1899 " "	3,125	3	23	291	13	108	0

The last year shows the gratifying result that the increase of the revenue of the office amounts to the sum of $7,899.61 over the preceding year, and a surplus of $69,546.51 over the expenditure. It will also be found in the preceding tables that the total revenue for the year is $107,261.56, being the largest in the history of this branch of the department.

Although an increase appears in the number of applications for patents during the year ended October 31, there is a decrease in the number of patents granted in that period; this decrease, it may be remarked, is due to several unavoidable circumstances which had arisen during the year in the examiners' division by the prolonged illness of one of the examiners, the resignation of another, and other interruptions caused by the re-arrangement of the examiners' rooms, incident to the work of the new classification of patents, but I am now happy to say that ample provision has been made to overcome the difficulties, and at present the issue of patents is exceeding four hundred monthly.

As usual, the larger proportion of applications came from inventors resident in the United States, to whom were granted 2,038, nearly 65 per centum of the whole issue.

The Patent Act confers on the Commissioner the power of granting the patentees extensions of time in which they may import, and within which they must manufacture their inventions in Canada. The number of cases in which satisfactory reasons were shown to justify the granting of the importing privilege during the year, was 1,071 and of the manufacturing privilege 2,404.

The total number of applications for patents during the year, which were reported on by the examiners, was 3,613.

It is in the interest of both the applicants and the office that great care should be taken by applicants in the preparation of the papers which are required by the rules and forms. Copies of these are furnished gratuitously to all applicants, and the directions in them should be closely observed.

Patentees who are resident in foreign countries continue to avail themselves of the privilege granted under section 8 of 'The Patent Act,' by giving notice to the Commissioner of intention to apply for patents in Canada. The number of these notices registered during the year was 958, yielding a revenue of $1,912.

The 'Canadian Patent Office Record' continues to be published monthly. It contains a transcript, with drawings, of all claims of patents granted, dates of filing, dates of issue, and length of term for which granted; together with the names and residences of patentees. It also contains a list of copyrights granted and trade marks registered, and in addition to this it is the intention in future to add a list of designs registered. This publication is of great and increasing value to all who are interested in patents. It affords convenient and easy reference to the claims of all patents granted in Canada, and thus enables both inventors and the public to see exactly what is patented.

This publication is supplied to foreign patent offices in exchange for their reports; and it is also sent, without charge, to a large number of free libraries in Canada and in foreign countries, with the object of diffusing in the public interest the information therein contained. The publication is also furnished at the rate of 20 cents per monthly number or $2 per annum; and back numbers in print are furnished at the same price.

The Canadian Patent Office is indebted to the London and Washington Patent offices for their weekly official reports; which are of material assistance to the exam-

iners and other officers of the Patent Branch of my department in the discharge of their respective duties.

Patentees under the instalment plan, who have paid fees for one or more partial terms of their patents, not infrequently postpone payment of the further fees required to keep their patents in force until after the date within which they are payable; consequently the patents expire, and it is not in the power of the office to revive them. A revival can only be secured by a private act, the obtaining of which entails considerable expense to the patentee. The attention of the patentee is therefore called to the necessity of their making these payments in time.

IV.—COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

DETAILED STATEMENT of all Moneys received from October 31, 1898, to October 31, 1899.

Month.	Trade Marks.	Copyrights.	Designs.	Timber Marks.	Assignments.	Copies.	Total.
1898.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
November	869 25	84 50	20 00	2 00	18 00	8 00	1,001 75
December	922 15	105 25	40 00	.....	29 00	12 00	1,108 40
1899.							
January	1,000 38	61 00	85 00	4 00	12 00	7 00	1,169 38
February	995 00	62 00	75 00	.....	9 00	8 10	1,149 10
March	1,499 75	69 00	45 00	2 00	14 75	1 50	1,632 00
April	1,485 00	78 50	61 00	.....	21 25	1 00	2,006 75
May	1,335 00	61 00	118 00	.....	33 00	12 00	1,559 00
June	776 15	79 50	44 00	2 00	15 00	21 00	937 65
July	640 00	74 00	20 00	.....	12 00	56 50	802 50
August	650 00	73 00	45 00	.....	22 00	1 50	791 50
September	805 25	77 00	63 00	2 00	7 00	26 00	980 25
October	865 50	83 00	30 00	2 00	27 50	15 00	1,023 00
Grand Total	12,203 43	907 75	646 00	14 00	220 50	169 60	14,161 28

The following table shows a comparative statement of the business of this Division from 1887 to October 31, 1899, inclusive:—

Years.	Letters Received.	Letters Sent.	Copyrights Registered.	Certificates of Copyrights.	Trade Marks Registered.	Certificates of Trade Marks.	Industrial Designs Registered	Certificates of Industrial Designs.	Timber Marks Registered.	Certificates of Timber Marks.	Assignments Registered.	Fees Received.
												$ cts.
1887.....	1,543	1,543	554	167	245	245	105	105	16	16	56	8,192 53
1888.....	1,655	1,889	566	167	288	288	71	71	29	29	71	9,262 86
1889.....	1,721	1,987	616	178	280	280	88	88	26	26	49	9,111 88
1890.....	1 766	2,169	688	222	293	293	68	68	21	21	104	9,876 38
1891.....	1,651	2,385	541	174	307	307	129	129	11	11	51	9,236 96
1892	1,773	2,300	536	159	294	294	30	30	27	27	66	9,496 29
1893.....	1,432	2,070	475	126	257	257	41	41	19	19	55	8,013 33
1894.....	1,882	2,720	546	216	311	311	39	39	20	20	77	9,463 63
1895.....	2,184	3,279	601	163	374	374	52	52	20	20	70	11,673 26
1896.....	2,185	3,437	653	212	331	331	68	68	14	14	161	10,579 54
1897.....	2,606	3,548	756	273	446	446	75	75	13	13	94	14,101 93
1898.....	2,576	3,453	734	275	423	423	136	136	15	15	114	13,535 17
1899..	2,487	2,910	702	237	430	430	112	112	5	5	117	14,161 28

The total number of registrations of copyrights, trade marks, industrial designs and timber marks, including registrations of assignments, was 1,366 during the year ended October 31, 1899. This consisted of 661 registrations of copyrights, 430 registrations of trade marks, 112 of industrial designs and 5 of timber marks. There were also issued 226 certificates of copyrights, 41 registrations of interim copyrights, and 11 certificates, 16 registrations of temporary copyrights, and 10 certificates. The total number of these different rights recorded was 117.

The correspondence of this branch of the department amounted to 2,487 letters received 2,910 letters sent.

The amount of fees received during the year, as certified by the accountant, amounted to $14,161.28.

V.—QUARANTINE AND PUBLIC HEALTH.

In view of the needs of the department, I found it necessary that the General Superintendent should make his headquarters in Ottawa, so that all matters referring to the Quarantine Service may be dealt with direct and without delay. By Order in Council of January 14 last, Dr. Montizambert was accordingly relieved of his duties

pertaining to the Grosse Isle Quarantine Station, and was moved to headquarters in Ottawa, to fulfil the duties of Director-General of Public Health. Such duties are to act as Sanitary Adviser of the Dominion Government, as General Superintendent of Quarantine, with the departmental administration thereof under the Minister, and Inspector of the Tracadie Lazaretto.

Dr. G. Elie Martineau, of Quebec, was appointed to succeed Dr. Montizambert as local quarantine officer at Grosse Isle, from May 1 last.

At Halifax, owing to the resignation of Dr. Wickwire at the end of the last quarantine year, Dr. N. E. MacKay was appointed as quarantine officer and Dr. G. C. Jones was appointed assistant quarantine officer, both from November 1, 1898.

The year has been a somewhat marked one in quarantine matters. In addition to the usual incidence of disease, two unusually large shiploads of immigrants, comprising about 2,000 in each instance, presented themselves, one at Halifax and one at Grosse Isle, with the infection of smallpox amongst them. That in spite of the large numbers, the overcrowding on relatively small vessels, and the large amount of luggage and personal effects to be disinfected, the disease was completely stamped out at quarantine on both these occasions, speaks well for the efficiency of my quarantine service.

At Victoria, the threatening from the Orient of plague, cholera, smallpox and epidemic dysentery continued throughout the year. Over 12,000 persons, passengers and members of the crews, have been bathed on arrival and their clothing disinfected.

Full details concerning the year's work at the different stations and at the Tracadie Lazaretto will be found in the reports of my officers, annexed as appendices.

TRACADIE LAZARETTO.

Dr. A. C. Smith, the Inspector of Leprosy and Physician at the Tracadie Lazaretto, reports there are twenty-one (21) inmates in the institute, the same number as was reported last year, fourteen (14) of whom are males and seven (7) females. Of those patients five (5) came from outside the Province of New Brunswick. Three (3) came from Manitoba. One (1) came from Prince Edward Island, but a native of New Brunswick and one (1) from Nova Scotia, but ten (10) years before from Barbados.

Three (3) deaths occurred during the past year and three (3) new cases were admitted during the same period of the latter. Two (2) came from New Brunswick and one (1) from Nova Scotia.

The different stages of the disease at the time of writing is reported as follows:—

1st stage	8
2nd "	8
3rd "	5
	21

Attention is directed to the Report of the Director General of Public Health (Appendix No. 1) on the subject of leprosy and the Report of the Medical Commission appointed to investigate into certain complaints made against the management (See Appendix No. 12) of the Lazaretto.

VI.—STATISTICS.

The statistical Division of the Department of Agriculture is based upon the Union Act, which specifically assigns census and statistics to the exclusive authority of the Parliament of Canada.

In accordance with this assignment of duties, the Parliament of Canada passed chap. 21, Acts of 42 Victoria.

In the Revised Statutes of Canada, 1886, this Act forms chapters 58 and 59. Chap. 60 is the authority for the collection of criminal statistics.

By chap. 15, Acts of 1890, the collection and publication of labour statistics are defined to be part of the duties of the Minister of Agriculture, acting under the general authority conferred upon him by chap. 59, R.S.C., and the sum of $10,000 is authorized to be spent annually in the work. This Act, however, has not been put in force.

As misapprehension seems to exist leading to indiscriminate and unofficial publication of statistics, sections of the Act, chap. 59, R.S.C., are here given :—

The first section provides for the collecting, abstracting, tabulating and publishing of vital, agricultural, commercial, criminal and other statistics by the Department of Agriculture.

The fourth section gives the Minister of Agriculture power to arrange with any Lieutenant-Governor in Council, or with any provincial organization, for the collection and transmission of information collected under provincial systems.

The fifth section says :—

'The Minister of Agriculture may, in collecting statistics in the manner provided by this Act, call upon any and all public officers to furnish copies of papers and documents and such information as lie respectively in the power of such officers to furnish, with or without compensation for so doing, as is regulated, from time to time, by the Governor in Council.'

The sixth section provides for the publication of an abstract and record of the various departmental or other public reports and documents.

The seventh section gives power to the Governor in Council to authorize the Minister of Agriculture to cause special statistical investigations as regards subjects, localities or otherwise to be made.

The eighth section empowers the Minister of Agriculture to cause all statistical information obtained to be examined, and any omissions, defects or inaccuracies discernible therein to be supplemented and corrected as far as possible.

The ninth section is as follows :—

'Every one who wilfully gives false information or practises any deception in furnishing information provided for by this Act shall on summary conviction before two justices of the peace, be liable to a penalty not exceeding one hundred dollars.'

By another section in the Act, the Governor in Council is empowered to appoint temporary clerks or employees for an indefinite period.

The evident aim and intention of these several Acts is the establishment of a Bureau of Statistics which shall form part of the Department of Agriculture, and in

which shall be consolidated the general statistics of the country, the officers in charge of which shall have every facility necessary to enable them to obtain the needed statistics from the several departments of the Federal Government, of the Provincial Governments, or by special statistical investigations.

A general collection and issue of Dominion Government statistics by the Statistical Division, as directed by the statute, would establish uniformity, coupled with increased accuracy and large economy in compilation.

The public appear to appreciate the efforts of this Division of the Department of Agriculture, the preparation of general statistics in answer to inquirers having been greatly in excess of former years; the aim is to give all inquirers the best information obtainable. The statistician's office has become a general inquiry office for all parts of the world. During the year, the number of letters received was about 3,000 and the number sent 2,500.

In the course of these inquiries the statistician has been forced to confess the fact that Canada lags behind other countries in many branches of statistics.

In no branch have there been so many inquiries as to that relating to agricultural statistics. These inquiries have necessarily been answered in a most unsatisfactory way, owing to the absence of any system of collecting agricultural statistics co-extensive with the Dominion. If a good plan, ensuring accuracy and early publication could be adopted in Canada, the value to farmers and business men of this information can hardly be over-estimated.

HEALTH STATISTICS.

No steps have been taken as yet to provide a better system of collecting vital statistics than that which was abrogated in 1891.

In the provinces of Ontario, Quebec, New Brunswick, British Columbia, Manitoba and the North-west Territories, the provincial and territorial authorities have placed on the statute-books Acts dealing with the collecting of vital statistics. Section 4 of chap. 59, Revised Statutes, already quoted, gives the necessary legislative authority to enable my department to join the provincial authorities in making arrangements for the better collection of different kinds of statistics, without limiting the power of my department to enter upon provincial fields not worked by provincial organizations. By a combination of forces the result would be more satisfactory than by any other system that could be originated by the federal authorities. Instead of clashing statistics there would be statistics having a joint approval.

This plan could be carried out in respect to agricultural statistics; so that while each province could have its own statistics for publication, the world at large would have those of the Dominion. The very great attention given to crop statistics in the United Kingdom, the United States, France, Germany and Australia, and the large monetary operations based upon them, make it almost imperative upon Canada to provide her farmers and business men with these aids to successful efforts.

CRIMINAL STATISTICS.

In the present report, the Statistical Division has grouped the crime of the country for the period 1888-1896. During that period there were 410,980 convictions under

the two heads of indictable offences and summary convictions. This is a yearly average of 37,362. The year 1898 supplied 38,206 convictions; so that it is slightly above the normal number.

The total convictions for indictable offences during the eleven years was 51,998, an annual average of 4,227 for such convictions. In the year 1898 the number was 5,787, indicating a larger than the normal number.

The growth of the graver crimes included under the general head of indictable offences as compared with the less serious offences is seen in the following statement of—

PERCENTAGE OF INDICTABLE OFFENCES TO TOTAL CONVICTIONS—INDICTABLE AND SUMMARY.

	Total.	Indictable.	Per cent.
1888	37,792	3,751	9·9
1889	38,608	4,213	10·9
1890	38,705	3,946	10·2
1891	37,617	3,974	10·5
1892	35,293	4,040	11·4
1893	35,653	4,630	13·0
1894	36,165	5,258	14·5
1895	37,685	5,474	14·5
1896	37,278	5,204	14·0
1897	37,978	5,721	15·0
1898	38,206	5,787	15·1

Taking a per head basis, the returns indicate that there were 8·0 convictions for indictable offences to every 10,000 inhabitants of Canada in 1888, and 11·06 convictions to the same number of persons in 1898.

During the period 1888–98, convictions for crime against the person increased from 822 in 1888 to 1,163 in 1898—an increase of 41 per cent. In the same period convictions for crimes against property increased from 2,929 to 4,624, an increase of 58 per cent. The offences against females increased from 78 to 123; or 58 per cent. Analysis of this group shows that the chief increase is under the head of assaults on females, wife beating, &c.

The convictions for burglary, robbery, house and shop breaking, arson and malicious injury to property increased from 298 in 1888 to 630 in 1898, an increase of 111 per cent. Larceny and all other offences comprised in Class III. have increased from 2,301 in 1888 to 3,659 in 1898, an increase of 59 per cent.

In summary convictions, which include about 87 per cent of the total convictions, the total for the 1888–98 period is an annual average of 32,626; the convictions in this class for 1898 are 32,419, showing a small decrease for the last year.

Take the two most important groups: 'Drunkenness' and 'Offences against the Liquor License Acts.' On looking over the number of convictions since 1888, it will be noticed that during that period drunkenness has increased in every province of the Dominion except in Ontario, where, on the contrary, a remarkable decrease is shown. In taking for instance the two years 1888 and 1898, it is found that in the year 1888, 51·7 per cent of the total convictions (12,837) for drunkenness belonged to Ontario, while

in 1899 the proportion had dropped to 22·4 per cent out of a total of 11,259 convictions. The other provinces have increased in the following proportions:—

	1888.		1898.	
Quebec	From 26·1	per cent to	33·5	per cent.
Nova Scotia	" 3·9	"	11·2	"
New Brunswick	" 8·9	"	11·5	"
Manitoba	" 3·7	"	5·1	"
British Columbia	" 2·9	"	8·6	"
Prince Edward Island	" 2·2	"	2·5	"
The Territories	" 0·5	"	5·2	"

The number of convictions for 'Offences against the Liquor License Acts' has also decreased considerably in Ontario during the same period of time, while it has increased in all the other provinces. In 1888 the total figures for such convictions in Canada were 4,295 against 2,178 in 1898, distributed by provinces in the following proportions:—

	1888.		1898.	
Ontario	72·4	per cent	37·0	per cent.
Quebec	14·6	"	22·0	"
New Brunswick	5·2	"	16·6	"
Nova Scotia	1·9	"	9·7	"
British Columbia	2·2	"	6·0	"
Prince Edward Island	2·1	"	1·5	"
The Territories	1·6	"	5·0	"
Manitoba	0·0	"	1·7	"

According to population, the number of convictions for drunkenness and offences against the Liquor License Acts stand as follows per 10,000 inhabitants:—

Provinces.	Drunkenness.		Liquor License Acts.	
	1888.	1898.	1888.	1898.
Ontario	32·2	11·1	15 1	3·6
Quebec	23·2	23·8	4·3	3·1
Nova Scotia	11·2	27·7	1·9	4·6
New Brunswick	35·5	40 1	6·9	11·3
Prince Edward Island	26·3	26·4	8·3	2·8
Manitoba	38·4	27·0	0·1	1·7
British Columbia	46·4	60·8	11·8	8·2
The Territories	7·9	44·6	7·9	8·2
Canada	27·7	21·0	9.3	4·1

The comparison between the two years 1888 and 1898 with respect to convictions for drunkenness indicates a marked improvement, the number of convictions in 1888 having been 12,837, and in 1898, 11,259.

In agreement with this decrease in convictions for drunkenness is the fact that offences usually associated with drinking habits also show a decrease.

The total convictions for assaults indictable and summary in 1888 were 4,202, and in 1898, 3,690, a decrease of fourteen per cent. In the same years the convictions for drunkeness numbered 12,837 and 4,259 respectively, a decrease of fourteen per cent.

THE STATISTICAL YEAR-BOOK.

The work is published by my Department under authority of chap. 59, sec. 6, Revised Statutes of Canada.

The demand for the work increases every year. Requests for the 1898 edition, from the governments, public libraries and chambers of commerce of France, Germany, the United States, Italy, Japan and other foreign countries have been received, while the number required for the United Kingdom and other portions of the British Empire has been larger than ever. The demand within Canada continues to increase every year.

The whole respectfully submitted.

SYDNEY A. FISHER,

Minister of Agriculture.

APPENDICES

QUARANTINE AND PUBLIC HEALTH.

No. 1.

REPORT OF THE DIRECTOR GENERAL OF PUBLIC HEALTH.

(F. MONTIZAMBERT, M.D., Edin., F.R.C.S., D.C.L.)

I have the honour to submit herewith my annual report as Director General of Public Health to October 31, 1899.

The year has been a somewhat marked one from the standpoint of public health. It has seen the bubonic plague extending steadily westward in Europe, establishing itself in South America, and continuing its threatening of this country, both on the Atlantic and Pacific sides. Smallpox, also, has threatened us on both coasts, but has been successfully controlled and stamped out at the Victoria, Halifax and St. Lawrence quarantines, although at the two latter, its control was rendered the more difficult by the very unusually crowded condition of the immigrant vessels by which it came.

Bubonic plague.—This disease has been present during the year in Japan, China, Egypt, India, Persia, Turkey, Portugal, Mauritius, Reunion, Madagascar and South America. It has also been reported as present at Marraquene and Magude, in south-east Africa. Dr. Hornabrook, sent by the Portuguese Government from Lorenzo Marques, reported it was not plague. A Dr. Barreiros, chief of the military and civil hospital, says it was. So the nature of the disease from which so many Kaffirs died at Marraquene and Magude, is still a mystery, as no microscopical examination has been made of any of the blood, lymph or other secretions from any of these patients.

Dr. J. A. Gregory, assistant medical officer of health, Cape Colony, publishes in the *South African Medical Journal* for August an account of a case of plague examined by him at Middleburg, Natal. While the bacteriologic examination and inoculation experiments were not absolutely conclusive they are sufficiently so as to leave little doubt as to the nature of the disease. Other facts, such as a mortality of rats at Delagoa Bay, where the patient came from, and the concurrence of other similar cases at that place, led Dr. Gregory to conclude that plague in a mild form has existed there since early in January, and probably for some time prior to that date. The lessened severity of the disorder, as compared with that in Bombay he attributes to more favourable sanitary conditions, and the measures adopted by the authorities. Dr. Gregory's diagnosis has been agreed to by the special medical plague officer at Johannesburg, Dr. Hornabrook, who examineed the microscopic specimens and cultures.

From a report dated March 22, 1899, by Dr. Cezzonis Effendi, Sanitary Inspector at Jeddah, received through a correspondent in Constantinople, we learn that on March 18, 12,143 pilgrims disembarked at Jeddah, and 18,858 proceeded from Jeddah to Mecca after being carefully inspected. There were left 1,270 pilgrims in the lazarette, but amongst these no cases occurred, and the health of the pilgrims was good. According, however, to official despatches from the Hedjaz, it would appear that on the following day (March 19) a recrudescence of plague occurred at Jeddah, where four deaths were reported from the disease on the 20th, and three new cases on March 21.

Dr. Ferid Ibrahim reports about the plague in Djiddah under date of June 17 last. He states the outbreak of the epidemic of plague this year is not due to importations. Very probably the very first case of plague was that of a beggar from Assyr, who was at the same time a gravedigger. Said beggar fell ill about ten days after he dug a grave. It is not possible to ascertain whether said grave did not belong to somebody dead last year from plague. No care has been taken to bury separately the corpses of persons dead from plague. All the corpses have been indifferently buried in the three graveyards of Djiddah.

The same carelessness still exists and the gravediggers dig indiscriminately among graves containing these corpses months or one or more years since. It is known how resistant is the Yersin-Kitasato microbe. The disease spreads very quickly in all the quarters of Djiddah, especially among the low class, which is composed of Hadramouts. It was very difficult to make a study of the disease on account of the fanatical resistance of the population.

Alexandria.—The date of the first case of the disease observed was on May 2, at the Greek Hospital. The diagnosis of bubonic plague was made only on the appearance of the second case, on the 18th instant. Both cases presented the same symptoms. Both patients got well. They are inhabitants of Alexandria, and had not been away from said town nor had they any relation with travellers or other people coming from places where plague does exist. The Ottoman Sanitary Commissioner to the Alexandria International Sanitary Commission, Dr. Duca, reports that many other cases had occurred in Alexandria before the one reported on May 2. Among said cases is that of a Greek who fell ill April 6. He entered the hospital and presented not only high fever and drowsiness but a bubo. The hospital physicians did not suspect at that time the existence of plague, and they made the diagnosis of adenitis. He got well and went for his convalescence to his own country, Volos, in Greece. Dr. Duca, the above mentioned Ottoman sanitary Commissioner, writes that according to his own inquiries on the subject of the first outbreak of plague in Alexandria, he found out that a Jew, accompanying some women, had arrived from Bombay in the beginning of the month of April and had taken a lodging at the quarter of Hamamil, where the plague case reported May 2 occurred. Three-fourths of the plague cases reported among Europeans occur among Greeks in Egypt. The reason is that the Greek colony in Egypt is the larger one, and the patients are servants serving in groceries, where there are many rats. Rats are said to have been found very ill in the Sailors' and Soldiers' Home, Alexandria, in April.

The Public Debt Commissioners have agreed to advance £20,000 to the Government of Egypt for expenditure upon plague preventive measures.

The despatch which Lord Cromer, Her Majesty's agent and Consul-General at Cairo, has addressed to the Minister of Foreign Affairs in England will have been read with much satisfaction. Lord Cromer is able to state that from the date of the official declaration of plague on May 20 down to October 12, the date of the despatch, there had been only seventy-one cases under observation, of which forty-seven had resulted in cures, while there had been twenty-one further deaths out of hospital. He adds that the disease has practically been confined to Alexandria, where the general mortality has been abnormally low, a fact which tends to prove that but few cases can have escaped detection. Since September 1 there have only been four isolated cases, so that in the opinion of Sir John Rogers, 'all fears of a winter epidemic may now be dismissed, though isolated cases may occur.' The plague in Egypt presents some peculiar features. In the first instance, the epidemic has been of an exceptionally mild nature; but the most distinctive point about it is that almost as many white persons as natives have been attacked by the malady. The belief has long prevailed—and this has been the experience in India and China—that foreigners are nearly wholly immune to plague infection. The epidemic in Lower Egypt has gone some way toward shattering this comforting illusion. So far as India is concerned the explanation of this seeming anomaly lies probably chiefly in the fact that the native sections of the towns and the native villages are in a deplorably unsanitary state, while on the other hand the European residents in the east live under the best hygienic conditions possible. *The Journal of Tropical Medicine* in an editorial draws attention to this phase of the situation, and furthermore points out that

many of the large centres of population, both in Great Britain and on the European continent, are regarded from a sanitary standpoint almost as bad as those of the east. The Oriental natives are undoubtedly more prone to contract the disease than the white men, at the same time sufficient and convincing proof has already been afforded that Europe has good cause to dread an invasion of the plague.

Mauritius.—According to official advices Port Louis has been affected with plague in epidemic form since the beginning of August. Sporadic cases also occur in the country districts. From the beginning of the outbreak in Jannary of this year to the end of June, 55 cases and 44 deaths have been reported. During the month of July and first two weeks in August, 227 cases, 184 deaths. For the week ending October 5, 98 fresh cases of plague occurred in the island and 58 deaths from the disease. The outbreak seems particularly virulent and the death rate much higher than in Egypt or Oporto. We hope soon to have information before us of the various methods of treatment in vogue in the different parts of the world, so that some estimate may be formed of the cause of the widely divergent death rates recorded.

Hong-Kong.—Last year the epidemic reached its maximum in the week ending May 14, when there occurred 179 cases and 157 deaths. In the week ending May 28, 1898, there were 63 cases and 61 deaths, while this year in the corresponding week, there were 143 cases and 134 deaths.

Paraguay.—Under date of September 19, Dr. Otto Voges, chief of the Argentine Bacteriological Institute, has informed the government that the disease from which many persons in Asuncion, Paraguay, are suffering is the bubonic plague.

Dr. Voges was sent by the Sanitary Department to study the disease. The Argentine government has determined to prevent any communication with Paraguay for the present, and to that end has sent two gunboats to the frontier.

Santos, Brazil.—A disease said to be the plague has appeared at Santos, Brazil. The disease appeared in a house inhabited by Italians. During the ten days ending October 21, there were nine cases, three of which had resulted fatally. Quarantine has been declared against Santos by Argentina and Uruguay and also by the other Brazilian ports.

In Russia.—Concerning the violent outbreak of plague in the village of Anzob, Samarcand, the St. Petersburg Novoe Vremya publishes the following report, from which it will be seen that the energetic measures of the Government have apparently been successful in confining the pestilence, although it had swept away about two-thirds of the population in little more than a month.

Prince Alexander, of Oldenburg, president of the commission for taking measures against plague, who, by order of His Imperial Majesty, visited Samarcand, reports as follows:—

'Having arrived at Samarcand, the president of the commission found in the village of Anzob, where the plague was raging, that a hospital had been established and the locality was well guarded to keep the disease from spreading. The local doctors have found the disease to be bubonic plague. In order that a proper diagnosis might be made and necessary measures taken to eradicate the disease from spreading to Turkestan and Bukhara, three lines of medical stations have been established, (1) one along the Amu-Daria River, (2) eight along the Transcaspian Railroad, (3) three along the Persian coast. For the Bukhara Khanate two lines have been organized. Flying medical camps supervise these stations, as well as the whole of Bukhara, Khiva, Transcaspian and Turkestan regions in order to guarantee European Russia from this awful epidemic. The Transcaspian and Andizshan railroads, Krasnovodsk, the coast of the Caspian Sea, and Astrakhan are strictly watched, as well as the sanitary conditions of the steamers and other vessels running on the Caspian Sea and the Amu-Daria River. In anticipation of the possible spreading of the disease, reserves of doctors and sisters of charity are being summoned in the principal cities of the empire, who must be ready at a moment's notice to go wherever they are sent. These reserves exist in Astrakhan, Warsaw, Vilno, Ekaterinoslav, Kazan, Kieff, Moscow, Odessa, St. Petersburg, Sebastopol, Simpheropol, Tiflis, Tomsk, Tula, Kharkoff and Jurieff. At present these reserves consist of 100 doctors and 80 sisters of charity; subscriptions for those who desire to enlist is still carried on. All the means for inoculation, according to Yersen's system,

are to be had in abundance; also the remedies of Haffkin have been brought from India, and are being prepared in the Imperial Institute of Experimental Medicine at St. Petersburg; the doctors have been instructed to use the same as much as possible, and to publish them among the population.

Spread of plague by a rodent in Manchuria.—The Russian Government, willing to know the reality of what was going on, decided to forward a mission under the direction of Dr. Zobolotny, accompanied by a botanist, a zoologist, and a scholar of the language school of St. Petersburg. Nearly ten years since, on the frontier which separates Siberia from Oriental Mongolia and Manchuria, as well as in the district of Atchinsky, the Russian physicians observed some persons suffering from fever and somnolence, presenting buboes, and dying in a few days. Said patients fell ill after having eaten the flesh of a rodent of big size like a big rabbit, andafter having used its fat for lubricating their boots and other skin-wearing apparel, as well as the harness of their horses. Said rodent is very common in the north plains of Oriental Mongolia, its zoological name is arctomis cobuc. Mongolians call it tarabagan. The arctomis cobuc, the skin of which is very much exported, dwells in a peculiar kind of subterranean galleries, in the bottom of which it reserves the seeds for its winter food. It knows how to wall up said galleries in order to preserve them from floods. The arctomis cobuc is subject to an epizootic which breaks out under the form of hemorrhagic pneumonia.

The Russian physicians having remarked a great similarity between the symptoms of said hemorrhagic pneumonia and those of classic plague, said malady had been qualified as plague of Tarabagan (Tarabagan plague), and several notes have been published on said illness. Now, southward from Mongolia, at 42° 3′ latitude N. and 118° longitude E. of Paris, at 1,675 metres above the sea level, at the village called Toung-Kia-yng-tze, in the district of Wei-tchang, ten days distant from Pekin northward and ten days westward from the Yellow Sea, near the forest of Wei-tchang, there is a Belgian Catholic mission. More than ten years since the Belgian fathers saw Tarabagan plague cases among their adepts, but did not realize the extent of the evil.

It was only last year, in 1898, when they read in newspapers what was going on in India, as well as the description of bubonic plague in the latter country, that they remarked the resemblance of the Indian plague with the Tarabagan one. They notified the fact to the Pekin French legation, and then Dr. Matignon, as above mentioned, went to Toung-kia yng-tze and ascertained the existence of plague. At the same time, he thought of the probability of the infection of the Trans-Baikalia through the caravans which follow the road of Kalgan and the desert upland of Gobi. Said caravans transport tea and bricks. When Dr. Zobolotny went to the spot he was able to observe sixteeen plague cases, which he examined bacteriologically. The greatest number of cases have occurred in a Chinese village of 300 souls, Ma-hien-to, two hours distant on horseback from Toung-kia-yng-tze. Before Dr. Zobolotny had arrived, twenty-four plague cases had already occurred with a fatal issue. According to the above information the present plague epidemic which threatens us does not recognize its origin in Hong-Kong or South-east China, but in Manchuria, and its existence goes back to more than ten years.

In China.—The following reports made to the Surgeon General of the United States Marine Hospital Service are of such general interest that I quote them in full.

Plague in Niuchwang.

SHANGHAI, September 30, 1899.

SIR,—I beg to hand you herewith the official reports *re* plague in Niuchwang, and to call your attention to the fact that apparently the disease was carried from Swatow to Niuchwang (say, 1,400 miles). So far as I am able to learn, this is the first time plague has gone so far north on this coast as Niuchwang, and the outbreak at Niuchwang has been the most severe on this coast this year.

I have the honour to be,

JOHN GOODNOW,
Consul-General.

Hon. Assistant Secretary of State.

[Inclosure.]

Medical officer's report on bubonic plague submitted to a public meeting of foreign residents held at Messrs. Bush Brothers' offices, Niuchwang, September 11, 1899.

Bubonic plague is the most fatal of all known epidemic diseases. From 25 to 70 per cent of the population are usually attacked where an epidemic occurs, and of these at the commencement about 90, and later on a smaller percentage, die.

The climate most favourable to its spread is a moist, hot one. A temperature of over 85° generally checks an epidemic, as does also extreme cold, but there have been some notable exceptions to this rule, such as in Moscow in 1770 and on the Volga in 1878–79, where severe epidemics raged in the severest winter weather. We, therefore, cannot rest assured of our Manchurian winter stopping the present epidemic or preventing its recurrence.

Bubonic plague appeared in this port for the first time, as far as can be ascertained, in the third week in July of this year, in the village Wutaitzü, and about the same time in the west of the town. It is impossible to accurately determine its origin, but, judging from the experience of other countries, it was most probably introduced by persons infected with the disease arriving from the south, who contaminated the atmosphere and soil in their immediate neighbourhood. From the centres it spread eastwards, and up to the present shows no signs of disappearing. On the 8th instant in one compound six corpses and nine men, sick with plague, were discovered, and on the same day in four houses, close together, twelve deaths took place from the same cause. Fatal cases have occurred in a foreigner's compound, and people have recently died from, and others are sick with, plague, and in dangerous proximity to our milk, meat and food supply shops in the main street. There has been heavy mortality amongst the lower animals, rats, dogs, pigs, chickens, ducks, geese, cattle, and deer having died in unusual numbers. Cattle have died in our butchers' yards and dairies, and who can tell what has become of these carcases?

Plague is transmitted by:

1. Contact with sick.
2. Contact with diseased animals that have died of plague.

NOTE.—There are four mortuaries containing, it is estimated, over 2,000 bodies. Of these, 400 to 500 are plague corpses deposited in the Shantung guild mortuary, 200 or 300 are plague corpses deposited in the Tientsin guild mortuary, situated outside the South Gate. Other bodies placed in their coffins are deposited on the ground outside the South Gate and elsewhere. In Mêngtze it has been observed that the outbreaks of plague always start from the neighbourhood of the cemetery. Chinese report to me that of the recent cases they attribute the attack in twenty instances to the victims having visited a theatrical performance which took place near the Tientsin guild mortuary.

The co-operating causes are:—

1. The overcrowding of dwellings.
2. Uncleanliness, which is the most potent one, more especially the accumulation of diseased organic matter around houses and the saturation of soil by filth. I, therefore, consider the authorities should direct their efforts to the following points:—

1. Prevention of the introduction of fresh centres of this disease.
2. The thorough cleansing of streets and drains and the keeping of the same in a sanitary condition.
3. The erection of suitable hospitals, where the sick may be treated by Chinese and foreign doctors.
4. The disinfection of infected houses with compensation for destruction of property.
5. The proper burial of the dead.

The above suggestions, which, if adopted, would benefit Chinese and foreign residents and prevent serious injury to trade, might be carried out without much opposition, but it would be, I am afraid, useless to suggest the compulsory removal of the sick.

In conclusion, I would address an earnest word of warning to foreign residents. You can not expect to live in your present unsanitary surroundings of plague on all

sides of you and escape it altogether. Sooner or later, if nothing is done, one or more foreigners will be victims of this foul disease.

You are in danger from—

1. Its close proximity to you ;

2. Contact with servants or others who are infected with plague ;

3. The introduction of it into your houses by diseased animals, and from

4. A poisoned food supply and infected clothes. In one milk shop there is a brothel, and in the other a dangerous cesspool.

It behooves you all, therefore, to be up and doing. If you take adequate precautions and insist on all that can be done being carried out there is no reason why this scourge should not be stamped out, and this port remain the healthiest in China. In all that you do, remember that you will be fighting for the benefit of trade, for the health and lives of Chinese, as well as for yourselves, your wives, and little ones.

C. C. DE BURGH DALY, M.B., B.C.L.

Resolutions passed at a public meeting of foreigners, held at Messrs. Bush Brothers' offices, Niuchwang, on Monday, September 11.

NIUCHWANG, September 11.

This meeting resolves—

1. That it can not but view with apprehension the outbreak of bubonic plague at this port, involving. as it has already, the lives of many Chinese, besides injuring trade directly and indirectly and exposing foreigners to risk of contagion.

2. That foreigners here are in a position of peculiar danger, living as they do practically in a Chinese town, there being no municipality, no drainage, or cleaning of the streets and no supervision of the food, water, and milk supply, or of laundries.

3. That as the foreign residents have not any authority to carry out any measure of self-protection, they look to the Chinese Government to take immediate steps to stamp out the plague from the port.

4. That they have heard with great disappointment that the scheme of sanitary matters proposed by the consuls and commissioner of customs has not been adopted by the Chinese authorities.

5. That, as an appeal to the local authorities has failed, the consular body be respectfully requested to make a joint appeal to Peking, urging the high authorities to take immediate action.

6. That the measures ordained should at least comprise :—

1. The medical inspection of all shipping, native and foreign, inward and outward.

2. The appointment of a sanitary board.

3. The establishment of a suitable quarantine station and adequate staff.

4. The cleansing of the drains and streets, and the keeping of the same in a sanitary condition.

5. The suspension of the import and export of coffins with corpses by either junk or steamer.

6. That no coffins be stored in mortuaries, but be buried at once.

7. That no shops be allowed to supply meat, milk, vegetables, etc., or do any laundry work for the foreign community unless in receipt of a certificate from the sanitary board as to their sanitary condition.

8. That the Chinese Government should bear the expense necessary to carry out these measures. In the event, however, of its inability or unwillingness to do so the minister and the Central Government be asked to sanction the levying and collection of a special tax, as two per thousand on gross value.

9. That should the Central Government refuse to carry out a thorough and comprehensive scheme to stamp out the plague, this meeting of foreign residents earnestly urges on the consular body the great importance of obtaining for them control in sanitary matters over a limited area, and respectfully requests them to use every effort to secure the same.

Oporto.—Oporto, in Portuguese Porto, is the second city in Portugal, and if Lisbon is the capital, Oporto is the capital of the north.

The city is situated on the right bank of the River Douro. On the opposite side is the Villa Nova de Gayor, remarkable for its large stores, wherein port wine is prepared for exportation. Its population to-day amounts to about 179,000 inhabitants, the greater part of whom consist of workingmen and tradesmen.

The essential industrial character of the city has caused it to be known as the Manchester of Portugal. The principal industries are weaving, goldsmith's work and ceramics, but at present these industries are prevented from assuming greater development because of the financial crisis which sent down the rate of exchange and put a premium of 20 per cent on gold.

The most important part of the city (the new part) is built according to principles of modern science, but there are still quarters of the old part (the quarter of La Se in particular) where the streets are narrow and very far from clean. The new part is pretty in places. It contains fine squares, good gardens, wide and clean streets. In short it is a modern city.

The old part consists almost entirely of alleys, irregularly paved, and its uncleanliness is due to the bad habits of its inhabitants, who are workmen and porters. It should also be remembered that the sewers of the city are of the most imperfect kind, and I believe that the great mortality is due essentially to the fact that the soil is saturated with contamination.

One cause which contributes largely to the mortality of the city is the irregularity of the temperature. There is very often a difference of 12 degrees centigrade between the maximum and minimum in the temperature of the day.

Having made known to you the city of Oporto, a writer says, I will now send you particulars of the epidemic raging in Oporto. It broke out at the beginning of June, in Fonte Taurine street, near the river.

Gregario Blanco, a Spaniard, forty-seven years of age, by occupation a porter, was the first victim. He had been an invalid some time, but continued work to June 5. After the day's work was over he returned home melancholy and tottering.

On arriving at his house he went to a room, and when sought for he was discovered dead. One of his companions, who was at his funeral on the following day, was seized with illness and taken to the hospital. The illness began with shivering fits, intense fever (39·5 degrees, centigrade), asthenia and buboes. In the same house and in adjacent houses there were other cases, and in nearly all of them it was ascertained that they were due to direct contact.

The disease came to a crisis on the third or fourth day, when the patient either collapsed and died, or entered on a period of rapid convalescence.

In Fonte Taurine street up to August 29 thirty-seven cases of the malady were reported, but there were only fourteen deaths. After the cases mentioned the disease appeared at isolated points in the city, but always with remarkable slowness. For thirteen days not one cure on the average occurred. Bacteriological researches have already been made, and it is said that the bacillus of Kitasato-Yersin (specific bacillus of the plague) has been discovered in the buboes and in the pus of the suppurations. The analysis has been intrusted to the municipal physician, Professor Ricardo Jorge, who is a truly scientific man, but unfortunately none of his reports have been published yet.

As soon as the epidemic was known, prophylactic measures were adopted. The railway stations were occupied by doctors, who were ordered to inspect departing travellers, and steps were taken to improve the sanitary condition of the city.

According to the official statement, 70 persons in all were attacked by plague at Oporto during the period from June 5 to September 15. Of this number 31 died. The cases and deaths occurred as follows in the respective weeks: Two cases, 2 deaths; 4, 0; 3, 1; 3, 2; 3, 2; 4, 0; 2, 1; 8, 2; 5, 1; 11, 4; 8, 7; 7, 2; 3, 3. From September 11 to September 13, there were 3 cases and 2 deaths.

Matters are proceeding from bad to worse in Oporto, and plague seems to be getting a marked hold upon the city. During the week ending October 14, 30 fresh cases of

plague occurred in Oporto, and 7 deaths from the disease. Since the commencement of the outbreak 161 cases of plague are known to have occurred. This may appear an insignificant total, but the worst feature of the epidemic is that in spite of sanitary precautions, the use of a prophylactic and curative serum, and of every measure known to science in Portugal, the number of fresh cases has increased largely during the past fortnight. It is some consolation to know, in the event of the possible spread of plague beyond Oporto, that the general consensus of opinion is that in no town in Portugal can plague find a more congenial home. It is difficult to find a place quite as bad all round as Oporto; the overcrowding is excessive, sometimes as many as 15 to 20 people occupying a single apartment. When a case of plague occurs in such an abode, and the work of disinfection is proceeded with, there is no place for the occupants to go except the street, and, as a rule, they remain there until their home is disinfected. It must not be imagined that the Portuguese are altogether a dirty race; their apartments are neater and cleaner to all outward appearance than in British towns, but overcrowding is rife, and their public sanitation is primitive and inefficient. Many Spaniards reside in Oporto, and it is noticeable that the earliest ascertained cases of plague occurred amongst them. The Spaniard is much less cleanly than the Portuguese, both in his person and in his household, and were plague to spread to Spain the bacillus would find a much more congenial atmosphere than in Portugal. The costly amusement of the military cordon around the city goes on, but the cordon is no barrier against the extension of the disease; already 9 cases, with 5 deaths, have occurred in a village situated some 12 miles from Oporto, and it is feared the rest of the kingdom will be attacked. The local authorities in Oporto are endeavouring to raise a loan of £1,000,000, whereby to effect radical sanitary reforms. If this energetic spirit prevails we may soon hope to hear of Oporto rehabilitating itself in an improved sanitary condition.

The disease seems to spread. In one of the Oporto gaols a prisoner died of plague. Suspected cases have occurred at Lobrigos, Regoa, San Mamedi, and at Tambuija and Atalaya, north of Santarem, on the railway between Oporto and Lisbon.

The populace in Oporto are hiding their sick, not only the plague-stricken, but persons suffering from ordinary illness. This is proved by the attendance at the public hospital, where the daily number of out-patients has fallen off. At the Misericordia Hospital the out-patients are only forty-eight daily, in place of 220. The poor believe that once sent to the hospital on suspicion of having plague that they are straightway poisoned.

The only official means of exit from Oporto is now by sea, but it would seem, however, that plague has infected the country beyond the cordon, so that, as so often happens, the soldiers forming the cordon may, as the infected zone is included, become the means of spreading the disease.

Ten cases of the plague have occurred outside the sanitary cordon around Oporto, and twelve new cases in the city—seventeen in all during September—with four deaths. Gierswohl has found the bacilli on the feet of flies in the hospitals and on the corpses of victims of the disease.

Two of the leading facts in connection with the recent outbreak of plague at Oporto, are the immunity of the personnel of the ship bringing the disease and its appearance among the men who unloaded her cargo, and the fact that this cargo was rice. I have not yet been able to learn how this rice was packed, but conclude that it was infected either by the packers or by rats.

Spain.—Spain has established three frontier quarantine stations, namely, Tuy on the northern frontier of Portugal, Fregeneda on the main line between Oporto and Salamanca and Valencia de Alcantura, a frontier town on the railway leading from Spain to Lisbon. At each of these camps of inspection a ten days' quarantine will be insisted upon.

The disease, however, has probably already invaded Spain. A despatch from Toledo, dated October 20, states that a serious outbreak of a disease suspected to be the bubonic plague has occurred in the village of Quero, near Toledo. No fewer than two hundred and thirty persons have been attacked.

The plague in India.—The India correspondent of the *Lancet* (October 14), writing under date of September 21, says that the government of India has under consideration a comprehensive scheme for establishing research laboratories in various points of India. The present laboratory at Muktesar is to have its staff increased and to become the central research laboratory for India, while health officers are to be given charge of the laboratories at Calcutta, Madras, Bombay, Agra and Lahore. It will cost the government of India about £3,300 per year, and local governments about £6,650. The governor general has made new regulations regarding taking or sending cultures or other articles containing live germs of the plague. No person who is not a commissioned medical officer, military officer, military assistant-surgeon, or medical practitioner in possession of a qualification not lower than that of L. M. S. of the University of Calcutta, Madras, or Bombay, can hereafter, with special permission, take cultures or other articles which he believes to contain living plague germs from one place to another in India. The writer gives the number of deaths from plague for the week preceding his communication as 4,400, the deaths in Poona being at the rate of 250 per 1000 per annum.

The plague summary for the week ending October 14 showed that the deaths in all India fell from 6,707 in the previous week to 5,806. Whilst in the city of Bombay an increase was observed; throughout the Presidency the numbers decreased from 5,707 to 5,310.

Plague increased in the following districts: Poona, Belgaum, Dharwar, Bijapore, and in the Southern Mahratta States during the second week of October, but declined in the Satara, Nasik, and Ahmednagar districts, the Madras Presidency, and in the Central Provinces.

On October 18, five cases remained in the European Plague Hospital at Poona. Owing to the Kameteepura part of the Poona cantonment being invariably the first part to be attacked by disease, whether cholera, fever, or plague, the committee have decided to rebuild the whole area.

In the Punjab plague is again appearing.

Vessels have arrived with plague on board at Plymouth, England, and San Francisco, but the disease has been successfully dealt with and prevented entering through the port.

Precautions at British Ports.—Dr. J. Wright Mason has drawn up a series of precautions against plague for the Hull and Goole sanitary authority. They are plain, simple, and conceived in accordance with our present knowledge of the disease.

It is well known that microbial maladies may be divided into two great classes. In one the microbe is parasitic, and is dependent for its life on the organism it infests; such diseases are conveyed from person to person by actual contact. On the other the microbe is saprophytic, or capable of living and multiplying in organic refuse, aptly called "matter in the wrong place," or dirt. Such disease can be carried from the sick by water, air, or clothing. The precautions necessary to be taken to prevent the diffusion of diseases depending on each class are, of course, different. The plague bacillus is capable of leading both a parasitic and saprophytic existence, so that from the point of view of preventive measures it is necessary not only to isolate the patient, but to render the surrounding conditions unfavourable to the growth of the plague organism.

Dr. J. Wright Mason advises masters of vessels visiting ports to confine their crew as far as possible to the ship, to frequently clean and disinfect waterclosets, and to provide disinfectants. Strict attention should be paid to those engaged in the discharge of a cargo, and in the event of illness, however slight, occurring amongst those so engaged, or amongst the crew, medical advice should be immediately obtained. Particular care should also be taken in respect to the food and water taken on board. Rats and mice have been the means of spreading infection, and every effort should be made to exterminate them in warehouses connected with the port, and in the ships themselves. He also advises the prompt isolation in a special cabin of anyone on board ship who shows any suspicious symptoms, the thorough ventilation of the cabin, and the provision of a special attendant who shall avoid direct contact with the crew, and the frequent use of antiseptics. All bed and body linen, as soon as removed from the sick person,

before being taken from the berth, should be put first into a solution of some reliable antiseptic. The discharges from the bowels and kidneys should be received on their very issue from the body into vessels charged with disinfectants. In case of death from plague occurring on board any vessel immediate burial is imperative. The bedding and effects used by the patient should be burned, and the berth occupied by the patient thoroughly disinfected.

The plague is not merely a historic disease, but has been expanding since 1894, when it left its homes in Assyr, Irak-Arabi and Persia. The spread of the disease was in China on the one hand, and on the other through Hindostan to Bombay, thence to Calcutta, then accompanying the Hindoo pilgrims to Camaran.

Red Sea ports became infected, and the outbreak at Alexandria was sufficiently serious to alarm the world.

It is so long since this once much dreaded visitor from the east obtained a definite footing north of the Mediterranean that a feeling of security had grown up amounting almost to a belief that modern Europe was proof against the infection.

Formerly prevalent over a very wide area, it completely died out in 1841, and during the fifty-eight years that have supervened up to the Oporto outbreak, it has only once appeared on the European continent. That was twenty years ago, and the circumstances of the outbreak tended rather to confirm than to dispel the feeling of security. The disease was confined to one limited area in the furthest corner of Russia, and its activity was of very short duration and the number of victims small. But though the visitation was unimportant in itself, it presented many features which it may be instructive to recall at the present juncture. The seat of the outbreak was a handful of villages on the banks of the Volga, in the province of Astrachan.

It was preceded, in 1877 and 1878, by the prevalence in the Volga delta of a mild illness of a very suspicious character. It was of a bubonic nature ; that is to say, after some feverishness, inflamed glands occurred under the arm, the lower jaw and in the groin. But the persons affected were rarely so ill as to go to bed, and no instance of transmission by contagion was observed.

The real and undoubted malady began about the end of October, 1878, at Vetlianka, a Cossack stanitza or settlement on the right bank of the Volga. This place is a large village with seventeen hundred inhabitants, and it appears to have had a previous reputation for unhealthiness. The people are exceedingly poor ; fish is the sole produce, and as the river is frozen for six months they can only carry on their industry for half the year.

From Vetlianka it spread to six other similar villages, three on each bank of the river. Most of the medical commissioners who visited these places were surprised to find the people so comparatively clean and well to do, but no doubt allowance must be made for the sanitary measures which had already been taken. Still it may be accepted as generally true that the Russian peasantry by no means live in that state of extreme squalor which is usually ascribed to them.

The manner of Infection in Bubonic Plague.—The occurrence of endemics of the plague in various places and the possibility that it may reach our own shores—a contingency which may come to pass at any day—show clearly enough that this disease has much more than only a historic significance even for us.

Since the recent appearance of plague in India and China the opportunities presented for thorough and scientific study of the disease have been used to exceedingly good advantage. We know that bubonic plague is caused by a bacillus which is pathogenic for animals, and that some of these animals, especially the rat, play an essential role in the local spread of this terribly fatal disease. While it is the accepted opinion that the disease is carried long distances by man himself, either in the person of patients or in infected articles of various kinds, yet the manner of extension in the endemics thus started does not depend so much on direct contagion as on the intervention of certain of the lower animals.

According to the investigations of Hankin and of Semond* the rat certainly is the carrier of infection. The irregular extension in the cities of India can not be explained

* Annales de l'Institut Pasteur, 1898, xii.

as due to infection through the air and water. Cases will appear in houses both far and near from original centres of infection, and at the height of endemics the spread is very capricious. In certain parts of Africa the onset of an endemic is foretold by the natives from the death of large numbers of rats which then occurs, and when these animals begin to die the natives leave their huts. In Formosa the term 'bubonic plague' literally means a disease of rats. The identity of the disease in rats and in man in such cases has been established bacteriologically. Simond has found that in two cases plague developed in men after endemics among rats on board ship. Simond also hopes that the recrudescences characteristic of plague epidemics depend on the appearances of new generations of rats.

The next question is: How does the disease spread from rat to rat and from rat to man? While an absolutely satisfactory explanation can not be given at the present time, there are a number of facts which speak in favour of the flea being the principal direct agent of infection. According to Simond, fleas abound on rats sick with plague; bacilli, like the bacillus of plague, have been found in the intestinal contents of such fleas; and the disease has been communicated experimentally to healthy rats through fleas from plague-stricken rats. The flea theory explains satisfactorily the partiality of plague for the inhabitants of the most unhygienic parts of cities, and also the manner in which infection may be carried in wearing apparel.

While this seems to be the usual mode of infection there are also other possibilities to be considered. It has been shown by suitable experiments that infection may occur through the digestive tract, although not readily. But the plague bacillus does not live long in water, and Childs shows that the mesenteric glands are not enlarged in cases of plague in man. These facts argue against the digestive tract as the usual seat of infection. In the so-called plague pneumonia the infection is generally held to occur through inhalation, because of the principal localization of the bacillus in the lungs, but it has also been shown that the bacillus is readily destroyed on exposure to the air. Hence, it may be concluded that, in the vast majority of cases, infection with the plague bacillus takes place through the skin, the flea and possibly other insects being the most likely immediate carrier of the infection.

Viewed in the light of our present knowledge of the manner of infection it is quite apparent that certain districts of our cities, especially the larger, offer favourable conditions for the spread and maintenance of the plague should it ever be introduced. The preventive measures are to be directed against rats, parasites and man. Simond recommends that ships should be fumigated so as to asphyxiate the rats, which should be treated with boiling water before removal and then other familiar methods of disinfection should be thoroughly employed.

In the *Times* of July 24, Mr. Edwin Freshfield points out the danger of plague gaining a footing in Europe. Mr. Freshfield contends that while, judging from past experience, there is little to fear of Northern Europe being invaded by plague from Arabia or Egypt—the southern route—yet there is great danger of infection by Persia, Asia Minor and Turkey—the northern route. Mr. Freshfield dates his letter from Smyrna, and states that Constantinople was usually attacked by way of Trebizond through Persia. He further remarks that previous experience in Smyrna has been that when plague reached the city from Constantinople it was sporadic, but when it came from Alexandria it became epidemic. He thinks that, judging from the time of year, the plague which has now travelled to Alexandria may probably become next year epidemic there, as it has become in Hong Kong, Bombay and Karachi; but that it will not spread over the basin of the Mediterranean for another year or two, so that for the moment there is no immediate danger. We may point out, however, that there is a direct trade in cotton between Alexandria and Manchester. Having regard to this, the Port Sanitary Authority of Manchester has approved of the distribution of a leaflet drawn up by Dr. J. H. Crocker, Port Medical Officer. The leaflet commences by pointing out that cases of plague have been occurring in Alexandria since May 4. It is added that as the incubation stage of plague is five days, and that at the longest probably ten, and as a steamer takes a fortnight to reach Manchester from Alexandria, there is little fear of the disease being imported by any human being without it being recognized. Dr.

Crocker then goes on to point out that there is an abundance of evidence to show that many varieties of animals may become infected with it, and that rats and mice are particularly susceptible. Instances in support of this assertion are quoted, and as a precautionary measure it is suggested that efforts should be made to exterminate, as far as possible, the rats in and about the various warehouses and buildings connected with the port of Manchester. The attention of ship owners is also directed to the possibility of infected rats being introduced from infected ports, and that steps should be taken to exterminate rats on board ships, particularly those trading between Manchester and Egypt and India. It appears that a few years ago a Manchester newspaper offered a prize for the most practical method of exterminating rats from warehouses, and it was awarded to a person who suggested the introduction of the mongoose. The animal, it is stated, has been tried in many warehouses in Manchester, and found most serviceable in exterminating rats.

Mode of Infection and Symptons of Bubonic Plague.—The report of Khan Bahadur N. H. Chosky, of Bombay, India, based on the examination of 939 cases of the plague in a Bombay hospital, deals with infection under the following headings: 1. Through the skin. 2. From the contents of buboes. 3. Through the sputum. 4. Through inspiration; atmospheric conditions, excreta; through the stomach, rat bites and shoe bites.

1. The fact that buboes were mostly found in the femoral and femoral-inguinal region, made it seem probable that infection gained entrance through the skin, but in not more than 5 per cent of the cases could there be found evidences of a breach of surface, while it must be admitted that these persons have been in the habit of going barefooted all their lives, and had innumerable cracks and fissures on the soles and elsewhere. Yet traces of inflammatory mischief from the absorption of the virus through the crack or fissure were conspicuous by their absence.

2. The pus from incised buboes was always found, on the first day, to contain a large number of plague bacilli, which, however, gradually diminished within three to five days, after which the discharge from the wound was almost sterile. In this connection a case is reported in which a member of the hospital staff, having operated on some cases, became infected directly through the hands, leading to the formation of buboes in axillary region with diffused infiltration over the forearm, arm and chest.

3. In the patients with plague, who subsequently developed pneumonia—pneumonia type—the sputum was found to contain almost pure cultures of the plague bacilli. 'And knowing as we do the habits of the lower classes, who would spit anywhere and everywhere, round about where they were sitting or lying down, it is not difficult to conceive how prolific a source of infection such sputum must be, and that it must have played, and is probably playing a by-no-means insignificant part in diffusing the epidemic.'

4. While the study of the sputum might lead one to conceive that infection might occur by means of the dried sputum, ordinary respiration does not seem to infect or scarcely a doctor, nurse or hospital attendant would enjoy such immunity as they do.

From the fact that the plague epidemic progresses like a regular wave from one end of the country to the other, as does influenza, atmospheric agency must be a potent factor. While infection by means of the feces or urine may be possible, it was not found what proportion of these excreta contained the germ. Infection through the stomach seemed doubtful, since in no case were the abdominal symptoms marked, or the mesenteric glands so enlarged as to indicate primary infection through the digestive tract. No infection through the water supply was possible, nor could it occur through grain—millet grain—used as food, which necessarily entailed the process of boiling, sufficient in itself to destroy the micro-organism. In no case was the plague attributed to rat bites, or to fleas, flies, ants, bugs, or even to mosquitoes.

The symptomatology is considered under the head, 'general condition of patients on admission,' being divided into: 1, attitudes; 2, gait; 3, aspect; 4, speech; 5, temperature; 6, buboes; 7, nervous and circulatory system, &c.

Regarding the attitude, the statement is made that owing to the advanced stage at which most cases were admitted, there was probably no characteristic attitude, unless it was that the patient as a rule would generally lie flat on the back, with limbs ex-

tended and one leg invariably crossed over the other. As a rule the gait was tottering, with weakness of the limbs, and bending of the knees, indicating thorough prostration. The aspect was almost invariably characteristic. Ordinarily the plague seemed to be stamped on the patient's features, giving it a characteristic and not to be easily-forgotten appearance. The features depicted fear and anxiety, or sadness and resignation, as if from an intuition of an impending fate. In certain cases of the nervous type there was delirium, with a maniac appearance, blood-shot eyes protruding through their sockets, giving rise to a weird aspect. The speech was as a rule characteristic, and, in fact, speech combined with the aspect, more often than not, determined the diagnosis of the plague. The speech was of two kinds. In the one it resembled that of a man under the influence of drink, the words being taken up into syllables, and each syllable articulated with difficulty and hesitation, and in a more or less thick and husky tone. In the second variety the patient's reply would be pronounced snappishly, with an angry look, the forehead being thrown into wrinkles, indicating that he was annoyed at being disturbed. In other cases aphasia existed.

Before the rise of temperature there is for several previous days a feeling of malaise, followed later by the appearance of a bubo, at which time the temperature begins to rise. It may or may not be preceded by a rigor. Children always show a higher rise than in the case of adults, the general range being from 102 to 105 F., with morning remissions and evening exacerbations with a difference of from 1 to 2 degrees. The temperature generally falls by lysis—sixth to tenth day—crisis being exceptional. When there is a rapid fall in the temperature it almost invariably indicates impending death.

The appearance of buboes is usually coincident with the initial rise of fever, and is characterized by pain, tenderness and swelling. In most cases the pain is severe, but exceptionally the buboes could be handled without giving discomfort. Swelling was always marked, due to inflammation of the gland, and to effusion or infiltration, serous, serosanguineous or hemorrhagic around the buboes. The size of the bubo was found to be quite independent of the gravity of the case.

At an early stage the nervous system is profoundly affected; headache, vertigo, intense pain at the back of the head, over the frontal region, along the spine or in the course of the sciatic nerve, muscular twitching, tremors and subsultus are present. Delirium may appear on the third or fourth day, and may be acute, or of the low muttering variety, as in typhoid fever. In some cases hypersensitiveness was observed so that the slightest touch would excite screams.

In no other acute disease does the pulse—an index of circulation—present so many variations, in force, frequency, volume and tone, as in bubonic plague, and in no other disease is the disproportion in the normal ratio between the pulse, temperature and respiration so divergent. The pulse varies with the character of the disease. The full bounding pulse, so often associated with high temperatures, is conspicuous by its absence, and in the majority of cases the pulse is easily compressible, extremely feeble and very frequent. As the case advances, the pulse becomes intermittent, regular or irregular, more often the latter, and distinctly dicrotic. The dicrotism was extremely well marked in some cases, and in advanced ones was considered characteristic. Failure of the heart's action was either sudden or gradual, with consequent collapse. No case of sudden death during convalescence was observed.

The blood was found not to be markedly deprived of its hemoglobin, there being present from 65 to 80 per cent, and a leucocyte count of 12,000 to 28,000. Bacteriologic examination of the blood was undertaken by the Austrian Commission, with the conclusion, like that of the other commissioners, that cover-glass preparations of stained blood were not only unreliable, but extremely fallacious, and that the only reliable test was by means of cultures.

Increased frequency of the respiration is a marked feature of the disease, probably due in part to hypostatic congestion of the lungs and ædema of the larynx. The lips, teeth and gums are generally covered with sordes, and the mouth is dry, the tongue being covered with a thick white coat in the centre while the edges are red. Urine is generally scanty, high coloured, and serum albumin is always present. Microscopically

hyaline casts are seen. Hematuria rarely occurs. The eyes are always injected and suffused, and in many cases sub-conjunctival hemorrhage is very distinctly marked, the whole of the eye appearing as a large bloody mass overlapping the sclerocorneal junction, but leaving the cornea free. Panophthalmitis with sloughing of the cornea may be present.

The points to be specially noted in making the diagnosis are the following: 1. Presence of fever, high or low. 2. A quick easily compressible pulse. 3. Furred tongue. 4. The aspect of the patient, as shown by the *facies pestica*. 5. The peculiar hesitating speech. 6. The presence of a bubo. 7. Suffused eyes. 8. The presence of cough with rusty or hemorrhagic sputa.

On the bacteriological diagnosis of plague, Dr. C. Balfour, Stewart, lately attached to the Plague Research Laboratory, Bombay, writes as follows, in the British Medical Journal, on the of September 23 last:—

The following methods are those adopted at the Plague Research Laboratory for diagnosing plague in man or animals, and for testing a plague culture. Naturally, in Bombay we had to do with recent cultures, and the following remarks apply to such. A plague culture grown for a long time on artificial media does not seem to give the same results; at any rate, a culture of plague which had been kept for a long time in a laboratory and which was given me to examine did not grow typically in broth.

Media.—Only two kinds of media are used—agar and broth; it is found impossible to work with gelatine on account of the high temperature. Ordinary agar slant tubes are allowed to dry. Should they be required for use soon after they are made it is best to place them for a few days in a drying bottle, with quicklime at the bottom, otherwise they may be dried by leaving them on their sides in a dark room for a few weeks. If plate cultures are made it is better to prepare the plate, and let it dry and make a smear culture.

Broth.—A special peptone solution and infusion of meat made out of goat's flesh is used on account of native religious prejudice against beef and commercial peptone, but ordinary broth made of beef infusion, plus 1 per cent peptone, plus 0·5 per cent salt, does just as well, or better.

The broth need not be neutralised unless very acid. I have often found the plague bacillus grow better in broth made without any addition of alkali, the reaction to blue litmus paper being a slight tinge of red. As such broth generally gives a precipitate after sterilisation and requires to be filtered and sterilised again, it is better for practical purposes to render the broth slightly alkaline, the less the better, and not more than is given by 0·2 gram per cent of caustic soda added to the broth after being made neutral. About 100 c.cm. should be put in globular flasks of about 200 c.cm. capacity and sterilised at a slightly lower temperature than that at which the broth was originally heated; if this is done, no further precipitate will come down.

Source of the Plague Microbe.—The plague microbe is found in the blood shortly before a fatal termination of a case of plague, so the specimen should be taken shortly before or soon after death.

The sputum of a case of pulmonary plague contains the bacilli. If the bacillus is to be sought for in the bubo, it is better to make a small incision in the skin, and push a small sterilised glass pipette into the gland, and suck up a drop or two of the juice. This should be done before suppuration has commenced.

Temperature of Incubation.—In Bombay it is found better not to use the incubator. The microbe grows best at the ordinary room temperature. By placing a large number of tubes to incubate under varying conditions, I found the best growth on those incubated at 74° F. in a cupboard. In this country an incubator would be required.

Growth on Agar.—The colonies appear in 24 to 48 hours. If numerous, they appear to the naked eye as small, round points, colourless and translucent. Under Zeiss, Obj. A. they are translucent with slightly greenish tinge, granular and have slightly ragged edges.

If the colonies are scanty the individual ones may grow larger, the growth takes place in successive concentric circles round the original colony which appears heaped up in the centre and is more the colour of mother-of-pearl as it grows older.

A plague colony slips about on the surface of the agar when touched with a platinum wire.

If a dried agar slant tube is inseminated by introducing 0·1 to 0·2 c.cm. of a broth culture by means of a long thin glass pipette, and if the culture is smeared evenly over the surface with a thin glass rod or with the end of the pipette (care being taken not to dig into the agar), the so-called 'ground-glass appearance' is seen after one or two days' incubation. The layer of growth should be viewed from underneath through the substance of the agar with the light coming from opposite, the eye being almost level with the slanting surface of the agar tube held about a foot off. The layer of growth looks like bright ground glass or like the back of a locking glass. The agar must be dry so that it will absorb the broth leaving the bacilli on the surface. If there is any broth not absorbed or any condensation water present the growth in contact with the liquid is smeary and somewhat milky. After inseminating the tubes it is well to leave them on their sides for a few minutes and then incubate them in the upright position. In examining them care should be taken not to allow any liquid that may be at the bottom of the tubes to flow over the surface of the growth.

This 'ground-glass' appearance was first shown by Haffkine. It is a very useful method of testing the purity of a culture known to be plague: because a strange colony is generally detected at a glance. Some microbes, proteus for example, will grow in amongst the plague, when the film will no longer have a typical 'ground-glass' appearance, but will appear somewhat slimy.

Neither is this 'ground-glass' appearance peculiar to the plague microbe alone, for I succeeded in separating a spore-forming micro-organism from the air that showed the 'ground-glass' appearance after twenty-four hours' growth, but the growth became opaque after forty-eight hours' incubation coincident with the formation of spores.

Broth.—Haffkine considers the stalactitic growth of plague in broth to be characteristic of the microbe. He puts a drop or two of cocoa-nut oil or ghee (native clarified butter) in the flasks before they are sterilized, the oil globules form a thin broken film on the surface of the broth. After inoculation the flask must be incubated on a firm shelf or table. In three to six days numerous thin threads of growth are seen hanging down from the surface into the otherwise clear broth. If the flask is gently shaken, the stalactites fall down to the bottom like a fall of snow, after a time the broth becomes clear again, and in a day or two another lot of stalactites will be found hanging from the surface.

It is most important to keep the flasks still, for the slightest movement or vibration is sufficient to cause the stalactites to drop. A shelf is most convenient to rest the flasks on, because the stalactites are best seen by placing a small candle end lighted behind the flask, and looking through it. If an incubator is used, the flask should be placed on the front of the shelf so as to allow room for the light behind, and the door should be opened very gently, an incubator would have to be kept specially for the purpose. The film of oil probably acts merely as a *point d'appui*, it is by no means necessary, but it hastens the formation of stalactites.

In making broth cultivations the writer always inseminated the flasks by means of a thin drawn out glass rod long enough to project above the mouth of the flask, one end is held in the fingers, and the rod passed seven times slowly through the flame. The other sterilized end is drawn over the culture, the rod is then passed into the flask between the cotton wool plug and the glass till the end touches the bottom, the unsterilised part of the rod projecting above the plug. If the flask is observed day by day another characteristic phenomenon may be seen: the microbe growth creeps up the glass rod till it reaches the surface, and then gradually spreads out till the surface of the broth is covered with numbers of small round colonies which grow down into the substance of the broth as 'stalactites.' A few whitish colonies may be seen growing on the bottom of the flask and up the sides; the broth itself remains perfectly clear.

This curious form of growth on the surface of the glass seems to be characteristic of the plague microbe; it proves a useful test, because some idea can be formed before the 'stalactites' have had time to grow. If the microbe is found to be growing in this

way and if the broth itself remains clear, so far as the writer's experience goes, it has always turned out to be plague and shows a 'stalactitic' growth in a few days more. No fat or oil was used in these cultivations.

Microscopic Examinations.—The plague microbe stains readily with aniline dyes, but not by Gram's method. The bipolar staining in stained specimens when the ends are found to be deeper stained than the centre is by no means a constant phenomenon and cannot be relied on for diagnosis. Mr. Watkins-Pitchford considers it due to a greater collection or condensation of the protoplasm in these regions; he notes that the spots are readily visible in the living and unstained specimens, so they cannot be due to staining. The detection of the spots he considers to be a most valuable aid to the rapid identification of the germ. Dr. E. L. Marsh drew my attention to the fact that plague microbes suspended in water dry as a bluish film on a microscope slide; if he does not get this he considers it unnecessary to go on with the staining.

The bacillus is polymorphic; it is sometimes seen as a very short bacillus, almost like a coccus or diplococcus, at other times as a short stumpy bacillus with rounded ends. Very often it is found in pairs as a diplobacillus, and sometimes in distinct short chains: I have found this latter form chiefly in broth especially in the unneutralised broth.

From the analysis of the evidence given before the Plague Commission I may quote as follows:—

The spread of the plague.—The factor in the spread of plague which has been brought forward as most important by different witnesses is infection through human agency, through grain, through clothes, and through rats.

Human Intercourse.—The spread of disease through the movements of infected people is certainly the most common and important of these, and the one least open to question. In numerous cases the evidence was clear that the first case in various places had come just from an infected area, but in several instances there was a remarkable interval, amounting to two or ten weeks after the introduction of the first case before others occurred. The first spread of the disease from Bombay to Poona, and many other places in the Bombay Presidency, was undoubtedly due to the exodus of a very large proportion of the inhabitants from the infected city on the outbreak of the disease, and before the railway inspections were fully organized. Again, in the case of Bangalore the first case was in a man who had come from Hubli, but the next case did not occur for over a month, when the disease was probably reintroduced, as it began in a different quarter. In several other instances the first few people to be attacked were railway employees, showing how the disease may travel in spite of railway inspections. This was the case in the second group that occurred in Bangalore, while other places in Southern India are said to have became infected in the same way. In Hyderabad, again, the first three or four cases were imported by railway from Bombay, and similar evidence as to the spread of the disease by human agency from village to village is on record. The villages appear to become first infected usually by the exodus from large towns on their first being attacked. For instance, out of 84,000 inhabitants of Bangalore, no fewer than 25,000 left the place, and it was recorded that the people of the villages of that part of the country made efforts to prevent infected people from the town coming into their villages, showing they were fully alive to the danger. In the case of Rajputana the disease is said to have been introduced by grain dealers from Poona who had returned to their homes, but in this case the infection was also through human agency, as they do not appear to have brought any grain back with them. In the case of Ahmedabad, again, of the first three cases one had come from Bombay, while the other two were employed on the railway. In the district near Satara it is recorded that the spread of plague in the villages was invariably connected with the movements of persons from infected to non-infected villages, and that every outbreak was due to importation. There was no recrudescence. Another witness stated that in Calcutta he had been able to trace the spread of the disease from street to street by human agency.

The influence of overcrowding in aggravating the incidence of the disease is also well brought out in the evidence. In Bombay, Karachi, Calcutta, Bangalore, and other

places it is recorded that the disease was worse in the most densely populated parts o the towns. The importance, then, of human agency in the spread of the disease is undoubted, and must always be carefully considered before other ways are recognized as being important factors in the extension of the disease.

Grain.—Infected grain was at first thought to be an important factor in the spread of the disease in Bombay, because the disease first appeared in the district in which all the largest granaries of the city were located, and this theory was supported by the very large mortality which undoubtedly occurred among rats living in these storehouses. The connection of these animals with the disease will be considered presently, but with regard to the possibility of infection through grain the experiments of Mr. Hankin must first be mentioned. He added the plague bacillus to grain under conditions which might be expected to be favourable to its preservation and growth, yet within a few days after he was unable to find any living organisms in this artificially infected grain. Moreover, the ultimate death rate of the population in the area containing the large granaries was much less than in any other parts of Bombay, and further experience has led to a very grave doubt being thrown on the likelihood of the disease being spread through the instrumentality of grain.

Clothes.—A good deal of evidence has been given tending to show that infection may be carried a long way in clothes. Some thought that Calcutta was infected in this way, while in Sirohi State in Rajputana the disease is said to have been carried a long distance in clothes. Again in Kotri the recrudescence of the disease on the advent of the cold weather was attributed to winter clothing being brought out, some of which there was reason to suppose had been in contact with plague cases in the first epidemic. In Damaun soiled clothes were said to be a means of spreading the disease. In this connection it is of interest to note that although in Bombay and also in the great heat of the Punjab the disease decreased markedly during the hot weather months, yet there were marked exceptions to this rule; for instance, in the case of Sukkur the disease was at its greatest height at a time when the temperature in the shade was 115° F. Moreover, the decrease during these months in Bombay is probably connected, in some degree at least, with the fact that at this time 350,000 of the inhabitants sleep in the open air. One observer stated that he had found plague bacilli in clothes which had been subjected to disinfection in a steam sterilizer. It seems, then, to be certain that clothes play an important part in the spread of the disease, while it is very likely that recrudescences of the epidemic may, at least in some cases, be due to the infection having been preserved for some considerable time in clothes and other infected articles. That the germs may live for some weeks at least outside the body is certain, for instances have been recorded in which persons who have returned to or even only visited previously-infected houses several weeks after they have been evacuated have contracted the disease, in some of which cases they had taken clothes out of the houses. It is then quite possible that recrudescence of the disease may be brought about through infection remaining latent for considerable periods in clothes, &c.

Rats.—The exact connection of rats with the disease is a more difficult question, and one with regard to which most divergent views have been expressed. That rats do die in large numbers during the prevalence of plague is certain, and it also appears to be the case that the death of rats may in some cases, but by no means always, precede the epidemic outbreak of the disease, although probably a few undetected cases have occurred before the death of the rats. It is also a fact that in various places the plague organisms have been found in rats that have died under these circumstances. On the other hand, the exact connection between the death of the rats and the occurrence and spread of plague is by no means so clear. Several witnesses have stated that the spread of the disease from one part of a town to another has been preceded by a migration of rats in the same direction. In Calcutta there was a heavy mortality among rats in March and April of 1898, and plague was officially notified as being present in the latter month. In Karachi the disease is said to have spread rapidly in the second outbreak owing to the people evacuating the place and causing the rats to spread through the town. One person is said to have become infected through handling a rat. In Karachi, too, many rats were seen before the epidemic began, and storehouses were severely attacked. The collector

of the Naira district said that dead rats were found in every village of that part a fortnight before the first case of plague was detected, and that fleas also swarmed in the streets and houses during the epidemic. In Damaun, on the other hand, dead rats were only found after the first case of plague had occurred. In Calcutta rats were also found to be suffering from plague, and buboes in rats have also been recorded. In Bombay over 50,000 rats were destroyed without any apparent good effect, and it has been pointed out that while during the first outbreak of the disease in that city a very large number of rats died, whereas during the second exacerbation of the disease dead rats were decidedly scarce, yet the plague mortality in the two epidemics were very nearly equal. Moreover, a table showing the mortality from this disease in rat districts and non-rat districts shows that the total mortality in the former was very much less than that in the latter. Once more, during the Bombay epidemics there were numerous vessels in the docks which are situated close to the great rat-infested granaries, and interchange occurred between those animals on shore and those on the ships, yet the crews of those ships remained unaffected during both epidemics.

Lastly, it has been shown by Mr. Hankin that when rats are serially inoculated with plague bacilli the disease dies out after three or four passages, which makes it difficult to understand how these animals could contribute much to the spread of the disease.

It seems, then, that while rats suffer from plague, and the death of unusually large numbers of these animals is an important sign of a place having become infected with this disease—all the more important as it may occur very early, before the few cases that have occurred have attracted the attention of the authorities—yet they do not play an important part in the actual spread of the disease, which may be very severe without any marked increased mortality among these rodents.

Meteorological Conditions.—One other point in the etiology of plague should be mentioned, namely, that charts were submitted to the commission showing that the curve of the mortality of this disease ran parallel to that illustrating the seasonal evaporation from the ground as calculated from the temperature, the dew point, and the difference in temperature in the ground and the air.

Mr. Griesbach, Director of the Geological Survey in India, gave evidence as to the formation of the soil in the infected areas, which pointed to the trap and crystalline areas being specially adapted to the spread of the disease. Bombay was situated near the centre of the Deccan trap formation. There was abundant evidence that the tenacity with which epidemics clung to localities was influenced by the geological formation.

Action of Germicides on B. Pestis.—The germicidal action of certain substances with reference to the bacillus of plague forms the subject of a report by Mr. W. Watkins-Pitchford, M.B. Lond., who worked on the subject at the Petit Laboratory in Bombay. The substances used were in general the commoner and less expensive disinfectants, upon most of which Mr. Hankin had already communicated his results in his report for 1897. The report before us is an extension of Mr. Hankin's work upon the same lines, and deals with the effect of watery solutions or suspensions of the substances upon watery emulsions of the bacillus obtained from agar cultures. In this sense, therefore, this is a preliminary report, further researches being in course of prosecution with regard to other conditions, such as admixture of the bacillus with solid media, etc.

The conclusions drawn from these experiments are that, of all the disinfectants used, mercuric perchloride is the most reliable, a strength of 1 in 5,000 proving germicidal within five minutes. Other valuable agents are potassium permanganate, chloride of lime, lysol, and other substances in less degree. Carbolic acid cannot be included in the list, as the strength of solutions required to be effective within five minutes must be 1 in 50.

These experiments corroborate the results already published in the *Cent. f. Bakt.* (April 24, 1897) by Abel, who emphasizes the value of mercuric perchloride, and notes the comparative inefficiency of carbolic acid. Mr. Watkins-Pitchford puts the thermal death point at 127° F. (53° C.), though the length of exposure to that temperature necessary to kill the bacilli is not stated. Kolle placed the thermal death-point at 58° C. for cultures when exposed to that temperature for several hours.

Another observation which was verified in the course of the experiments, is the difference in vitality of cultures of varying ages. Thus, young cultures were found to be less resistant to germicides than older cultures. The explanation offered is that in the latter the surface of the bacilli has become denser and less permeable to the disinfectant.

The researches of Wilm and Abel on the behaviour of B. pestis in water showed that it could exist for long periods in that medium, as much as twenty days being given by one of these observers as the length of time the bacillus took to disappear. On the other hand, we have the published researches of Gaffky, who states that the bacilli only live three days in absolutely sterile water, while in ordinary tap water they cannot be recovered by cultural methods after the lapse of twenty-four hours. That the plague bacillus varies within wide limits in its vitality as well as in its virulence is now well established, even when considered apart from its environment, and the only means by which we can reconcile the different results of Gaffky on the one hand, and Abel and Wilm on the other, is to surmise that the experimenters used bacilli of varying vitality. Hence, obviously, the whole question of the disinfection of material infected with the bacillus of plague is one surrounded with many pitfalls to the experimenter, and more particularly will these varying factors come into play when the task of estimating the resistance to disinfectants of the bacillus in the soil is undertaken.

Early in the past year I began, in compliance with the proposition of Dr. I. F. Rapchevsky in the laboratory intrusted to him, the study of the biological qualities of the bacillus of pest. The present communication relates only to the influence upon the organism of the drying process at various temperatures and under various circumstances.

Cultures of the bacillus pestis have been obtained through Dr. I. F. Rapchevsky from the Imperial Institute of Experimental Medicine. The hypodermic injection of one cubic centimetre of bouillon culture of the bacillus of pest to white mice, and injections performed in the abdominal region, killed the mice within two days, and the specific germs were found in the organs, as well as in the blood of the latter.

For drying experiments, the following materials were used:—Silk threads, letter paper, filtering paper, linen and cloth. All fatty substance was carefully eliminated from the silk threads, which were thoroughly sterilized. The other material was cut into rounds of similar size, one and one-half centimetre in diameter, and were also carefully sterilized. An emulsion from a two days' culture on agar-agar in meat broth (with peptone and salt), was made of such consistency that large type could not be seen through it.

The material experimented upon was immersed for one-half an hour in this emulsion, and distributed after preliminary drying between sheets of filtering paper, in Petri dishes, sterilized beforehand and not hermetically closed. I arrived at my conclusions about the loss of the multiplying capacity from the fact that no growth could be noticed in the experimental vessels with broth in which the silk threads and rounds were put, even after a two weeks' stay in the thermostat.

In view of the absence of characteristic qualities of the growth of the bacillus of pest in broth, each experimental vessel was also microscopically examined for control. Experiments to which some foreign matter has accidentally been admixed were not taken into account.

The following results have been obtained by me:—

(1.) Under the action of sunlight at room temperature (18° to 20° C.) growth was noticed on the silk threads until the nineteenth day; on rounds of letter paper until the ninth day; on rounds of filtering paper, until the eleventh day; on rounds of linen, until the eighth day; on rounds of cloth, until the twelfth day.

(2.) In darkness and at room temperature growth on silk threads was to be noticed until the twenty-third day; on rounds of letter paper, until the sixteenth day; on rounds of filtering paper, until the twenty-third day; on rounds of linen, until the twelfth day; on rounds of cloth until the twenty-second day.

(3.) In the desiccator at room temperature growth was noticed in the silk threads until the twenty-second day; on rounds of letter paper, until the tenth day; on rounds of filtering paper, until the ninth day; on rounds of linen, until the eleventh day; on rounds of cloth, until the twelfth day.

(4.) In the thermostat (temperature 33° to 36° C.) on silk threads, growth was noticed until the eleventh day; on letter paper, until the fourth day; on filtering paper, until the sixth day; on linen rounds, until the third day; on cloth rounds, until the fourth day.

(5.) At a temperature of 60° C. in dry bath, growth was noticed on the silk threads for sixty minutes; on rounds of letter paper the growth stopped after fifteen minutes; on rounds of filtering paper, after thirty minutes; on linen rounds, after fifteen minutes; on cloth rounds, after forty-five minutes.

(6.) At a temperature of 80° C. in a dry bath, after fifteen minutes, no growth was noticed either on the silk threads or on the rounds.

Further, pieces of filtering paper of about 1 cm. wide and 4 cm. long were smeared with the organs of the white mice that had perished from the injection of the suspension of bacillus pestis. These pieces of filtering paper were put between sheets of folded letter paper; this paper was placed in an envelope of stout paper and the letter placed in a thick book. The book was placed in a dry bath at a temperature of 60° C. The growth was stopped after two hours. In a dry bath at a temperature of 80° C. the growth was stopped in eighty minutes.

The growth kept on for forty-eight hours in room temperature. Under the influence of formalin steam, the growth was stopped in thirty minutes.

Action of Gaseous Disinfectants on the Plague Bacillus.—Reports on the germicidal value of certain gaseous products have been also issued. The action of gaseous sulphide dioxide is the subject of three reports from the Plague Research Laboratory, Bombay, on investigations carried out by Major Bannerman, I.M.S., and Drs. Marsh and Watkins-Pitchford. These experiments were performed in such manner as to test the efficacy of the disinfectant on plague bacilli both in cultures and in infected materials exposed to the fumes of the gas liberated into a room of known cubic capacity. It is noted at the outset that the rooms of the native houses do not lend themselves to gaseous disinfection, for the construction of the houses, doors, etc., is such as to make it impossible to render them air-tight. Thus the native huts have tiled roofs without any ceiling; hence the impossibility of maintaining the requisite percentage of disinfectant for the prescribed time. But a room which could be rendered air-tight in a particularly well built native house was chosen. The sulphur dioxide was obtained in liquid form, under pressure, in small tins, each of such capacity as to be sufficient for the disinfection of 1,728 cubic feet.

Major Bannerman, experimenting with a room of 1,684 cubic feet, obtained living subcultures from all the agar growths exposed to the action of the gas, while Dr. Marsh, using a room of 1,152 cubic feet capacity, found that cultures of the B. pestis, freely exposed to the action of the gas, as for example agar plate cultivations, were killed by the sulphur dioxide, but similar cultures, not so openly exposed, retained their vitality. Drs. Marsh and Watkins-Pitchford obtained slightly more favourable results on another occasion. They conclude from their experiments that the vitality of cultures is destroyed when such cultures are freely exposed, and also when protected by thin coverings of earth, wool, leaves, &c.; and also that the gas acts as an efficient aërial disinfectant in a room of the size stated (1,150 cubic feet), and that it penetrates certain thicknesses of different substances likely to retain infectious material. They also found that the artificial addition of moisture to the atmosphere increased the potency of the disinfectant. The action of nitric fumes evolved on the addition of nitric acid to copper is also the subject of a report by these two investigators, but they found that these fumes possess only limited powers of penetration and diffusion, and an exceedingly feeble disinfectant action. Lastly, the action of vaporized carbolic acid forms the subject of a report by Major Bannerman. Pure carbolic acid was poured into an iron vessel previously raised to red heat in a fire and the fumes so generated allowed to act for several hours. In such case he obtained entirely negative results so far as the B. pestis was concerned, though the insects in the room were killed by the gas.

Drs. Marsh and Watkins-Pitchford have also issued a report on the same method, and are in agreement with regard to the destruction of insect life. They found also that the vitality of the bacillus of plague is destroyed, provided that the bacillary growth is

freely exposed to the action of the fumes, but that any obstruction to the free access of the fumes prevents the disinfectant action. They conclude from their experiments that compressed sulphur dioxide is superior as an aërial disinfectant to either carbolic acid or nitrous oxide fumes. Professor Haffkine, in whose laboratory these experiments were carried out, in forwarding the reports to the Secretary to the Surgeon-General with the Government of Bombay, emphasizes the difficulties that attend gaseous disinfection of native houses as at present constructed, and remarks that they can only be of service to supplement the action of liquid disinfectants, more particularly with the object of killing the insect life in the air, as insects in infected rooms are likely to be carriers of contagion.

The following interesting remarks have been recently published on the prevention of plague through the suppression of rats and mice, by Dr. Doriga, provincial medical officer of health, Venice:—In the recent outbreaks of plague in China and India it has been noticed that mice have played a very important part in the diffusion of the disease. This fact was for the first time brought before the attention of Europeans in 1881 by the French missionaries of Yunnam, and by Rocher, French Consul at Mong-Tzè; but it appears to have been long known and dreaded by the natives of the Himalayan districts, where plague is endemic, as also by those of Formosa (Ogata); and Hankin found it indicated in the memoirs of Ichangir-Schangir, Emperor of India, in reference to the pest at Agra in 1818.

Although Simond in 1893, at Long-Tcheou, on the Kwang-Si, Rennie at Pakkoi, and Lien-Chu in the province of Canton, and Hutchinson in the district of Gurhwal in 1894 had confirmed the foregoing observations, the merit of having affirmed that plague before becoming a disease of men is a disease of rats, and of having advocated the destruction of these animals as a valuable prophylactic measure against the epidemic, is undoubtedly due to Yersin. The careful researches of Snowet Weir, first Municipal Commissioner and second sanitary officer of the city of Bombay, and the minute investigation of Simond and Hankin have proved the accuracy of these opinions, and have set them forth in fresh light.

Hence the agency of mice in spreading plague, and the relation of their disease to that of man as cause and effect, may be considered as amply proved.

The following is a brief résumé of the chief facts relating thereto as ascertained by recent investigations:

1. Kitasato and Yersin, and many others after them, have found the specific bacillus of plague in the dead bodies of rats and mice collected in houses in which cases of the disease subsequently broke out among the occupants, or in the streets of infected towns. They have also placed beyond question the great susceptibility of these rodents to the bacillus.

2. In all the towns of India manifest examples of contagion from mice to men have been observed. At Bombay, in certain establishments where the dead bodies of rats were found, it has been noticed that the persons who collected them alone contracted plague, although many other work-people were engaged at the same place.

3. The first cases of the disease have sometimes appeared in warehouses where wheat, cotton seed, or other substances likely to attract rats were stored. At Kurachee, where the warehouses are situated in streets without dwelling-houses, the first sufferers were the caretakers.

4. Well-constructed and well-maintained houses, i e., where rats cannot find harbour, nearly always remain free from plague. This same immunity was demonstrated by Rennie at Canton in 1894 among the occupants of boats anchored in the river. On the other hand is to be observed the permanence of infection in the houses of poor natives, notwithstanding the removal of the residents and furniture and the most rigorous disinfection, because of re-infection by means of mice.

5. The epidemics of Bombay, Kurachee and Karad were chiefly localized in quarters where the disease had broken out amongst rats. The spread of infection in other parts of these same towns was regularly preceded by the immigration and death of rats, and its diffusion always corresponded to the route of travel taken by these rodents in their migrations.

6. In healthy countries adjoining infected the disease broke out amongst the inhabitants without the importation of a single (human) case, but was preceded by the immigration of rats from an infected place.

7. In many countries and towns the development of the epidemic among the inhabitants followed a month after the importation of the first cases, or after the death of fugitives arriving from infected localities. During the interval the plague had been propagated by mice.

8. Lastly, the mode of infection and propagation of plague on certain ships proved that the rats on board had been the vehicles of contagion.

An evident and well-demonstrated connection exists between the plague of man and that of mice. The same specific agent is the cause of each. It is communicable from mouse to man, and vice versa. Either one or the other may be the vehicle of contagion from place to place. Although the transference of infection from a sick man to a healthy man does occasionally occur, the mouse (or rat) seems to be the chief and almost necessary agent of the epidemic diffusion of plague.

These observations show how ordinary measures, viz., isolation of the sick and disinfection, which give excellent results in other infectious diseases, are ineffectual against plague unless all mice and rats are promptly exterminated, or their migrations kept within a circumscribed zone. In Bombay and certain other Indian towns, attempts have been made since June, 1898, to secure this result, either by flooding the sewers with acid, sprinkling the earth round dwellings with carbolic powder to keep out the rats, or inoculating a few of them with the bacillus of septicæmia to spread an epizoötic amongst the rest. But the results have not been encouraging. It is clear, however, that suitable precautions must be adopted, and occasion taken to ascertain if there is any rapid, sure, and practicable way of destroying rats and mice.

The hunting of these rodents by their natural enemies, such as cats, dogs and pigs, is a very ancient custom, but their employment during times of plague is not free from danger. Observed facts and laboratory experiments conduce to the belief that dogs only are immune, and that cats and pigs are tolerably susceptible.

The experiments of Lawson, who failed to infect pigs, either subcutaneously or by the mouth, are contradicted by the positive results of Wilm and of Ogata. The latter has seen cats die after inoculation, like other animals, only a little more slowly. Merely a contradiction in appearance to this are the more recent experiments of Mattei, who did not succeed in killing pigs and cats but observed them to be more or less gravely ill, and found plague bacilli in their dejecta.

Although these animals may become vehicles of infection either through their dejecta, or by their feet and snouts becoming soiled with infective fæces, blood, &c., or, in the case of cats, from their custom of clawing, in certain cases they may be useful in driving away vermin, and so preventing an epidemic. Professor Muller, quoting Hankin, relates that in the village of Mahim-Bundarwada at least one cat was kept in every house by the residents, to kill mice, which were at that time considered capable of conveying the plague, and that this village remained free from the epidemic although it raged in a great many neighbouring villages.

In sewered towns, or those affording other shelter for rats and mice, the above means of defence seems inadequate; and when the malady has already affected the rodents it will be well to send from the house every animal likely to be brought into contact with them, and resort to physical, chemical, or mechanical measures for destruction, either singly, or in combination, according to circumstances of time and place. Rats may be suffocated by blowing smoke or sulphur fumes down their runs, with special apparatus, such as gas-guns or smoke-machines, consisting essentially of an ordinary bellows fitted with a long tube, having an expansion to hold rags charged with sulphur for burning. In Thessaly the best results followed the burning of sulphide of carbon in the runs after closing all the holes.

Among poisons, those chiefly used are arsenic, phosphorus and strychnine, mixed with other substances; carbonate of baryta, camphor, chloride of lime and scilla maritima, mixed with various foods, especially flour.

These and other similar measures can yield only limited and unsatisfactory results, especially in inhabited dwellings having underground kitchens, with sinks, drains, and other channels inaccessible to man, but harbouring rats. Asphyxiating processes are nevertheless well worth a trial when the inlets to such conduits can be hermetically closed.

In addition to the foregoing means, which necessitates action of a somewhat individual character, experiments have in recent years been made specially against field-mice, with the object of destroying rapidly the entire population of mice in a given area, which consists in provoking among them the development of an epizoötic. This idea was put into practice for the first time in 1882, by Dr. G. Joseph, Professor in the Scientific Institute of Rural Economy at Breslau, who covered the skins of mice for several days with rags soaked in the secretions and crusts of human *tinea favosa*, and then set them at liberty. The sick mice succumbed to a severe disorder, and were destroyed by healthy mice, which are in the habit of killing and eating their feeble, sick, or disfigured companions, and the malady was thus spread among the multitudes of mice in the locality. The weak point is the duration of the disease, which, lasting several weeks, cannot successfully prevent the invasion of another ailment of a more rapid course, like plague. Besides, the contagiousness of favus seems very limited, as in many towns it is not uncommon to find rats ill of this disease, in spite of which the multiplication of the species is not limited. Lastly, even though the ifomycetes proposed by Joseph were more successful, it could not be generally adopted, as the malady is communicable to man.

A better known micro-organism is that suggested by Löffler,* which was isolated from white mice, dead of an epizoötic of spontaneous origin in the laboratory in October, 1890. This is a very motile bacillus, capable of forming long filaments, and not stained by Gram's method, which, from its resemblance to Eberth's typhoid bacillus, has been named the typhoid bacillus of mice *(B. typhi murium.)* Löffler has observed that not only white mice but also the *Arvicola arvalis* can be infected by way of the alimentary canal. Death supervenes in fourteen days. Other rodents, such as the field-rat (*mus agrarius*), and a black rat with striped back, as also cats and many animals useful in agriculture, *e.g.*, pigeons, fowls, goats, sheep, pigs, and small singing-birds, resist infection. By the decree of the King of Greece, Löffler, in 1892, carried out his experiment on a large scale in Thessaly against the *Arvicola savii* (a large mouse almost like a rat), and obtained excellent results.

However, an English Commission sent soon afterwards into Thessaly to collect information on this matter arrived at the conclusion that the method was not available on account of its costliness, but still more because the bacillus destroyed the *Arvicolæ* only, and had no effect on other mice. Further, it is not sufficiently proved that the disease spreads among mice left at liberty. Moreover, Professor Lüpke, of Stuttgard, questions the efficacy of the method, as in his laboratory experiments he noticed that only the more feeble individuals died after a period of less than fifteen days, whilst the stronger escaped with a slight reaction, or were not even unwell.

The conclusions of Sniadowski,† Straunsch,‡ Lunkevitsch,§ Mereshkowsky‖, and several others who have studied the *Bacillus typhi murium* in the laboratory, are similar to those of Löffler. The experiments of Sniadowski were few in number and superficially conducted. Straunsch noted a delay in the death of mice, especially of the house variety, and Lunkevitsch concludes that the bacillus is surely and promptly fatal to the *Arvicolæ* in five or six days, but that the house-mice are immune, or, if infected by eating field-mice, will not die until much later, even the forty-seventh day. Mereshkowsky affirms that the domestic mouse is susceptible to the action of the bacillus, but that death occurs at a period much later than stated by Löffler, even so remote as two months.

*Löffler, 'Sur les Épidémies observées sur les Souris à l'Institut d'Hygiène de Greifswald,' etc., *Cent. f. Bakt.*, 1892, xi., p. 129; *ibid.*, xiii., p. 1; *ibid.*, 1893, xii., p. 647.

† Sniadowski, quoted by Zupnik, *Cent. f. Bakt.*, 1897, xxi.

‡ Straunsch, *Der Landwirth*, 1892, 79.

§ Lunkevitsch, 'Recherches sur la Biologie du Bacillus Typhi Murium,' etc., *Cent. f. Bakt.*, xv., p. 845.

‖ Mereshkowsky, 'Contrib. a l'Étude de la Virulence du Bacillus Typhi Murium,' etc., *Cent. f. Bakt.*, 1894, xvi., p. 612.

Among those who have tried this method in the country, Kornauth* alone relates that in Austria of thirty-six stations of agricultural chemistry the results have been very good at thirty, fairly good at three, and negative at three; and concludes that the action of Löffler's bacillus as a means of destroying mice is certainly affirmed. All other experimenters have had very little satisfaction in their results.

Lastly, Zupnik, † of the University of Prague, inquired into the matter of the virulence of Löffler's bacillus, chiefly with the object of establishing the reasons for the difference of the results obtained in the laboratory and in the country. From numerous well-conducted experiments he concludes that the *Arvicola arvalis* and the *Mus agrarius*, like the white and the grey mouse, are killed in a mean period of fifteen days. But as the bacillus does not produce toxines, or at least since its products are not toxic to mice, death is due to the invasion of the blood and organs by the bacilli; so that the quantity of bacilli ingested is of great importance, both as regards the duration of the disease and its consequences. If the cultures are poor the mice remain healthy. Zupnik has further noticed that in leaving the cages of sick and healthy mice together for several weeks the latter were rarely infected. This explains why a great many of the experiments made in the country were without effect. In the laboratory undiluted cultures are most commonly used; and, moreover the mice are obliged to consume infected food only. On the contrary, in the country, on account of the expense, the cultures are diluted and the mice do not eat up all the food except where there is nothing else for them. Still they may be infected by devouring the corpses of their defunct companions, although these are apt to be quickly seized by birds of prey.

War has been declared in Europe against rats and mice, as a preventive measure against the bubonic plague. The French board of public health has issued a circular to shipowners requiring the screening of all openings by which rats can enter a vessel, and a protecting appliance fitted on each cable tying it up to the dock. Rats on board must be trapped or poisoned with the preparation sold for the purpose, and carcasses burned. Vessels must be disinfected with sulphurous acid in the haunts of the rats, and elsewhere with mercuric chloride.

United States Consul Heenan writes from Odessa, August 28, 1899:

I saw the other day a curious device attached to the mooring rope or cable of a steamer which was loading at this port. The cable was run through a piece of iron pipe about a foot in length, and welded on the end of the pipe was a flange or funnel which looked like the end of a trumpet, with the wide end facing the ship. The iron pipe was stuffed with oakum, to prevent it from slipping and also to prevent rats from passing through it. This novel construction was quite close to the ship. On inquiring what purpose this device served, I was informed that the Russian authorities furnished these appliances and obliged all ships to use them whenever they came from a port infected with the plague, in order to prevent the rats on the ship from coming on shore. It is generally conceded that the plague has been carried and spread by rats which have left ships coming from infected parts. It is known that rats make use of the cable to come on shore, and this iron pipe with its funnel-shaped arrangement was employed to prevent such visits, if possible. These devices are attached to each cable by which the ship is moored. In addition to this precaution, the master of the ship is obliged to take down his loading stages every night and erect them again the following morning, in order to prevent the rats from coming on shore during the night. I do not know whether this device is known to our sanitary authorities, and I send this description of it in the hope that it may be of service.

And the following has been published on the part played by insects, arachnids, and myriapods in the propagation of infective diseases of man and animals by George H. F. Nuttall, M.D., Ph.D., Demonstrator of Bacteriology in the University of Cambridge:—

The facts which have been established by the brilliant researches of Ross, Grassi, Bignami, and Bastianelli with regard to the role of various species of mosquitos in the

* 'La Destruction de la Peste de Souris au moyen du B. Typhi Murium,' *Cent f. Bakt*, 1894, xvi., p. 104.

† 'Sur la Mode de l'Emploi Pratique des B. des Souris, apropos du B. Typhi Murium de Löffler,' *Cent f. Baket.*, 1897, xxi., p. 446.

propagation of malaria have at last aroused more general attention to the part which insects may play in the propagation of disease, and it is probable that the new impetus given by these investigations will lead to fruitful researches in other directions.

When we look at the work which has been done on insects as carriers of bacterial agents of disease, we are struck by its relatively small amount, whereas an unlimited amount of experimental work has been devoted to the study of the behavior of bacteria under various physical and chemical conditions, in air, water, soil, food, etc. It is certain that insects may under certain conditions play a most important part—both active and passive—in the propagation of bacterial diseases.

The part of insects in the spread of Bacterial Diseases.—1. Passive. Insects may play a passive part as carriers of pathogenic organisms. *Musca domestica* and allied species are chiefly to blame in this respect. Such flies are incapable of 'biting,' but may, from the nature of the food which they seek, carry pathogenetic bacteria about on their bodies or within their alimentary tract, and deposit them on lesions of the mucous mem. branes or skin, or on food.

Anthrax.—Raimbert (1869) and Davaine (1870), and many others since have attributed such a part to flies in the propagation of anthrax. Celli (1888) reported experiments which showed that virulent anthrax bacilli were contained in the faeces of flies which had been fed with material containing these organisms. Proust (1894), as also Heim (1894), showed that certain beetles and their larvæ which are found on dry skins might serve to scatter the spores of anthrax. They found anthrax spores on the skins which were derived from animals dead of anthrax, as also in and on the insects named. The faeces of these insects, light and powdery, are scattered by the slightest current of air.

Plague.—The presence of numerous flies during plague epidemics has been recorded in some of the older chronicles. Yersin (1894), working in Hong Kong, noticed many dead flies lying about his laboratory where animals which had died of plague were examined. He inoculated an animal with the contents of one fly, and noted that it died of plague. The fly was seen to contain bacilli morphologically identical with those of plague. He came to the conclusion that flies might serve as carriers of the germs, and play a role in the propagation of the disease. He, however, went too far when he concluded from the examination of this one dead fly that all the others had died of plague, as the insects might very well have died from coming in contact with disinfectant solutions. In 1897 a number of experiments with flies were made which were fed with the organs of animals dead of plague. It was found that such flies contained virulent plague bacilli in their faeces for forty-eight hours and longer after they had received plague organs and then sterile food to eat. In one experiment flies were kept at a temperature of 12° to 14° C., and it was found that they were all alive at the end of eight days. In two other experiments, at 14° C., all the flies fed on plague organs were dead by the seventh or eighth day. At temperatures of 23 to 28° C. the flies infected nearly all died within three days. Though it is evident that flies die off more rapidly at high temperatures, these experiments showed that they might live a considerable time whilst carrying plague bacilli in a virulent state. The practical conclusions to which these experiments lead are too self-evident to be mentioned here. About the same time Hankin (1897), in India, found that the fæces of certain ants *(Monomorium vastator)* contained virulent bacilli after they had been fed on rats dead of plague. He expressed the belief that such ants might serve to spread the plague by gaining access to the bath-rooms in search of water and defæcating there.

Cholera.—Nicholas (1873) relates observations which he made in 1849 at Malta on the warship *Superb* which led him even at that time to conclude that flies might play a very important *rôle* in the propagation of cholera. Maddox (1885) observed the cholera spirilla microscopically in the dejections of flies *(Masca vomitoria)* which he had fed with cultures of that organism. Tizzoni and Cattani (1886) isolated cholera germs from three flies caught in the cholera wards at Bologna. Sawtschenko (1892) fed flies with cultures, and found spirilla in the fæces after two hours. Simonds (1892) found spirilla

in a fly caught in the *post-mortem* room at Hamburg. He made a few experiments with flies which had been in contact with cholera intestines. After they had been removed the flies were rolled in gelatine tubes after intervals of four minutes to one hour and a half had elapsed. All cultures showed colonies of cholera germs. Macrae (1894), working in conjunction with Haffkine and Simpson in India, observed how flies carried cholera germs to sterilized milk, which was purposedly exposed in various places in the prison where cholera prevailed. Flies were very numerous in the prison. Buchanan (1897) describes the occurrence of cholera in a prison at Burdwan at a time when flies were numerous. There had been no cholera in the prison until after a strong wind had blown over numerous flies from the direction of some huts outside where cholera prevailed. Only those prisoners who received their food at the corner of the prison nearest to the huts developed cholera. The evidence here presented seems convincing enough.

Typhoid Fever.—Celli (1888) reported experiments by Alessi in which that observer had isolated virulent typhoid bacilli from the excreta of flies which had been fed with cultures of that organism. Further evidence is wanting, but it seems almost certain that flies may infect themselves by feeding on typhoid excreta, and then transport the germs of the disease to food which is left exposed.

Other Diseases.—Similarly flies may act as passive carriers of infective agents in framboesia, transferring the specific agent from diseased to healthy persons, and depositing them on cutaneous lesions. An important part has long been attributed to flies in Egyptian ophthalmia, and it seems certian that *Hippelates pusio* disseminates the disease germs, producing 'Florida sore eye' (Schwartz, 1895). Dewèvre (1892) reports experiments which show that pediculi may serve as carriers and propagators of impetigo.

2. *Active.*—An active part may be played by blood-sucking flies in the propagation of bacterial diseases. Experimental evidence is wanting, though clinical writers report a certain number of cases of anthrax, septicæmia, pyæmia and erisypelas as arising from the bites of flies. In the case of anthrax, subjective sensations very frequently lead patients to declare that they have been bitten by an insect, whereas this is not the case. In many cases infection may result from an infected fly being crushed by the person bitten. An active part has recently been attributed by clinical writers to blood-sucking insects in plague. Bugs and fleas were supposed to be the active agents here. Experiments made by the writer on animals with plague, anthrax, mouse scepticæmia and chicken cholera all gave negative results. In a large number of experiments, made by allowing these insects to bite animals dying of the diseases named, and then immediately afterwards transferring them to healthy animals, not a single case of infection occurred. Though the dejecta of bugs contained virulent bacilli after twenty-four hours, they did not do so later. In fact, it was shown that both fleas and bugs digest various pathogenic bacteria, which they have taken up with the blood of diseased animals. Simond (1898) goes so far in his elaborate theorizing as to conclude that plague bacilli may acquire a heightened virulence in the bodies of such insects. He attributes a very important share to these insects in the propagation of plague, but gives no evidence to prove his assertions. The entirely negative results of my experiments should weigh more than gratuitous assumptions. That a bug or flea filled with the blood of a patient containing plague bacilli may serve as a passive carrier of the germs may be safely concluded from my experiments with these and other germs which were seen to remain alive and virulent in the bodies of these insects for twenty-four hours or longer when they were kept at low temperatures. If such an insect were crushed and the skin scratched by nails soiled with the blood it contained, infection might readily occur. In warm weather the insects are physiologically more active, and consequently digest the micro-organisms more rapidly. It has been asserted that such insects, as well as biting flies are capable of propagating recurrent fever, the 'bouton de Biskra,' framboesia, leprosy, tuberculosis and yellow fever, &c., but decidedly more evidence is wanting before we can come to any definite conclusions in this respect. In the case of the three last-named diseases, the evidence given may well be termed frivolous.

The part of Insects, Arachnids and Myriapods in the spread of disease due to Animal Parasites.—1. Insects, &c., whilst serving as Intermediary Hosts, may play: (*a*) A passive part, when they are devoured by a host of the parasite they contain,

(*b*) An active part, when, as in the case of the tick in Texas fever, and various mosquitoes in malarious affections of man and animals, they inoculate the parasite into a host by means of their probosces.

(*c*) An intermediary position must be given to mosquitos in connection with *Filaria Bancrofti* and *Filaria recondita*, as they infect themselves by sucking the blood of the definitive host.

2. Insects, &c., without serving as Intermediary Hosts, may play an Active or Passive Part.—(*a*) A passive part when they transport the eggs of animal parasites and deposit them in food, &c. Grassi (1883) made experiments on flies showing that they might transport the eggs of *Tœnia solium*, *Trichocephalus*, &c.; and Stiles (1889-1890) informed me that he saw the eggs of *Ascaris lumbricoides* undergo developmental changes in flies raised from maggots which had been fed with the eggs of the parasites during warm weather. Provided that flies take up the eggs in a sufficiently developed condition, they might readily disseminate the parasite by dropping their excreta on food, or falling bodily into it.

(*b*) An active part by carrying the diseased agent from one animal to another and inoculating the parasite. Tsetse-fly disease (Bruce).

In the table will be found a brief summary of our present knowledge of the part played by insects, myriapods, and ticks in the spread of diseases due to various animal parasites.

The analysis of the British Medical Journal of the evidence given before the Plague Commission on curative and prophelactic inoculations is as follows :—

Curative Serums.—The first serum that was tried as a cure for plague was that of Yersin. The witnesses who tried it all agreed that it was ineffective. Dr. Galliotti gave evidence with regard to a serum which had been prepared by Professor Lustig in Florence. The results had not been very satisfactory, but he hoped for better when he was able to prepare it in Bombay, as it was sometimes partly spoilt on the voyage to India. Another witness stated that this serum was tried in Bombay in six or seven cases with very satisfactory results in 1897. An injection of the serum reduced the temperature three or four degrees. During 1898, 257 cases were treated with the serum, of which 145 died and 112 recovered, showing a mortality of 56 per cent. This percentage would have been considerably reduced if thirty moribund cases had been eliminated. The percentage was higher in 1898 than in the previous year, but this was due to an increase in the severity of the type of the disease every succeeding year. A serum prepared by Professor Roux at the Pasteur Institute at Paris had also been tried at Karachi in forty-seven cases, twenty-five of which recovered after doses of 40 c.cm., given at intervals of from twelve to twenty-four hours. Before the trial of the serum treatment the mortality in the hospital where it was tested was 70·14, and during the period of the trial 74·6 per cent of the untreated cases died, while the mortality among the treated was 46·8 per cent. The value of these figures is, however, somewhat discounted by the fact that although mild cases are said not to have been treated, yet it is also stated that in no cases under three days old was the serum used. The results were also uniformly unfavourable in pneumonic cases, which are also the most fatal. No harm ever followed the use of the serum. Professor Mayr, of the Austrian Mission, said that in two instances in which the blood of the patients showed a considerable number of plague microbes on microscopic examination, three injections of Lustig's serum were made, with the result that all alarming symptoms disappeared, and the patients recovered in a very short time.

It appears then that while the serum treatment has not furnished brilliant results, yet slightly favourable reports on the use of the serum have been recorded, and encourage the hope that the practical difficulties in their preparation may yet be overcome and their curative powers considerably increased before very long.

Haffkine's Prophylactic Inoculations.—A very large amount of evidence has been given on this subject, and, with one notable exception, the whole tendency of it has been in favour of the method. It will be convenient to deal with the objection that has been taken to it first—namely, that the medium which is inoculated is a putrescent organic

liquid. This is at variance with the evidence of a host of witnesses, who stated that they had never seen the slightest harm follow its use in large numbers of cases. The explanation of these divergent statements has been furnished by those who are responsible for the manufacture of the fluid, who state that an examination of a series of bottles stored in the laboratory where it is made, some of which dated as far back as May, 1897, has shown that a small number of them had become contaminated owing to the bottles being imperfectly sealed, but that all the fluid was efficiently sterilized in the process of manufacture. Moreover, such contamination in the rare cases in which it has occurred can easily be detected by the smell on opening the bottles, while the organisms that have been cultivated from such bottles were all non-pathogenic. The harmlessness of the fluid is thus explained, and the evidence as to its efficiency can now be examined.

The principle of Professor Haffkine's inoculation is similar to that of his prophylactic against cholera. The fluid consists of a culture of the plague organisms that have been sterilized. In its first trial in Bombay 8,142 persons were injected, and out of these eighteen subsequently developed plague, but only two of them died ; both showed symptoms within twenty-four hours, that is before there had been time for any protection to be afforded. Professor Haffkine also gave the results of his method in various places in the Bombay Presidency, which showed that those who were inoculated enjoyed, with very few exceptions, immunity from plague, which was at the same time causing great mortality among the uninoculated. The Surgeon-General had witnessed some of these trials, and after a careful inquiry had given evidence to the effect that as far as he could see the case for inoculation was absolutely clear, for although it was not absolutely preventive, yet it was so to a considerable degree. The best instance in which it has been carried out on a very large scale in a limited community is perhaps that of Hubli, and from a report that has just been issued it appears that a protection of 85 per cent on the whole epidemic, and of 90 per cent and over for the greater part of the time was obtained. More than 20,000 persons were inoculated in this town, and 10,000 of them were operated on a second time, the double giving a 10 per cent advantage over the single inoculation. Eventually 95 per cent of the entire population were inoculated, and at the time the report was written the epidemic had practically died out. There could be no question as to the causal relation between this fact and the inoculation measures. The people of all classes after a time recognized the benefits of the process and flocked to be inoculated. Again, in Dharwar, 4,926 inoculations with a single dose gave 45 cases and 15 deaths, while 3'387 double inoculation gave only 2 cases and 1 death. It is also worthy of note that in these instances not the least difficulty was raised with regard to Pardanasian women. Another Bombay witness stated that he had inoculated a large number of people, and in only three cases had the disease subsequently attacked them, and all recovered. Numerous cases have also been reported in which the inoculated members of families escaped while the uninoculated contracted the disease. In Bangalore plague occurred in 38 inoculated persons, but only 10 of them died, although the general mortality in the hospitals was 55 per cent. In the Punjab very favourable results have been reported. In the Hoshiapur district, 1,407 persons were inoculated, and no deaths occurred among them, whilst several occurred among the uninoculated in the same villages. A very good test was furnished by the inoculation of seven-eighths of the coolies who were engaged in cleaning out the houses of the infected, and were consequently exposed to considerable danger of infection. Among the small number who were uninoculated, there were many cases of plague, but no single case occurred among the number, seven times as large, who had been inoculated before commencing the work. In Karachi one witness stated that there had been 6,000 inoculations without any bad effects, while another said there had been only one case of the disease among 900 inoculated within his knowledge, but most of them belonged to the upper classes, among whom the danger of infection was slight. In another town 1,018 people had been inoculated, and, although some cases subsequently appeared among them, the mortality of those attacked was only 35 per cent against a 70 per cent among the uninoculated. In a village in the Baroda State, 513 were inoculated with 3 deaths, whilst among 437 uninoculated, 26 deaths occurred.

The symptoms which follow a dose of 3 cubic centimetres of the fluid are fever, usually running up to about 102° F., but occasionally rising two or three degrees higher, some pain at the seat of inoculation, and usually some enlargement of the nearest lymphatic glands. All the symptoms pass off in two or three days, but reinoculation is recommended after about four months, in order to secure lasting results. The protective action does not commence until forty-eight hours after the inoculation, so it is of no avail if the disease manifests itself within that time, which has been the case with a large number of the instances in which plague has followed the infection, the patients having already contracted the infection before the inoculation was performed. In order to get a lasting protection, a sufficiently large dose must be used to ensure a good reaction with fever following, and latterly somewhat larger doses have been used than at first were deemed advisable, and better results have occurred.

The evidence on this head may then be summed up as proving that a considerable immunity is produced by efficient doses of this material, and that this is enhanced by its repetition. The cases which have occurred after inoculation are milder, and attended with a considerably lower mortality than among the uninoculated. It is, therefore, a most valuable accessory to other plague measures, and especially so in protecting those who are exposed to infection, while carrying out measures for the suppression of the epidemic. Although in small communities it may be effective in controlling an outbreak if nearly the whole community will submit to the operation, yet this will only very exceptionally be the case, and it should therefore be subordinated to other methods, such as evacuation and disinfection.

Serum treatment of plague.—Frank G. Clemow remarks on the treatment of plague patients in Bombay, with the Yersin-Lustig serums. The mortality with the former was 80 per cent, and it seems to make but little difference at what stage of the disease it was used. He concludes that however effective other serums may be, this one is not the specific for the disease. The doses given were increased to 60 c. c. (15 z) per day, and he believes that the serum is absolutely ineffective. While he had fifty persons under treatment with the Yersin serum, only thirteen were treated with the Lustig preparation. The number, therefore, is rather small to form an opinion on, but the results were very similar to those treated with the other material.

Professor Roux's Serum.—Dr. V. E. Nazareth, medical officer in charge of the Seth Vishindass Hospital reports on the results of the experiments with Professor Roux's serum in the treatment of plague patients at the Karachi Plague Hospital. The experiments were somewhat limited in their nature owing to the small quantity of serum obtainable, the supply being only sufficient for the treatment of eight patients per week. The conclusions necessarily are far from decisive, though, according to Dr. Nazareth, the treatment is encouraging, and worthy of further trial.

From May 9 to June 6 (the period during which the serum and ordinary treatment were tried) 122 cases were treated in the hospital, and the death rate was 63·9 per cent; 47 of the 122 were treated solely by injections of serum, and 25 recovered, giving a mortality percentage of 46·8.

The serum appears to be able to bear the ordinary temperature of tropical countries, and has no antiseptic substance added to it. There is no violent reaction after its injection, and under its influence, in favourable cases, the fever abates in a few hours, and in most cases the inflammation and pain of the glands subside with rapidity. The amount of serum used by Dr. Simonds, director of the Pasteur Institute of Saigon, who carried on the experiments, was, for an adult, 40 c. cm. for the first injection, 40 c. cm. for the second, which would be made 12 or 24 hours after the first; and a similar dose for the third injection. If, after the third injection, no appreciable improvement took place the treatment was abandoned. Failures occurred, particularly in cases of plague pneumonia, where the curative effect of the serum is stated to be almost nil.

No attempt appears to have been made to treat the cases as they were brought into hospital, irrespective of the length of time of the infection. On the contrary, only recently infected cases were treated. This fact, together with the comparatively few cases subjected to the serum treatment, materially detracts from the value of the experi-

ment. In fairness it must, however, be noted that some remarkably severe cases are quoted in which the serum treatment was rapidly followed by most excellent results.

W. Symmers, of Cairo, gives a record of experiments made to determine the therapeutic efficacy of plague serum (*Centrab. f. Bakt.*, April 15, 1899), carried out at the Serum Institute at Abbasieh, in Egypt, without any definite satisfactory results.

Present position of Serum Therapy.—The present position of serum therapy may be briefly summarized as follows: There is no satisfactory evidence that in either leprosy or tuberculosis anything very definite has been accomplished by the use of serum. In rabies, tetanus, and diphtheria in the human being, and in rinderpest and anthrax in animals, it has proved very efficient. It was also probable that such treatment is capable of conferring immunity from snake venom. There is strong evidence of the practical value of protective inoculations against cholera and the plague. The serum treatment of typhoid fever and pneumonia is yet purely in an experimental stage. In diphtheria alone has serum therapy proved a complete success.

In response to my request to the Pasteur Institute of Paris for information as to the possible acquisition of some of their serum for the equipment of our quarantines, I have been informed from the Institute that they cannot issue their serum to uncontaminated countries.

I am now corresponding to obtain information with regard to a possible supply of Haffkine's prophylactic fluid. That its value is being recognized outside of India may be gathered from the fact that many applications are stated to have been made for supplies of it. Amongst these may be mentioned applications from the Governments of the Mauritius, Natal, Italy and Russia; from the Crown Agents for the Gold Coast, the Consul General of Zanzibar, the Governor of Nicosia, Cyprus, and from the Chamber of Mines, Johannesburg.

Asiatic cholera.—This disease has been present throughout the year in its usual homes, as in India and China. There have also been limited outbreaks of it in Japan, the Straits Settlements and Turkey. It has not this year invaded Europe, nor has it reached our Pacific Coast.

Yellow fever.—This disease invaded the United States on several occasions during the year. Outbreaks occurred in the Soldiers' Home at Hampton, Va., at Port Tampa and Key West, Fla., as well as in the States of Louisiana and Mississippi. The U. S. Army transport *McClellan* brought yellow fever to the New York Quarantine, where Dr. Doty tried his yellow fever serum on one of the patients with apparent complete success. Yellow fever vessels arrived also at Chatham, N.B., and at Victoria, B.C.

Smallpox.—This disease has been widespread throughout the year. It has come to two of our quarantines, Halifax and Grosse Isle, in both cases coming from Russia, by way of Batoum on the Black Sea.

It has been widely prevalent in the United States. The type, however, has been an unusually mild one.

Vaccinating a Nation.—Groff gives an account of the vaccinating of the natives of Porto Rico, and the stamping out of smallpox, which was there endemic. The total cost of the work was $33,000, and at the present date not a single case of smallpox is known to the military or civil authorities of the island.

Scarlet Fever.—(*The Micro-organism of Scarlet Fever*)—William J. Class (*Chicago Medical Record*, May, 1899, p. 373), referring to the unsatisfactory results of the investigations of Klein, of Crajkowski, and of other careful observers in isolating a specific microorganism of scarlatina, concluded that the fault lay with the culture media employed. After various failures he has succeeded in finding a medium on which he has been able almost invariably to obtain, both from the scales and from the throats of scarlatina patients, the growth of an organism which presents such characteristic features, both in its morphology as well as in its growth, that he believes it to be the specific germ of scarlet fever.

It is a diplococcus resembling, as ordinarily seen on slides made from fresh cultures, a very large gonococcus. This biscuit-shaped appearance is best seen in specimens that have been but slightly stained. In these is also noted a transverse line running through each half of the organism, giving it the appearance of a tetrad. The size varies. It is

always considerably larger than the ordinary pus microbe. Lancet-shaped forms, as occur in the pneumococcus, are never met; but streptococcus forms are occasionally, though rarely observed, as are also single cocci. They have no capsule and show no spores. Specimens from pure cultures are satisfactorily stained by watery solutions of methylene-blue, by carbol-fuchsin, Bismarck brown, and Pitfield's flagellæ stain. They are decolourized by Gram's method, though not to the same extent as the gonococcus, the larger variety holding the stain somewhat better than the smaller.

The culture medium consists of glycerin-agar, to which is added about 5 per cent by weight of black garden earth, previously sterilized by discontinuous heating. On this medium the scales of a scarlet fever patient are placed with a sterile platinum loop, and the tubes put in an incubator, the temperature of which is kept about 35° C. Within forty-eight hours to one week, small, whitish-gray semi-transparent colonies appear along the track of inoculation and around the scale. On agar-agar, glycerin-agar, and gelatin there is no growth, and bouillon is not clouded. Milk does not appear to be affected, but the organism apparently multiplies in it. On potatoes there is no growth.

Rabbits and guinea-pigs were not effected by subcutaneous injection of pure cultures, by scarification and in inoculation of the wounds produced, and by intra-abdominal injection.

The germ described has been cultivated from the scales of about thirty cases of typical scarlatina, and has also been found in the throats of these patients and in cases of angina occurring in persons exposed to scarlet fever in whom no eruption appeared, and last in the throats of children in a family where one member had typical scarlatina, the children being in normal condition when the culture was made, but subsequently developing a typical rash, in the scales of which the same organism was found.—*Amer. Journal of Med. Science*, July, 1899.

Dysentery in Japan.—This malady is peculiarly prevalent in Japan. In fact of all the infectious diseases dysentery claims the largest number of victims as well as providing the longest death roll. In the *Jimmin* are some impressive statistics bearing out this truth. During the five years ended in 1897 the total number of persons attacked by eight infectious diseases in Japan was 938,216, and out of that aggregate no less than 552,109, or fifty-eight per cent, were dysentery patients. Further, the deaths from these eight diseases numbered 269,086, and of these 137,880, or fifty one per cent, resulted from dysentery, so that every year 110,420 are attacked by and 27,578 succumb to dysentery. Tokio is the most unfortunate city in Japan as regards this malady. In the five-year period referred to above, the total number of persons who suffered from the eight diseases are 17,107. Of these 6,921 were attacked by dysentery. The total number of deaths was 5,298, the deaths due to dysentery being 2,148. Thus dysentery was the cause of illness in forty per cent. of the cases, as well as the cause of the deaths in the same percentage.

The Serum Treatment of Leprosy.—The treatment of leprosy by means of serum obtained from the horse, after injecting serum from the blood of a leper under the animal's skin, which Carrasquilla of Bogotà claimed to have given such brilliant results in his hands, has proved disappointing. Subsequent independent investigation has shown that in those cases in which improvement had taken place it was fleeting in character.

Beri-Beri.—An observer of this disease, writes from Tokio, Japan:

'I saw here at Tokio, in the Imperial Hospital, my first cases of that Asiatic disease beri-beri. Those I saw were nearly all the result of typhoid fever. A weak circulation, a rapid pulse, and a condition of partial paraplegia were symptoms that existed in all these. The disease is extremely prevalent in Japan, Dr. Baelz having the records of a thousand cases he has treated. He believes there are 50,000 annually in the entire empire. Those who have had a large experience in the management of the affection do not agree as to its cause. The chief of the Japanese medical marine service, Dr. Takali, thinks that it is caused by a deficiency of albumen in the diet of the great masses of the people, and hence his chief element in its treaument is to supply this deficiency by giving the patient freely of egg and the like. Dr. Baelz, however, does not hold to this theory as a causative factor in the production of the disease, but

believes that altitude plays an important rôle in its production, and hence sends his patients, when possible, to the mountains, giving them at the same time digitalis, strychnin, etc. Statistics show that from twenty-five to fifty in every thousand of those attacked succumbed.

Cases of this disease have presented themselves during the year at the quarantines of St. John, N.B., Chatham, N.B., and Victoria, B.C.

Tuberculosis.—The following practical points in the prevention of tuberculosis as a widespread and destructive disease were inculcated by various speakers of the International Congress held at Berlin in May last.

(*a.*) The primary importance of free ventilation and wholesome and abundant food. Improvement in the dwellings and the food of the poorer classes in this country, and their increasing cleanliness and sobriety, have not only diminished sickness generally, but directly reduced the number of deaths from consumption until the mortality from this cause is less in London than in any other large city. (It is, however, important to notice that the death rate of young children from disease of the bowels has little, if at all, diminished. See Sir Richard Thorne's Harben Lectures.)

(*b.*) The prevention of infection of the lungs by the bacillus of tubercle depends chiefly on rational treatment of the sputa of consumptive patients, or rather, for practical purposes, of the sputa of all those affected with cough and expectoration. The phlegm should never be deposited on the ground or on a handkerchief, where it can dry up; it should be kept moist until it can be destroyed by heat, and the vessel used to receive it should contain phenol or some other antiseptic solution.

(*c.*) The prevention of infection by tuberculous milk may be accomplished either by boiling all milk given as food to children, or by inspection of dairies, so as to prevent tuberculous milch-cows being used.

(*d.*) The prevention of infection by meat can be secured by careful and thorough inspection of carcases, or by diagnostic testing of cattle with tuberculin. This, the only undoubtedly useful application of the so-called tuberculin, has the drawback that after the effect of the inoculation has passed off, a tuberculous animal becomes immune to it for a time, and so may be passed as healthy. (It is said that cattle suspected of tubercle are thus rendered immune to the tubercular test before being sent over the French frontier.)

Finsen's Phototherapy.—Much interest has been excited at the Paris Tuberculosis Congress and since then throughout the medical world by the reports of the results obtained by Dr. Finsen, of Copenhagen, in lupus and some other affections by means of concentrated light. The name of Finsen is known from his red-light treatment of the exanthemata of the different eruptive diseases, especially small-pox (for instance, *British Medical Journal*, December 7, 1895). More recently Dr. Finsen has devised another method, applying light for therapeutic purposes; the technique of this method is now so far perfected, and it has been tried in so many cases, that it deserves to be more extensively known.

Dr. Finsen's treatment of small-pox was, as is well known, founded on the following considerations:

As the 'chemical' (blue, violet and ultraviolet) rays of light are capable of causing an inflammation (erythema solare) of the healthy skin, it might be assumed that they would equally be capable of aggravating pre-existing inflammations. In other words, if the diseased skin be protected against the injurious action of the chemical rays of light, it will be possible to diminish the intensity of the inflammation, and thus prevent suppuration. The object is therefore to exclude the chemical rays of light which are injurious to the skin. In the new way of treatment devised by Finsen these rays are now used as curative agents. The method consists in treating local superficial bacterial skin diseases by the concentrated chemical rays of light.

The experimentally proved data on which the method is founded are the following:

1. The bactericidal property of the chemical rays of light.

2. The power of the chemical rays of light to produce an inflammation of the skin (erythema solare).

3. The power of the chemical rays of light to penetrate the skin.

Collective Reports on Glycerinized Vaccine Lymph.—The above is the title of an article by Dr. Albert C. Barnes, of Philadelphia, in the *Sanitarian* for November 1899. The doctor sent circular letters of inquiry to a large number of physicians in order to ascertain the following facts :—

1. The actual value of glycerinized lymph as a preventive of small-pox, and its relative value as compared with points, quills and crusts.

2. The proportion of successful 'takes' in both primary and secondary vaccinations; and

3. The relative frequency of complications, such as inflammation, celluletis, lymphangitis, &c. In Baltimore over 100,000 tubes of glycerinized lymph were used. No case of small-pox followed vaccination with the lymph. Conservative estimates place the number of successful 'takes' in primary cases as ninety-five per cent. The number of sore arms did not exceed one per cent.

In Minneapolis in one series of 3,045 vaccinations with this lymph there were twenty-nine failures, all in persons who had been previously vaccinated. In a second series of 3,875 vaccinations, there were four failures in primary and fifty-one failures in secondary cases. All the data from this city show a proportion of ninety-five per cent of success in primary and seventy-five per cent in secondary cases. Reports were also received from Cleveland, Richmond, Norfolk and Portsmouth, Philadelphia, Indianapolis Chicago, Pittsburg, Allegheny, Stoudwood and Lisbon, Iowa; Caribou, Maine, Porto Rico, and other places, all favourable to the use of the glycerinized lymph.

The following conclusions are drawn :—

This investigation proves conclusively that the recommendation of the United States Marine Hospital service that 'glycerinized vaccine only should be employed, (Public Health reports, January 6, 1899), is well substantiated by experience, because—

'1. Properly prepared glycerinized lymph is pure and free from staphylococci, streptococci and other pathogenic organisms which are invariably found (Copeman, Crookshank, Pfeiffer, Reed, U.S.A.) on vaccine points.

'2. Glycerinized vaccine affords absolute protection against small-pox; vaccine points are uncertain in this regard.

'3. Vaccination with the glycerinized products does not cause excessive inflammation of the vaccinated area. Cellulitis and inflammation of the lymph vessels and glands amounting at times to abscess formation, is a not infrequent sequence of the use of vaccine points.

'4. Vaccine points are apt to lead to a false sense of security, inasmuch as they induce a local staphylococcic or streptococcic infection which is entirely distinct from true vaccination. Such a result is not protection against small-pox.

'5. A high estimate of successful takes from vaccine points is by these and numerous other reports shown to be not over sixty per cent in primary cases and a much lower percentage in secondary cases.

'6. Glycerinized vaccine has been officially adopted by the governments and health authorities of the United States, Great Britain, France, Russia and Belgium.'

United States surveillance in Foreign Ports.—'Public Health Reports' issued by the marine hospital service at Washington says :—

Upon the recommendation of the Secretary of the Treasury, with the concurrence of the Secretary of State, the President has directed the detail of P. A. Surg, James A. Nydegger and Asst. Surg. John F. Anderson, of the United States Marine Hospital Service, to serve in the office of the United States consul at Cadiz and United States consul-general at Barcelona, Spain, respectively. These officers will assist the consuls who are now enforcing the quarantine regulations of the Treasury Department to be observed at foreign ports by vessels bound for the United States, Cuba, and Porto Rico, and will sign the bills of health with the consuls. From these two ports these officers will have surveillance over emigration from Spain and Portugal. Practically all the emigration from Portugal, where plague prevails (in Oporto), comes through Spanish ports. These details are the result of a recent inspection by a medical officer of the Marine-Hospital Service.

Dr. A. H. Doty, health officer of the port of New York. who recently went abroad in order to make arrangements for the detention, at the port of sailing, of emigrants from Russia until the period of incubation of small pox had passed, after having visited Hamburg and Bremem and conferred with the steamship agents and port authorities, has gone to Russia in order to secure the co-operation of the frontier officers in that country if possible.

Formaldehyde Disinfection.—The use of this disinfectant has been generally favourably reported upon during the year. The circumstances connected with the disinfection by this means, of a steamship at the St. Lawrence quarantine in June last having been some what unusual, I reported them in a paper read before the August meeting of the Canadian Medical Association at Toronto as follows :—

On the evening of Tuesday, June 6, the SS. *Lake Huron* arrived at the quarantine station of Grosse Isle, in the River St. Lawrence, below Quebec. She was twenty-five days out from Batoum on the Black Sea, with 2,300 Doukhobor immigrants on board, and a crew of sixty-nine, including the pilot.

Smallpox being found on board, the vessel was ordered into quarantine. Seventeen cases of this disease, eleven of the Doukhobors and six of the crew, were removed to the hospital between the time of the arrival of the vessel and the completion of the landing of the persons and effects she had brought. All the 2,300 passengers were landed by the Friday evening, the 9th. The heavy luggage from the hold was landed on the Saturday and Sunday. The vessel was disinfected on the Monday and Tuesday, the 12th and 13th, and she was offered to her agents for release, with a new crew, on Wednesday, the 14th, at 4 a.m.

The usual methods employed in the Canadian Quarantine Service for the disinfection of vessels are as follows :—

Steam for all hospital cabins and other small apartments where it can be used; formaldehyde for saloons, staterooms and small apartments where the permanent fittings would be destroyod by steam ; sulphur dioxide gas, under pressure from the blast furnace, for holds and steerages ; and mercuric chloride solution for all free surfaces, alleyways, latrines, bilges, &c.

On this occasion the sulphur dioxide blast appliance of the station was not available. Steam is not suitable for large apartments as the temperature cannot be kept up, and the steam is therefore precipitated as simple hot water. Accordingly, formaldehyde was used for the holds and steerages on this occasion.

The cubic space involved was as follows :—

	Cubic feet.
Main deck, three compartments open longitudinally.....	34,453
	13,441
	26,977
	74,871
Freehold, three compartments perpendicularly open by hatchways.	17,534
	13,461
	18,117
	49,112
No. 2 hold, three compartments perpendicularly open by hatchways.	17,680
	15,727
	22,975
	56,382

	Cubic feet.
No. 3 hold, three compartments perpendicularly open by hatchways.	4,657
	4,264
	5,920
	14,841
No. 4 hold, two compartments perpendicularly open by hatchways.	13,446
	19,530
	32,976
After hold, two compartments perpendicularly open by hatchways.	13,734
	13,520
	26,254

Total measurement, 254,436 cubic feet.

The formaldehyde was liberated from formalin, the forty per cent aqueous solution of the gas. Twelve ounces of the solution were allowed for each 1,000 feet of space. The time of exposure was eight hours. Two instruments were employed in the work.

Although, as stated, the disinfection of the vessel was completed on the morning of Wednesday, June 14, owing to heavy weather it was not until Friday, the 16th, that the new crew could be sent down to receive and take away the vessel. During this interval an 'anchor watch' was kept on the vessel's deck, and in her engine room, the officers and crew continuing to live on shore. When the small steamboat bringing the new crew came in sight, the last of the old crew were brought ashore, and the *Lake Huron* was left riding at anchor in the offing without anyone on board. The new crew that then boarded and took her away were from a sister ship, the *Lake Superior*, then at Quebec. After taking the *Lake Huron* up to that port they had to leave her within a day or two to rejoin their own vessel. They were at once replaced on the *Lake Huron* by another, a third crew.

Thus two new sets of men boarded, occupied, lived and slept in this vessel within from two to four days following her disinfection, after there had just been removed from her seventeen cases of smallpox, scattered among nearly 2,400 people packed on board, and having occurred both in the steerages and in the fo'castles.

This constituted, of course, a much more severe test of this method of disinfection than the re-embarking of the original crew would have done.

I am happy to be able to state that there has not been reported any subsequent case of the disease in connection with any of these persons, or traceable in any way to this vessel, during the two months and a half that have now elapsed since these events occurred.

I am aware that this disinfectant, formaldehyde, has been employed for the purification of vessels; notably some of the United States transports after recent service at Cuba. But I have not seen any instance recorded of its use on so large a scale in the face of actual infection with smallpox. Nor do I know of its results being put to so crucial a test as upon this occasion.

In my opinion the use of sulphur dioxide driven in from the sulphur furnace under the strong pressure of the exhaust fan must remain our chief reliance for large apartments, such as holds and steerages. But this instance of the successful employment of formaldehyde as an alternative is not without its value. I do not forget how careful we have to be not to hastily draw conclusions from any one case or occurrence, still it is only by the noting of single cases that cumulative evidence can be obtained, and I have, therefore, thought this test of formaldehyde disinfection on a somewhat extensive scale to be of sufficient interest for me to bring it before this Association.

Official Inspections, &c.—On the first day of November, 1898, I proceeded, by your instructions, to Halifax. I there took over the quarantine station from the out-going officer, performed the duties of inspecting officer for some days, and then installed the new incumbent in the office. I left there on November 11.

On January 3, 1899, I returned to Halifax to meet and deal with, by your desire, the unusual immigration of Doukhobors then expected. I remained there until February 17. The last three weeks of this period were passed at Lawlor's Island in quarantine for small-pox.

On April 22 you directed me to go down and reopen the Grosse Isle Quarantine Station, to hold it until my successor in office there should be sent to me, to then install him and instruct him in the duties, and finally to await the arrival at, and discharge from, quarantine of two further shiploads of Doukhobor immigrants. Here, as at Halifax last winter, the second vessel had to be quarantined for small-pox. I left the St. Lawrence, therefore, only on July 3.

From August 29 to September 3 I attended, as your delegate, the meeting of the Canadian Medical Association at Toronto.

From September 30 to October 22 I inspected the Tracadie Leper Asylum, and the quarantines of Chatham, N.B., Halifax, N.S., Sydney, C.B., St. John, N.B., Charlottetown, P.E.I., and Grosse Isle, Que.

On October 28 I left for Minneapolis, Minn., to attend, as your delegate, the annual meeting of the American Public Health Association.

QUARANTINE STATIONS, ETC.

St. Lawrence Quarantine Service.—Four hundred and ninety-nine vessels were inspected in the St. Lawrence during the quarantine year. Of these 462 were inspected at the Grosse Isle Station and thirty-seven at the sub-station of Rimouski. Although the number of vessels arriving by the St. Lawrence is thus less than last year, the actual tonnage shows an increase, and 6,000 more passengers arrived than in the previous year.

Grosse Isle.—Vessels inspected, 462. Diseases reported as found on arrival, small-pox, chickenpox, scarlet fever, measles and enteric fever. Admissions to hospital, sixty-seven. Deaths, six. Births, two.

The want of a deep water wharf continued to be greatly felt, both for a shelter for the inspecting steamer, and to facilitate the prompt handling of infected vessels. For example, one vessel which arrived on a Tuesday evening requiring the landing of her passengers for quarantine, had, for want of such a wharf, to be anchored in the stream. It took until the Friday evening to land the passengers. All Saturday and Sunday were required to land the baggage with a lighter. It was not until the Monday, therefor, that the disinfection of this vessel could be begun. With a deep-water wharf such a vessel could have moored to it on arrival on the Tuesday evening and the passengers and luggage been landed early the following day, thus saving at least four days to the vessel.

Since the termination of the contract with the steamer *Beaver* in the autumn of 1897, the Grosse Isle Quarantine Service has not had the use of its Sulphur Dioxide Blast disinfecting appliance. Prior to that time it had been carried on the various supply and disinfecting steamers *Hygiea, Druid, Miramichi* or *Beaver*. Since that time it has been stored, unused, at Quebec. It is an essential part of the equipment of a complete quarantine station. This has been accepted by the Government of Canada, and the four principal stations, Victoria, Halifax, St. John and the St. Lawrence, have been provided therewith.

This appliance and the vessel may be brought together either by its installation on a deep-water wharf to which the vessel may be brought, as at Victoria and Halifax, or by its being installed on a disinfecting steamer, and so taken out to the vessel, as at St. John, and as formerly at Grosse Isle. Of the two methods, that of its being again installed on a disinfecting steamer seems to me the better one for Grosse Isle as, owing to the distance from Quebec to the station, there is too much risk of delay to incoming

vessels in sending the inspecting steamer to Quebec for necessary supplies, with convalescents, etc., and the disinfecting steamer carrying the sulphur dioxide appliance would be available for such duties, and also to relieve the inspecting steamer when temporarily disabled from any cause.

I beg leave to especially dwell upon the importance of restoring this appliance to the St. Lawrence service at the opening of next season on account of the over-increasing threatening of Bubonic plague. This disease has established itself in Egypt, in Portugal and in South America. Vessels with it on board have arrived at Plymouth and at San Francisco. One from Brazil is now in quarantine at New York with plague amongst its crew. All the literature on the spread of plague agrees on the important part taken therein by rats. It is stated to have been brought into India and into Portugal by the rats in the grain ships from infected ports. The importance of destroying the rats on an infected vessel and so preventing their landing at our city wharves is therefore paramount. No known appliance can be relied upon to destroy the rats in a vessel except the sulphur-dioxide blast.

I beg leave, therefore, most urgently to recommend its restoration to the St. Lawrence quarantine before the first vessel arrives there next spring.

Rimouski.—Vessels inspected, 37.

Halifax, N.S.—Vessels, 286. Diseases reported or found on arrival, small-pox, measles and scarlet fever.

Your taking over the steamer *Argus* on the 1st of this month as an exclusively quarantine vessel, is a step towards facilitating the working out of the plan of quarantine service at this port, which I had the honour to submit to you in a report dated March 2 last. In that report I had the honour to point out that in my opinion the usage of having the quarantine officer resident at Halifax, with permission to continue in private practice, hospital appointments, professorships, &c., has always seemed to me most unfortunate from the quarantine standpoint.

The telephone then recently acquired provided, in a new and complete manner, for the reporting to Lawlor's Island of incoming vessels when first signalled below. The acquisition of your undivided control of the *Argus* now renders inspection by her off McNab's Island and from Lawlor's Island, entirely practicable. I therefore take the liberty of repeating the recommendation made in that report, that a residence be provided for a quarantine officer and for the crew at the Lawlor's Island quarantine station; that the inspecting vessel be kept there (where now, moreover, your permanent engineer could then care for the disinfecting appliances at the station), and that you direct that all vessels for that port be inspected from Lawlor's Island, as above, before going up to the city.

Meanwhile, I would recommend that your inspecting officers at Halifax be instructed to meet as far as possible vessels down the harbour with the *Argus* rather than to inspect them after their arrival at the crowded wharfs of that populous city.

With regard to water supply for the Lawlor's Island Station, further investigation gives no encouragement for the proposed artesian boring from any experiences in that district. I would now, therefore beg leave to confirm the recommendations submitted in my letter from there, dated October 9, viz., the erection of a 25,000 gallon tank on the highest part of the station; sea water to be pumped to it by a steam pump at the wharf, and piped to the various buildings for all baths and closets. A pipe from the cistern well to the hospital would probably give all the fresh water required for that building, the only one for which it is likely to be needed for many consecutive days; and for drinking and washing in other buildings, the surface wells to be depended upon, supplemented when necessary by a waterboat from the city. It took the 2,100 Doukhobors six days to exhaust the supply last winter, and it may be long before there are so many persons there at one time. This modified plan for the water supply should cost less than the appropriation now available for this purpose.

St. John, N. B.—Vessels inspected, 143. Diseases reported or found on arrival, enteric fever, measles, diphtheria, and beri-beri.

When the water supply and works are completed, which you have already approved, this station, Partridge Island, will be well fitted to meet all present probable requirements.

North Sydney, C. B.—Vessels inspected, 79. Disease reported or found on arrival, diphtheria.

In view of the requirements of this port, and of the expected large increase in its shipping from the very extensive new works about to be opened there, I would respectfully recommend the removal to, and establishment at, the Point Edward quarantine in Sydney harbour of the small steam disinfecting appliance now in the immigration building at Halifax. This small disinfector which was transferred from Grosse Isle to Halifax, has not been required at the latter place for quarantine purposes since the last threatening of asiatic cholera, nor will it be required there to the same degree, even should another cholera epidemic threaten, as there are now the completed steam appliances at the Lawlor's Island quarantine.

Charlottetown, P.E.I.—Vessels inspected, 10.

Chatham, N. B.—Vessels inspected, 110. Diseases reported or found on arrival, yellow fever, enteric fever, and beri-beri.

Victoria, B.C., William Head.—Vessels inspected, 122. Diseases reported or found on arrival, leprosy, dysentery, beri-beri and yellow fever.

Owing to continued presence of plague and small-pox in the Orient, the special precautionary measures in force at this quarantine were carried out throughout the year. Over 12,000 persons, passengers and members of the crews, have been bathed on arrival and their clothing disinfected.

Vancouver, B.C.—Vessels inspected, 10. No infectious diseases reported or found.

The Yukon.—I have been called upon during the year to advise the Department of the Interior as to disinfection of Dawson City.

Tracadie, N.B., Leper Lazaretto.—Inmates, 21 ; 14 males and 7 females. Deaths during the year, 3. Interments are made within the grounds of the lazaretto. Admissions, 3 ; one from the parish of Tracadie, one from the neighbouring parish of St.-Isidore and one which may fairly be described as from Barbados, via Annapolis, N.S.

The suggestions I would submit to you as arising from my recent and first official visit to this institution are as follows :—

Fences.—To increase the isolation presumably sought for in the institution and to protect it from promiscuous and sometimes unwelcome visitors, it would seem desirable to surround it with a fence with gates and bell.

Mains from the hot water heating furnace to be covered with heat-retaining material in those parts of the basement where warmth is not required.

Well under basement.—The supply of drinking water is taken from a well under the building. This does not commend itself on sanitary grounds.

Steam laundry.—I think the institution should be provided with this method of promptly disinfecting the clothing. The history of the first introduction of leprosy into New Brunswick, about 1820, tells us how two sailors from the Levant, who sailed from Quebec to Caraquet and Tracadie, were the instruments of its introduction through—it is to be assumed—their soiled clothing. A Madame Benoit, who washed the clothes that served for their bedding during the night, became the first leper in that district. Such added protection as a steam laundry will afford may well be provided for the devoted guardians of these afflicted people.

Disposal of excrement, etc.—I beg leave to recommend that the excreta of the lepers be consumed by fire ; or that the sewage of the establishment be disposed of in a small sewage farm with subsoil tiles. This last would be a safe, cheap and effectual method.

Icehouse.—In obedience to your instructions, I inquired into the matter of the conservation of supplies, and as a result recommended that the erection, &c., of an icehouse be a first charge upon the grant for improvements, &c.

Diet and regimen.—As a result of my inspection, I fully endorse the recommendation made by the commission, consisting of Dr. E. P. Lachapelle and his two associates, last year with regard to the confiding of the management in these matters to Dr. Smith. They come under medical officers of other hospitals everywhere. They are part of the medical treatment of the patients, the full responsibility for which should rest upon the physician attending. This also would always protect the religious ladies from the

annoyance of complaints, however unfounded, made by discontented patients, the responsibility and the complaint being at once transferred to the medical attendant.

The recommendation of Dr. Lachapelle that the medical officer should have an office in the Lazaretto I also cordially endorse. From a letter on file in the department dated June 14, 1894, written by Mr. Lynch, accountant and acting inspector, to Dr. Smith, it would seem that at the time of the erection of the new building, it was understood or expected that Dr. Smith should have an office therein. And there is a room on the right of the entrance door and, if I am not mistaken, also opening into the surgery and pharmacy, which would seem to have been designed for such office, or in any case would well answer the purpose.

Complaints by inmates.—I may add that when it was known to the inmates that I was visiting the institution officially many of them availed themselves of the offered opportunity to pour out their sorrows to me. The sisters gave me a private room and in it I received the patients one by one, and heard their piteous tales. I inquired closely as to the matters concerning which complaints against the institution had been made. I found in one and all of the men satisfaction with the management in every way. And in the women a similar satisfaction, coupled with expressions of marked gratitude and esteem for the religious sisters in charge.

But in one respect the patients, male and female, are vehement in their complaints. They declare it is a monstrous injustice that they are shut up there, *and are not cured.* They do not, and apparently cannot, realize that so far science has not grasped any cure for the disease from which they are suffering. They hear from their visitors, and doubtless in other ways also, of persons stated to have been worse than they, who have been cured by some medicine or some doctor, unknown to them, but which they urge should be provided by the Government. They all speak gratefully of Dr. Smith's kindness and attention during their intercurrent attacks of various minor ailments, but bitterly complain of his inability to cure them, and urge that he be replaced by some one who can. My efforts, gently and patiently, but firmly, to bring home to them the incurable nature of their disease did not seem to make any impression upon them. Except apparently to convince them that I shared the ignorance of Dr. Smith and of the Government on the subject.

I refer to this very natural condition of things amongst these patients who are drawn from quite the poorest and least educated classes of the community because it seems evident that it is this feeling of dissatisfaction and personal injury—however unfounded—which has been at the root of the charges against the institution which have been made by these most unfortunate persons.

I have the honour to be, sir,

Your obedient servant,

F. MONTIZAMBERT, M.D., Edin., F.R.C.S., D.C.L.,

Director-General of Public Health.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 2.

ANNUAL REPORT ON ST. LAWRENCE QUARANTINE.

(G. E. MARTINEAU, M.D.)

GROSSE ISLE, QUE., November 3, 1899.

SIR,—I have the honour to submit my annual report of the St. Lawrence Quarantine Service to October 31, 1899.

Four hundred and twenty-four vessels presented themselves for the inspection during the year, a little decrease over the last year, but owing to their greater tonnage and the diminution of the sailing vessels, the number of passengers inspected shows an increase of more than six thousand over the last year.

The only vessels that seem to call for special remarks are the following:—

The ss. *Lake Huron*, Evans, master, having sailed from Batoum on May 12, arrived at the station on June 6 at 4 p.m., with 2,275 passengers (Doukhobors) and 68 crew.

On her arrival, one suspicious case having been reported and shown to us by the captain and surgeon, we found, after careful inspection, that it was a case of small-pox, so we ordered the steamer with passengers and crew to be detained in quarantine. The vessel having anchored near the station, we removed immediately the sick passenger to the small-pox hospital, and as it was too dark and too late to complete our inspection, we decided to await daylight the next morning to do so.

We went on board early on the morning of the seventh, and we found eleven new cases of small-pox. Having removed these cases to the hospital, we began immediately the vaccination; while our boat the *Challenger* landed the greatest number of passengers possible.

Five new cases were developed on the following dates: two on the eighth, one on the ninth, one on the eleventh, and one on the twelfth. They were all removed, making seventeen cases in all in the small-pox hospital, of which eleven were Doukhobors and six crew. No further cases occurred after the twelfth.

We urged the vaccination, the landing of the passengers with their baggage, the disinfection of the vessel and of the baggage and the bathing.

The first day we vaccinated 1,200 persons, and on the second day we had about finished the vaccination, with the exception of about fifty that we completed on the next morning.

Our boat the *Challenger*, owing to her smallness, could not land more 200 or 250 persons each trip, so we were obliged to have a bateau to help for the removing of the baggage.

The clothes, bedding, &c., were disinfected as soon as landed with steam disinfector, and the leather things and furs with formaldehyde. The agents and interpreters having told us that there were only two villages where small-pox existed before their sailing, and that the baggage coming from those two villages were separated, so we took their declarations and that of the other chiefs, that there was no, and there had not been any cases of small-pox in their villages since six months, and we landed only the baggage of the passengers coming from the two infected villages to be disinfected with steam disinfector, leaving the rest of the baggage to be disinfected on board together with the vessel.

As soon as we had finished the vaccination and the landing of passengers and baggage, on the morning of the 11th, we began the disinfection of the steamer. The hospital and other cabins occupied by the sick were treated with super-heated steam. The other parts of the vessel, including forecastle and the holds were drenched with the mercuric chloride spray and disinfected with formaldehyde.

On the afternoon of the 11th, the disinfection of the baggage being finished, we began to give the (needle) baths with antiseptic solution of chloride of mercury, while the clothes they had on them were disinfected with steam disinfector. We gave 324 baths on the 11th, 380 on the 12th, 516 on the 13th, 237 on the 14th and the rest on the 15th.

The steamer having been disinfected in every part, with the greatest precaution (with the apparatus at our disposal), was discharged from quarantine and left the station on July 16 with a new crew in charge of her, coming from Quebec with the tug *Beaver*, and having had no communication whatever with persons at the station.

The passengers and crew which had been detained as suspicious, having been vaccinated and bathed and their baggage disinfected, left the station, crew on June 28 and passengers (Doukhobors) on July 2.

The convalescents having been bathed with antiseptic solution and their clothes disinfected were discharged from the hospital at quarantine and left the station, crew on July 26 and the passengers (Doukhobors) on July 29.

All the cases of small-pox have fully recovered.

The deaths numbered six, one from general debility, two from old age, one from inflammation of the lungs, one from dysentery and one from enteric fever.

Two births occurred in the upper (observation) division and one in the hospital.

The ss. *Lake Superior*, having sailed from Liverpool on July 8, arrived at the station at 11.30 p.m. on the night of July 19 with thirty-three cabin, nineteen intermediate and 621 steerage passengers and ninety-one crew.

Owing to the fact that eleven of those passengers were Doukhobors and came from the district infected with small-pox, we ordered steamer to be detained until the daylight of the next morning to be inspected.

We went on board early on the morning of the 20th, and on inspecting the passengers we found that amongst the eleven Doukhobors who came from the infected country, three of them were convalescent and seemed to have had small-pox about two or three months previous. The captain and interpreter told us that the baggage of these (11) eleven (Doukhobors) had sailed with the ss. *Lake Huron*.

Referring to article 29 and 53 of the Quarantine Regulations, we sent immediately a telegram to Ottawa, and we waited instructions.

The answer to our telegram being: 'If passengers have baggage packed in a small-pox village, and not since opened, safer to land it for disinfection'; so we took the declaration of the captain, of the interpreter and of the Doukhobor chiefs, that they had no baggage whatever stored in the holds of the ss. *Lake Superior*, it having been forwarded by the ss. *Lake Huron*, and we gave the clearance to the steamer. It was 4.30 p.m.

Infective diseases of minor importance were reported or found on the following vessels: ss. *Dominion*, *California*, *Vancouver*, *Laurentian* and *Lake Superior*.

The diseases so reported and discovered were scarlet fever, chicken-pox, measles and enteric fever. All those sick were removed with attendants to the hospital and the vessels proceeded after having had their hospital disinfected.

The admissions to hospital at quarantine numbered 67.

The ss. *Assyrian* landed for burial at quarantine the body of a fireman, who died suddenly from heart failure the day before her arrival at the station.

In accordance with the instructions of the department we have made careful inspection in vessels coming from South American ports, owing to the outbreak of bubonic plague at Asuncion, Paraguay. Special care has also been exercised in the inspection as regards the existence of leprosy amongst the Finlanders.

QUARANTINE STAFF.

Dr. A. Lapointe continued during the season the inspection of the weekly mail steamers at the station of Rimouski.

I visited this advance post and, coming up from thence on the mail steamers, made a detailed inspection between Rimouski and Grosse Isle.

I am very happy to express here my regards to the whole quarantine staff for steadiness and zeal with which all duties were carried out. The number of staff had also to be increased to meet the long addition of work during the detention of the ss. *Lake Huron* at quarantine.

REQUIREMENTS.

1. The great deficiency at the quarantine station continues to be that of a second boat as a supply, disinfecting, reserve inspecting, mail and for the forwarding of the convalescents when discharged from the hospital at quarantine.

This second boat could be provided with the disinfecting appliances for the evolution of steam and of sulphurous acid gas under pressure, and their discharge by means of the steamboat's engines into the ship's hospital, forecastle, hold or other infected parts, thus securing the complete disinfection with the minimum delay to the vessel.

It would be greatly in the interest of the shipping as well as of all concerned.

2. Deep water wharf, a wharf to which infected vessels could be brought to land their passengers and baggage for disinfection.

There are still some other works or repairs absolutely necessary which have been asked, and the list for which is in the hands of the Public Works Department.

The whole respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

G. E. MARTINEAU, M.D.,

Medical Superintendent.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 3.

REPORT ON HALIFAX QUARANTINE STATION.

(N. E. MACKAY, M.D.)

HALIFAX, N.S., October 31, 1899.

SIR,—I have the honour to submit my annual report of the work done and improvements made at this station during the year ending October 31, 1899.

When I took office in November last, no records of any kind whatever were transferred to me of the work done at this station in past years, or of anything else, so that I am unable to compare the work performed during the year just ended with that of the previous years. I may say apparently very little effort was made to enforce the quarantine regulations, and not unfrequently the captain, crew and pilot landed before the vessel was granted pratique. This indifference in the enforcement of the law made it more difficult for me to enforce it, but now, I am pleased to say, the regulations are fairly well respected.

The year just closed was one of unusual activity at this station. This was due to the unusually large number of immigrants who entered Canada through this port. The coming of the Doukhobors added more than usual interest to the work of this station.

The first detachment of them, numbering 2,050, arrived here by the ss. *Lake Huron* on January 20. They were practically all well, one case of measles being the only contagious disease on board. The second contingent, in number 1,997, arrived by the ss. *Lake Superior* on January 27, all well. However, one child developed small-pox on the passage and died three days before the vessel arrived in port, and was buried at sea. The vessel, with the crew and passengers, was taken to Lawlor's Island and put in quarantine of observation for twenty-one days, during which time the immigrants and crew were vaccinated and thoroughly bathed, and their effects were thoroughly fumigated and disinfected, as was also the ship.

When the vessel arrived we were not quite prepared to accommodate so many people, but a temporary building was speedily erected to accommodate from 500 to 600 people, after which we were able to make them quite comfortable, notwithstanding the exceedingly cold weather.

The scene at the station during this time was a very busy one, and we owe the Director-General of Public Health a debt of gratitude for the kind assistance rendered us in handling the Doukhobors.

Minor quarantinable diseases were found amongst the steerage passengers and immigrants on board the following steamers:—The ss. *Lake Huron*, from Batoum, Russia, January 20, one case of measles; the ss. *Carthaginian*, from Liverpool, April 12, three cases of measles; the ss. *Brasilia*, from Hamburg, May 9, three cases of measles; the SS. *Carthaginian*, from Liverpool, May 17, two cases of scarlet fever; the ss. *Phoenecia*, from Hamburg, May 21, one case of measles, and on July 2 three cases of measles. The schooner *Edward I. Rice*, from Gloucester, arrived on February 20 with one of the crew sick with measles.

By arrangement with the immigration agent here, the patient ex *Lake Huron* was treated in the immigration hall. All the other cases with their respective families were sent to quarantine and cared for there. The scarlet fever patients were retained for 36 days till desquamation had ceased.

The ss. *Carthaginian* of May 17 had on board a family of Galicians from Russia who left a child sick with smallpox in Liverpool. The authorities in Liverpool vaccinated all of them before embarkation. Acting under the instruction of the department, we retained the family in quarantine of observation till 21 days had elapsed from the date of last exposure.

The schooner *Elma* from Canary Islands arrived on the 19th of July with one of the crew sick with smallpox. The patient had been ill 24 days and was convalescent. The vessel and crew were sent to quarantine to be fumigated and disinfected. They were detained for 9 days. While the captain and two of the crew were vaccinated, the rest having been successfully vaccinated at Barbados where the vessel called on her voyage here. The patient was detained for four weeks.

During the year 286 veseels were inspected and 30,987 persons examined, as follows: cabin passengers, 1,397; second class, 1,833; steerage, 17,438; crew, 10,319.

The department is to be congratulated on the much needed improvements made in this station during the past year and also for the provision made to complete the work begun.

During the year the following improvements were made:—A kitchen was added to the steerage detention building and a new steerage building large enough for 400 persons was erected adjoining it. The second class building was converted into a hospital with an isolated ward for suspects; a kitchen was added to the hospital.

A building was put up between the sulphur house and the disinfecting house, 40 by 20 feet, for a set of needle and shower baths; there are twelve such sets in two rows of six each with undressing and dressing rooms at the ends. We find these baths a great improvement on the tubs. A shelter roofing was added for the unpacking and repacking of luggage.

The discharge pipe from the sulphur dioxide blast was lengthened to reach the hold of a vessel at the wharf, and properly fixed; the mercuric chloride tank was provided with proper hose and sprinklers; a central transverse partition was placed in the disin-

fecting chamber to separate the disinfected from the infected effects, and a room was fitted up in the disinfecting house for formaldehyde disinfection.

Five hundred galvanized iron berths, two tiers high, were procured for the steerage detention building. This did away with the necessity of the steerage passengers sleeping promiscuously on the floor and added to their comfort. Two ranges were also provided, one for the steerage and one for the first-class building.

We have telephone communication with the station, but the service is not satisfactory.

A force pump was placed in the disinfecting building to fill the tank for the needle and shower baths and also the mercuric chloride tank with sea-water, which we now use for the baths and perchloride solution instead of the well water.

The perchloride tank and the machinery in the sulphur blast were cleansed and painted and put in perfect order, and other important improvements were made in the appliances.

The insufficient supply of water is a great drawback to the station. At present we get our water supply from surface wells, and it seems now that in future we shall have to depend largely on this source, especially for drinking and culinary purposes, as three unsuccessful borings for water were made last summer.

To my mind the best solution of the difficulty is to place a large sea-water tank in the vicinity of the old hospital and to connect it by means of pipes with the different buildings and also with the force-pump in the disinfecting house. The tank could then be easily filled with sea-water which could be used for baths and flushing. By this arrangement the drain on the wells would be greatly lessened, and by sinking two or three new wells the difficulty in the water supply would be practically overcome.

The transfer of the ss. *Argus* to quarantine will enable us to carry on the work more satisfactorily.

I have the honour to be, sir,
Your obedient servant,
N. E. MACKAY,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 4.

REPORT ON NORTH SYDNEY, N. S., QUARANTINE STATION.

(HORACE RINDRESS, M.D.)

SIR,—I have the honour to present my report for the year ended October 31, 1899. The total number of vessels inspected at this station for the year number 79.

Steamboats.....	61	Trans-Atlantic.....	55
Sailing vessels.....	18	Cis-Atlantic.....	24

The only case of quarantinable disease during the year, was a case of diphtheria on board the ss. *Tiber* from St. John, June 9. He was removed to the hospital and soon recovered.

The buildings, wharf, &c., at the quarantine station are in fairly good condition.

I have the honour to be, sir,
Your obedient servant,
HORACE RINDRESS, M.D.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 5,

REPORT ON ST. JOHN, N.B., QUARANTINE STATION.

(J. E. MARCH, M.D.)

ST. JOHN, N.B., October 31, 1899.

SIR,—I have the honour to submit my report for the year ending October 31, 1899.

No quarantinable disease has entered the country through the port of St. John, by means of any vessel subject to inspection during this period.

On the afternoon of November 30, I was asked to visit a member of the crew of the ss. *Tongariro* which had arrived that morning from Halifax. The ship's surgeon stated that the man had been ill four days, and that he had diagnosed the case as enteric fever. As the ship had not signalled for me at quarantine, not being subject to inspection, I declined to interfere further than to advise the local board of health.

On December 1 an intermediate passenger who had arrived on the ss. *Parisian* two days previously, from Liverpool via Halifax, died at the general public hospital of acute cerebro-spinal meningitis. On the arrival of the *Parisian* at Halifax all were well, but on her arrival at St. John, some thirty hours afterwards, this man was ill. Several fatal cases afterwards occurred in St. John and vicinity, and, although no connection has been traced between this first case and those which followed, it must remain a matter for regret that this patient was not landed at the quarantine station.

In cases where, on arrival, illness exists on coastwise vessels, I think it would be well if masters and pilots were instructed to summon the quarantine officer to pass judgment upon the nature of the disease before proceeding to dock.

On Saturday, June 24, the ss. *Cheronea* arrived from Liverpool with the master and third engineer ill with typhoid fever. These cases were removed to the station, the necessary disinfection performed and the ship granted pratique at 5 a.m. on Monday morning. No further cases occurred on this ship. Both patients recovered. On the previous voyage of this vessel, from Rosario to Liverpool, seven cases of typhoid developed. Four of these proved fatal, one at sea, and three, including the second engineer, in hospital at Liverpool.

On July 7 the schr. *Stella Maud* arrived with a case of measles in her forecastle. The patient was removed to the station, the crew bathed, the forecastle disinfected by washing with solution of bichloride of mercury 1—800, all clothing and bedding steam sterilized, and pratique granted the same day. No further cases occurred. The patient recovered.

On February 27 the ss. *Glen Head* presented a case of diphtheria in the person of the first mate. The case was isolated in an admirable location on the ship. As the weather conditions forbade the removal of the patient I granted conditional pratique, injected the subject with anti-toxin, immunized the mess-room boy who was attending him, and continued the isolation. Rapid recovery followed, and in two days the throat was clear of membrane. I disinfected with bichloride of mercury solution, 1—100. There were no other cases. Two cases of beri-beri were observed during the year. The first, a negro fireman (Barbados) on the ss. *Alcides*, arrived January 17. He was removed to the general public hospital. The second case was one of the crew of the wrecked barque *Maiden City* who was returning home as a disabled seaman on the ss. *Taymouth Castle* September 22. He was convalescent and proceeded to his home in Liverpool, Nova Scotia. Cases of beri-beri will, in future, be treated in accordance with the instructions lately received from the Director General of Public Health.

One case of erysipelas, seventeen of tuberculosis and twenty-three of venereal disease complete the list of contagious diseases observed during the year.

One steamship, the *Brattingsborg*, presented two cases of tuberculosis in her engineer's department. In this and in all other instances where tuberculosis was discovered, I informed the master of its infectious character and instructed him in the measures necessary to prevent its communication to others. In several instances these measures were adopted.

A telephone with city connection is very much needed here. On January 17 the ss. *Alcides* arrived during a heavy easterly gale. As it was snowing, our signals for the *Neptune* could not be seen. With great difficulty I succeeded in boarding the steamer in a small boat. At eleven o'clock the same evening the ss. *Harlaw* arrived off the station and signalled. The storm had not abated and it was still snowing. It was unsafe for the steamer to anchor so near a lee shore and I again put off in a small boat. No blame can attach to the *Neptune* in these cases, of which the above are only examples, but it is necessarily true that when she is most needed there is likely to be most difficulty in communicating with her by the means (flags and lanterns) now at our disposal. Apart from its usefulness to us a telephone would be a boon to the whole shipping community which I am assured would be greatly appreciated. It is a matter of history that during one storm last winter five vessels were blown from their anchorages outside of this station, and two of them driven ashore and wrecked. This disaster could have been averted had a telephone been available to transmit to the city their signals for assistance which were visible from here.

I desire to express my thanks to your department for the appropriation which was secured from Parliament during its last session, and also for the uniform courtesy which has been extended to me by the officers of your department, both officially and personally, during the year.

As I close my report, I learn with great pleasure that the contract for the erection here of a new hospital and two detention buildings has been awarded by the Department of Public Works to Mr. John Duffy who was the lowest tenderer.

I have the honour to be, sir,

Your obedient servant,

J. E. MARCH,

Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 6.

REPORT ON CHATHAM QUARANTINE STATION.

(J. MACDONALD, M.D.)

CHATHAM, N.B., October 31, 1899.

SIR,—I have the honour to submit this my annual report.

The arrivals from foreign ports during the past twelve months number 110.

There were cases of infectious diseases found on two vessels. On board the Bg. *Lily*, from Para, were a case of enteric fever, one of beri-beri, and two persons who were suffering from the effect of yellow fever. There was one case of enteric fever on the ss. *Platea*, from Dublin.

Four vessels arrived from South American ports, where both smallpox and yellow fever prevailed, but it was not deemed necessary to detain them

I beg respectfully to call attention to the necessity of having a ladder placed on each of the three quarantine buildings on Middle Island. J. Currie is a careful and efficient caretaker of the buildings.

I have the honour to be, sir,

Your obedient servant,

J. MACDONALD,

Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 7.

REPORT ON CHARLOTTETOWN QUARANTINE STATION.

(P. CONROY, M.D.)

CHARLOTTETOWN, P.E.I., October 31, 1899.

SIR,—I have the honour to submit my report for the year ending October 31, 1899.

No dangerous disease of infectious character was found on board any vessel arriving at this port during the past year.

The number of arrivals direct from foreign contries was thirty-one.

Vessels arriving from points north of New York were allowed pratique without inspection.

Having lately had the pleasure of an official visit from the Director General of Public Health, advantage was taken to call his attention to the need of some minor repairs to the hospital building.

An estimate of the cost of these repairs, which were approved of by him, will be submitted at an early day.

I have the honour to be, sir,

Your obedient servant,

P. CONROY, M.D.,

Inspecting Physician.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 8.

REPORT ON WILLIAM HEAD QUARANTINE STATION.

(A. T. WATT, M.D.)

VICTORIA, B.C., October 31, 1899.

SIR,—I have the honour to submit this my report for the year ending October 31, 1899.

The number of vessels inspected was 122. This number is slightly less than for the previous year, but it would have been somewhat larger had the United States Government not chartered all the regular vessels of the Northern Pacific SS. Co. and the two extra vessels belonging to the Canadian Pacific, besides several other steamers which formerly came to British Columbia ports, as transports for troops to the Philippines. The number of immigrants, however, was considerably larger than that of last year.

Patients suffering from leprosy, beri-beri and dysentery, nine persons in all, have been treated in the hospital this year. The existence of plague and small-pox in the east has caused a continuance of the special precautions which have been observed during the two previous years, namely, the disinfection of the persons and effects of all steerage passengers. Over 12,000 persons, including members of crew, have been so treated. The people are given warm shower baths. Steam is used for disinfection of their effects where possible. Articles which would be injured by steam are disinfected by formaldehyde gas, apparatus for this purpose having been installed during the year. Cases of plague developed on four of the liners running to San Francisco. On one of these steamers a case developed shortly before reaching Honolulu and another between Honolulu and San Francisco. The claim sometimes made that this disease could not be brought to this coast owing to the length of voyage from Hong Hong is therefore shown to be without reliance. The recent appearance of the plague in places separated by long ocean voyage from the countries out of which the infection must have been brought, also disposes of this claim. And as the prevalence of plague is in no ways lessened in China and India, the countries where it first made its appearance, and as the disease has shown itself capable of making progress to and in many other parts of the world, the question of having disinfection of the effects of persons who might bring the disease to this coast, done at the point where it should properly be done, namely, the port of embarkation, seems more than ever a matter of great importance. There is reason to believe, I am glad to say, that Dr. J. C. Perry, passed assistant surgeon U. S. Marine Hospital Service, who recently went to Kong Hong as sanitary inspector, will probably make some practical move in this direction.

On September 23 the ss. *Idgami Marie* arrived here from Yokohama with a case of epidemic disentery on board. A number of cases were reported on the bill of health as having occurred in Yokohama. The patient had remained two or more days in the steerage with several other passengers before being removed to a room by himself, and that without any precaution being taken to guard against infection. As the other passengers took their food and drink in close proximity to the patient, there seemed ample opportunity for infection being conveyed to some of them. The steerage passengers for Victoria were therefore detained eight days, this being the quarantine enforced for the disease in Japan, where, owing to their extensive experience with the disease, such measures of isolation and quarantine are deemed necessary. No further case developed here.

Two years ago 90,000 cases and 20,000 deaths occurred in Japan. Dr. Kiyoski Shiga, assistant to Prof. Kitasato, in studying the disease, then discovered a bacillus

which he considered the pathogenic agent of dysentery. If this is warranted, the disease as prevailing in Japan may prove different from the so-called Amœbic dysentery of which the *Amœboe dysenteriæ* have been recognized as the cause.

During the past summer a number of improvements and repairs were make at the station. Three cottages for the use of the staff were built and a coal shed with work shop and storehouse at one end was erected on the small wharf. A two inch water main was laid to the different buildings, and fire hose provided. The need and utility of the latter were demonstrated almost immediately by a fire in the roof of the disinfecting building. The large stream of water thrown by the new hose extinguished the fire before any damage was done. Without the hose however the fire would soon have got beyond control and the most valuable building of the station destroyed. The approaches to the wharf were strengthened and repaired, and some of the copper on the piles of the wharf renewed. Some fencing and improvements to the grounds was done by the staff.

The steamer *Earl* was laid up a good many times during the year owing to leakages in the boiler. This led to a good deal of direct and indirect expense. The latter being for boat hire. The boiler is not thought to be good for much longer, but as its condition is likely to be referred to in a special report of the steamboat inspector I need not further mention the matter now.

At this date the German barque *Coriolanus*, from Panama, is at the quarantine wharf undergoing disinfection. While she was at Panama two-thirds of the crew were removed to the hospital in one day suffering from yellow fever, and of these ten died. A special report will be made on this vessel.

I have the honour to be, sir,
Your obedient servant,
A. T. WATT, M.D.,
Superintendent B. C. Quarantine.

The Honourable
The Minister of Agriculture.
Ottawa.

No 9.

REPORT ON VICTORIA QUARANTINE STATION.

(R. L. FRASER, M.D.)

VICTORIA, B.C.,
October 31, 1899.

SIR,—I herewith submit my report for the Quarantine Station, Victoria, B.C., for the year just ended. At various times during the year, I inspected a number of ships that failed to called at William's Head, or that arrived at Royal Roads anchorage at times when Dr. Watt was unable to attend to them. Coasting vessels from the neighbouring ports of the United States were not inspected, as they were exempt from quarantine regulations by order. No case of contagious or quarantinable disease arrived at this port during the year.

I have the honour to be, &c.,
R. L. FRASER, M.D.,
Inspecting Physician.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 10.

REPORT ON VANCOUVER QUARANTINE STATION.

(L. N. MacKechnie, M.D.)

Vancouver, B. C., November 1, 1899.

Sir,—I have the honour to submit herewith my report for the year ending October 31, 1899.

Notwithstanding the destruction by fire of one of our largest lumber shippers, the Hasting's mill, a greater number of vessels have called at this port than during any previous year.

Vessels coming direct from St. Michael's down the Yukon I have taken the precaution to thoroughly inspect.

Coasting steamers from the Sound and northern coasts, were with but few exceptions not inspected.

No case of infectious or contagious disease was found in this port this year.

I have the honour to be, sir,
Your obedient servant,

L. N. MACKECHNIE,
Quarantine Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 11.

REPORT ON THE LAZARETTO, TRACADIE, N.B.

(A. C. Smith, M.D.)

Tracadie, N.B., October 31, 1899.

Sir,—I have the honour to submit my annual report covering the period from November 1, 1898, to October 31, 1899 :—

There are on the registry to-day twenty-one inmates of the lazaretto—fourteen males and seven females—representing leprosy in all stages of the disease. Of these patients five came from outside the province—three from Manitoba, one from Prince Edward Island, but a native of New Brunswick ; and the fifth from Nova Scotia, but ten years before from Barbados. There were three deaths during the year, and three new cases admitted. Of the latter one came from this parish (Tracadie), another from the adjoining parish of St. Isidore, and the third from Annapolis, N.S.

Several cases reported to me during the year as leprous I investigated, and found to be free from the disease ; but I am at present giving attention to the condition of two others who, in all probability, are lepers. The necessity of caution in this respect is emphasized in a circular despatch from Downing street, dated June 21, 1899, based on a recent report of the Royal College of Physicians of London, and addressed to the

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Governors of British Colonies. It is stated in paragraph 18 that:—'It is further 'admitted that leprosy is in its earlier stages exceedingly difficult to diagnose, and it 'will be most necessary in considering any compulsory legislation to introduce effectual 'safeguards against the law being put in operation in cases of mere suspicion of disease.' In the early history of our institution two non-leprous persons were placed in the lazaretto on certificates given by physicians not attached thereto. One of these was a young girl nine years of age admitted by certificate signed by two physicians. Her disease proved to be lupus—not leprosy. Although leprosy, in certain stages, bears a striking resemblance to several diseases, the introduction of a non-leprous person to close confinement with lepers would, at the present day, be a terrible and inexcusable error. The more thorough knowledge of the disease, aided by bacteriological examinations, would make such a mistake almost a crime.

Lepers are subject to the con mon ailments of mankind, which are made by the complication more difficult to treat. The general health of the inmates during the past year has been more than usually good.

There have been no attempts at escape. The year has been uneventful in the history of the institution, which is quietly but efficiently fulfilling its object, viz., 'segregation without coercion'—a principle we have been applying successfully for several years previous to the receipt of recent instructions to that effect conveyed to us in the above-mentioned despatch. The mournful cry, 'Room for the leper, room!' comes to us across the ages, and is to-day heard in our midst. When I declare an individual leprous, his nearest friends avoid him; he is refused employment, and he soon finds a resting place in the home provided for such unfortunates. I seldom have difficulty in effecting a removal; and it is only just to say that the clergymen of the different parishes are always willing to aid in the unpleasant work. I am thoroughly in accord with the opinion placed on record by the late Sir Morell McKenzie, M.D., who had made an exhaustive study of leprosy in many countries, in which he affirms that the only way of coping with leprosy is to deal with it as a thing dangerous to mankind. 'It would be criminal,' he says, 'to allow the scourge free play because academic pedantry is not satisfied as to the exact mode of its transmission.' Our forefathers did not allow themselves to be disturbed by philosophic doubt, but stamped out the pest. If I had the misfortune,' he adds, 'to be a leper, I should prefer to be where one touch of nature makes the whole world kin, though it were only by fellowship in suffering, to being an object of horror to all around me. Medicine, though it cannot cure, can do much to mitigate the incidental miseries of leprosy, and nowhere can treatment be so well applied, or the necessary nursing so intelligently carried out as in places where special experience has engendered special skill. Sanitary arrangements must be of the highest attainable perfection, as the concourse of foul smells in leper houses is especially apt to breed disease. The food must be abundant and nutritious.'

The Canadian Government sets a generous example to the world in so bountifully providing for the maintenance of its leper hospital; the religious ladies in charge provide uninterruptedly the choicest and most nutritious food that can be obtained; the lepers receive four meals a day; no foul smells are permitted in any of the wards; the cleanliness everywhere apparent is a surprise to all visitors; and the sisters' unremitting care and devotion to the unfortunates are beyond praise.

I have the honour to be, sir,

Your most obedient servant,

A. C. SMITH

The Honourable
The Minister of Agriculture,
Ottawa.

No. 12.

REPORT OF THE MEDICAL COMMISSION APPOINTED ON OCTOBER 26, 1898, TO INVESTIGATE INTO THE COMPLAINTS MADE AGAINST THE MANAGEMENT OF THE TRACADIE LAZARETTO.

We the undersigned, Doctors E. P. Lachapelle, Professor of the Faculty of Medicine of Laval University, Montreal, Chairman of the Board of Health of the Province of Quebec, and Superintendent of Notre Dame Hospital; A. Vallée, Professor of the Faculty of Medicine of Laval University, Quebec, and Superintendent of the Beauport Insane Asylum; and E. P. Benoit, of the medical staff of Notre Dame Hospital, and Chief Editor of l'Union Médicale, experts appointed by Order in Council of the Federal Government, dated October 26, 1898, proceeded to Tracadie, New Brunswick, in accordance with instructions from the Honourable Minister of Agriculture, and called at the Lazaretto, on arriving, on the first of November instant, unexpected.

After exhibiting our credentials to the Reverend Mother Superior, we proceeded at once to inspect the establishment, and were, by our wish, taken first to the kitchen and pantry, where we found everything to be in perfect condition. The various rooms devoted to the storage of foods, the kitchens, are very clean, well lighted and well ventilated. The flour, beef, dried fish, butter, eggs, vegetables, cereals, bread, etc., seemed in good state of preservation and of first class quality. The same with the supply of preserves, brown sugar, molasses, tobacco, etc., all for the use of the patients. Some dishes, chicken, vegetables, pastry, prepared for their next meal, were well cooked and inviting.

We then visited the leper's quarters, the dormitories, dining rooms, working rooms, etc. Everything was in a state of great neatness; the floors, the furniture, the beds, the garments hung up in the vestiary. In a room on the ground-floor provided with carpenter's benches, the patients have each a chest in which to keep the tools or other things they wish to have. They have full liberty to go and come on the grounds of the Lazaretto; they have their boats, guns, fishing lines, and may go hunting and fishing on the Bay of Tracadie.

The first and second day following, having got through our inspection of the building, we brought before us, and in a room alone, and questioned at length the lepers whose names follow: Gudman Christianson, Tom Thersteison, John Gimmisson, Joseph Gionnet, Olivier Plourde, Jean-Baptiste Plourde, Joseph Dignard, Maurice Benoit, Marcel Leblanc, Tranquille Leclere, the women Plourde, Olive Légère, Justine Comeau, Geneviève Drisdale, Marianne Giasson. We moreover offered to hear any other patient who would communicate with us; but no other came forward. There are in the Lazaretto 21 lepers.

We then questioned at length, among the nuns, the Superior, the *Depositaire*, the Apothecary, and also Father Babineau, chaplain of the Lazaretto, Dr. Smith, inspector of the Lazaretto, and the following employees: Alphonse Albert, baker, Matilda Lozier, cook for the lepers, Marianne Lacroix, maid at the men's table, Bénoni Richard, stoker and messenger.

On closing our inquiry at Tracadie, we proceeded to Caraquet, 25 miles distant, and had an interview there with the Honourable Robert Young, who had received the complaints of some of the patients and had forwarded them to the officials of the Lazaretto. He stated to us that he was not aware of anything personally, nor apart from the complaints made by the patients.

It appears from our investigation that the complaints made by the lepers regarding the management of the Lazaretto, and transmitted by the officials to the department, complaints which the lepers repeated to us in about the same form, are unfounded, as

we easily found out by our inspection, by the cross-examination of the patients, as well as by the explanations and information furnished by the other persons examined. It happened a few times,—the nuns and servants admit it readily,—that a baking of bread was not as well made as the preceding; that the fresh fish bought during the week, had, when put on the patients' table, somewhat of a smell, in spite of all the care taken; but that seldom occurred, and only exceptionally. At certain times of the year when it is difficult to get fresh beef (in the spring), salt beef was given to the lepers, and this, as everybody knows, then takes a dark colour, but is still perfectly edible. But never have the patients had before them foods in spoiled condition, or unfit for consumption. Far from that, the nuns appear to comply with great kindness with the requirements of the lepers, and to present them the dishes in the form which suits them most. And that is not as easy a matter as in an ordinary hospital. Leprosy is a disease which, especially in the tuberculous stage, spreads into the mouth and the throat; it also affects to a great extent the senses, that of taste included. When that occurs, it is so much more difficult to provide for the lepers' diet, that salt, pepper and other condiments cannot be employed in the preparation of the dishes, on account of the irritation which they cause in the ulcered mouth and throat of the patients. In such cases, the use of salt provisions even well freshened is to them a cause of suffering. It often happens that these lepers, rendered irritable by disease, become freakish and difficult to satisfy. So, as regards the food of the lepers, we are satisfied that the nuns are doing their utmost to content them, giving them food as substantial as the resources of the country will permit, and prepared, as far as possible, in the way the disease requires, as appears by the attached copy of the monthly bill of fare kept in the kitchen.

The patients receive every day a light meal in addition to the three regular meals. They admit that they are left to choose between brown sugar and molasses to sweeten their tea or their porridge.

All the patients, moreover, have complained of the food, only as of a secondary matter. Their primary and principal cause of dissatisfaction was the fact of their not being cured. That notion of the possibility of a cure, inspired by a desire quite natural in the sick man, is kept up by local legendary accounts of marvellous cures, which they tell one to the other, and by superstitions carefully entertained. They admit that the doctor visits them from time to time, that, besides he comes to see them whenever they wish; and that he bestows good care on them at all new phases of the disease; but they are bitter against him for not trying to cure them. We attempted in vain to discuss the matter with them and to convince them of the impracticability of a cure in the present state of science; they maintained their position. And that notion that it would be possible to cure them, but that they are left to die slowly after being confined in the Lazarretto, renders them unfair and rash (at any rate some of them) as regards the doctor, whom they refuse to see, and as regards the nuns whom they then threaten and address with anger.

The patients complain that their correspondence cannot remain secret. We have questioned them specially on that subject. We duly receive our letters, have they answered us, but we cannot reply without the letters being sealed by the sisters. That is not so. The patients are at liberty to remit their letters sealed to the sisters; but the latter require,—and they are quite right,—that no letter should leave the Lazarretto unless one of the nuns has put it in a second envelope which she herself addresses. That rule has been laid down at the request of the postmaster. All letters received are remitted to the patients unopen.

The inmates have also complained that they are not kept busy. They are not however forced to remain idle. They may during summer go out rowing, fishing, hunting or to do some gardening; they have at their disposal during winter a room furnished with benches, where their tool chests are kept, and where they are at liberty to work wood. But how many of them are in position to do so? Leprosy in the tuberculous or anesthetic form, misshapes the hands, maims the fingers, causes atrophy of the muscles. Neither are the feet spared. Work, painful at first, soon becomes impracticable. It is useless then to think of making these poor cripples work, and they do not seem to have a great yearning for work, since the garden is forsaken, and the tools are left idle, and

when work is mentioned, they show at once their hands and declare loudly that the Government has agreed to board them. The lepers' labour cannot be utilized, on account, first of the limited amount of it that can be obtained, and then on account of the impracticability of selling the products of that labour outside of the Lazaretto. A few of these inmates could take up some house work: take in wood for the stoves, see to the fire, do some scrubbing, etc. The nuns in that respect give them full liberty, but as a rule they are very careful not to take undue advantage of that liberty; very few are willing to busy themselves in that way.

On the whole, after seeing things for ourselves, after collecting information from the lepers, the nuns, the chaplain, the medical inspector, the servants, &c., we come to the conclusion that the management of the Tracadie Lazaretto is carried on a solid, humanitarian basis, and in such a way as to meet the main requirements of such an institution.

But we must add that it seems evident, as shown by the remarks we made previously, that some details of the management might be modified to advantage, in order to meet special requirements of a medical, hygienic or administrative order, which although not urgently and absolutely indispensable, have, nevertheless considerable importance.

Therein we see an easy and effective means of doing away as far possible with pretexts on the part of the inmates for futile and unfounded complaints; and should these still occur, the complaints might be examined and disposed of on the spot, as soon as expressed, and the nuns would be thus spared the troubles to which they have just been subjected for months, and the Government would avoid the expense of a commission necessary to clear up matters, determine responsibilities, if any should exist, and satisfy public opinion.

We shall therefore follow up the conclusions of this report with recommendations given hereafter and which apply either to the medical management of the Lazaretto, to its inside government, or to questions of public health:

(1) There is not any reason for modifying in any way the position of the nuns of the Lazaretto, who acquit themselves of the working of the institution with skill, devotedness and economy. The care and nursing of the lepers could not be placed in better hands.

(2.) But as regards the medical treatment of the lepers, the prescribing and overseeing of their dietary, as well as the hygienic and sanitary regulations of an institution of that kind, we are of opinion it would be much preferable to confide the management to a medical superintendent; this would, from a scientific and practical standpoint, be a safeguard against all strife. Dr. Smith, the present inspector of the Lazaretto, is qualified in every respect for filling that place.

(3.) That measure would ensure to the lepers a continuous and active medical supervision, and would afford them much moral comfort.

The intercourse between the inmates and the medical superintendent would be facilitated, if the latter had an office in the hospital itself, with keys to enter at will and see the patients at his discretion. All the inmates would be seen by the doctor at least once a week. And though in the present state of science, a cure is not to be expected, each inmate would thus be enabled to follow a treatment suited to uphold his spirits.

There should be a book of prescriptions in which the doctor would enter what he prescribes for each inmate, with the date, etc.

(4.) The government might ensure the efficiency of the management and of the medical service of the Lazaretto, by having the Chief medical officer of the Department of Agriculture or the General Superintendent of Quarantines to visit it at least once a year.

On that occasion the Government's representative would receive communication of the books which constitute the actual archives of an hospital:

(1.) The book of prescriptions, of which we spoke above;

(2.) The medical register, which in an institution of that kind should be very complete and give: the name of the inmate, his or her age at the time of entering the hospital, sex, nationality and religion; for what time back the disease has been apparent; what stage the disease has reached; from what place the inmate came; the date and

cause of his or her death. A column might be added for remarks from the doctor. That register very easy to keep would be of great public utility; it would render possible the study of leprosy and of its history in Canada. It would, moreover, be a safeguard for the inside management.

The nuns keep a register which is not sufficiently complete.

(5.) We desire as regards the confinement of the lepers, to draw attention to a fact which struck us. According to the information tendered to us, the lepers are confined on the order of the medical officer alone, and without the Government being even notified. We think that the medical officer should be bound, on admitting a leper, to send a brief report to your department, giving the name of the patient, his civil status, the place he comes from and the date of his confinement. That measure would be a protection for the individual and a safeguard for the officials of the Lazaretto and for the Government, if perchance some individual took it into his head to denounce a case of arbitrary confinement. It would at the same time put the department in a position to follow up the evolution of leprosy in the different parts of the country and to keep constantly in touch with the changes going on among the inmates of the Lazaretto.

(6.) The visits of relatives to inmates should not take place in the common room (or work room), but in a parlour specially furnished for that object.

(7.) The sisters have not any ice-house for the preservation of foods during the hot weather. That explains how it may have occurred sometimes that the victuals were not perfectly fresh. The sisters use in the best way they can the ice-house of the presbytery, which is far away, much too small and inadequate. It would be an easy matter to build one at the Lazaretto, ice being stored in it during the winter without difficulty.

(8.) The stable attached to the Lazaretto is very small and can accommodate only three cows, and that is not sufficient. At certain times of the year, the sisters are in the necessity of buying milk from outsiders. We recommend therefore that the stable be enlarged and that may be done at small cost.

(9.) We earnestly suggest that the Government see that there be in the Lazaretto, one or two suitable rooms, where lepers, husband and wife, when the case occurs, may live together and provide one for the other care suited to alleviate their sufferings.

(10.) We noticed that old fashioned bedsteads, wooden and surrounded by curtains, are used in the dormitories. These old fashioned bedsteads are condemned by hygienists. They should be replaced by iron bedsteads with spring beds and without curtains.

(11.) It is necessary, in the case of leprosy as in the case of tuberculosis, that the rooms and all other apartments frequented by the inmates be provided with spittoons containing an antiseptic solution.

(12.) In order not to run the risk of developing a new centre of infection in the village of Tracadie, where the disease appears practically extinct (the infected individuals now coming from Point Marcel, the Anse, Chipagan and from Manitoba), it is important to cease burying the lepers in the parish cemetery, where more than forty lepers are at this time interred in the vicinity of the public school. We think that the cemetery for the lepers should be on the premises of the Lazaretto itself, near the bay, in order to avoid all danger of contamination of the subterranean waters and in order also not to submit this infected ground to frequent diggings which would be dangerous for the public health.

(12.) In support of our last recommendation, we recall here that accurate statement made by Leloir (an authority on the question). Leprosy, says he, 'is not as is generally thought, a somewhat prehistorical disease, about to disappear, but is actually an awful plague incessantly threatening and slowly making its way.' We are easily convinced of this when we ascertain that there are hundred thousands of lepers in the British East Indies and in China, fifteen hundred in Norway, over four thousand in the Sandwich Islands and a great number in Egypt. That horrid disease, in fact, far from disappearing, seems to gain ground, and has succeeded in getting a foothold not only in Canada, but also in the United States, in Nouvelle Calédonie, in Spain, Mexico, Iceland and even in Northern Prussia.

Very definite instructions should therefore be given to the officials at the quarantine stations to prevent lepers from entering the country and developing new centres of contagion.

One of the Icelanders detained at the Lazaretto told us that he had been a sufferer from leprosy for three years before coming to Canada, and it is likely he has contaminated his comrades at Selkirk.

A mulatto from Bermuda, exhibiting all the symptoms of leprosy has been permitted to pass through quarantine at Halifax without trouble. An actual danger is lurking here and it will be growing by the fact of the annexation of the Sandwich Islands to the United States As is known, leprosy is at present endemic in those islands, where the population to the extent of 10 per cent is suffering from the terrible plague. Then, as the United States will endeavour to protect their ports on the Pacific Ocean against the inroads of the disease, it is to be feared that the immigrants, or travellers, rejected by the United States authorities will take the way of our ports in British Columbia, and these will be more exposed than previously to an invasion of leprosy if necessary means are not taken to prevent it from going through our quarantines.

We have reason to believe that the carrying out of the above recommendations, will not only make the actual uneasiness disappear, but will bring about excellent results for the future, results more than sufficient to warrant this investigation which is, we believe, the first undertaken since the Lazaretto has passed under the control and responsibility of the Federal Government.

Montreal, November 14, 1898.

E. P. LACHAPELLE,
A. VALLÉE.
EM. P. BENOIT,
Secretary.

The Honourable
The Minister of Agriculture,
Ottawa.

COPY OF THE MONTHLY BILL OF FARE DEPOSITED IN THE KITCHEN BY DIRECTION OF THE COOK.

First Week.

Sunday—Morning, meat pies ; noon, rice soup, steak ; evening, doughnuts.
Monday—Morning, porridge ; noon, soup boiled beef, turnips ; evening, pies.
Tuesday—Morning, codfish and broiled pork ; noon, stewed meat ; evening, puddings creuses.
Wednesday—Morning, fricassee (meat) ; noon (engraissé) stuffed codfish ; evening, biscuits.
Thursday—Morning, pancakes ; noon, soup, roastbeef ; evening, pain doux.
Friday—Morning, boiled eggs ; noon, soup, codfish ; evening, pain doré.
Saturday—Morning, codfish fricassse ; noon, soup, pies ; evening, preserves.

Second Week.

Sunday—Morning, fried eggs ; noon. rice soup, roast ; evening, short pastry.
Monday—Morning, mullet ; noon, soup, boiled beef, turnips ; evening, fricassee.
Tuesday—Morning, beans ; noon, soup, pot en pot ; evening, pies.
Wednesday—Morning, bœuf à la sauce ; noon, soup, codfish, broiled pork ; evening, hot rolls.
Thursday—Morning, meat pies ; noon, stew ; evening, ginger snaps.
Friday—Morning, porridge ; noon, pancakes, soup ; evening, codfish fricassee.
Saturday—Morning, herring ; noon, soup, boiled beef, turnips ; evening, toasts.

Third Week.

Sunday—Morning, boiled eggs ; noon, rice soup, roast ; evening, ginger bread.
Monday—Morning, beans ; noon, soup, codfish, broiled pork ; evening, meat fricassee.

Tuesday—Morning, pap; noon, soup, pies (meat); evening, poudings creuses.
Wednesday—Morning, codfish; noon, soup, pancakes; evening, pain doré.
Thursday—Morning, bœuf à la sauce; noon, soup roast; evening, doughnuts and others.
Friday—Morning, omelets; noon, soup, codfish balls; evening, apples.
Saturday—Morning, porridge; noon, stew; evening, pies.

Fourth Week.

Sunday—Morning, meat pies; noon, rice soup, steak; evening, short pastry, &c.
Monday—Morning, mullet; noon, boiled beef, soup, turnips; evening, grandpères with pork.
Tuesday—Morning, codfish fricassee; noon, soup, roast; evening, ginger snaps.
Wednesday—Morning, beans; noon, pancakes; evening, preserves.
Thursday—Morning, meat fricassee; noon, soup, roast; evening, hot rolls.
Friday—Morning, boiled eggs; noon, soup, codfish; evening, toasts.
Saturday—Morning, bœuf a la sauce; noon, soup, pot en pot; evening, herrings.
N.B.—Butter and bread at each meals, as well as tea, milk and coffee. The patients also partake of a light meal every day, besides the three meals mentioned above.

No. 13.

CANADIAN QUARANTINE REGULATIONS.

BY ORDERS IN COUNCIL BEARING DATES AUGUST 18, 1898, AND APRIL 4, 1899, IN VIRTUE OF CHAPTER 68, REVISED STATUTES, INTITULED: AN ACT RESPECTING QUARANTINE.

The whole of the Quarantine Service of Canada is under the administration of the Minister of Agriculture.
There is a medical officer as General Superintendent of Canadian Quarantines.
On the Pacific coast there is a Medical Superintendent of Quarantines for British Columbia.
Each Quarantine Station is in the immediate charge of a specially appointed medical quarantine officer.
At each unorganized maritime or inland quarantine station, the local Collector of Customs is the quarantine officer for the purposes of these regulations.

THE QUARANTINE STATIONS.

The Quarantine stations of Canada are:—
1. On the Atlantic coast:—
(*a.*) Grosse Isle, in the River St. Lawrence, with Rimouski, the Louise Embankment and the Grand Trunk Wharf at Lévis, as sub-stations, province of Quebec;
(*b.*) Halifax, the harbour and Lawlor's Island, in the province of Nova Scotia;
(*c.*) St. John, the harbour and Partridge Island, in the province of New Brunswick;
(*d.*) Sydney, Cape Breton, in the province of Nova Scotia;
(*e.*) Chatham, in the province of New Brunswick;
(*f.*) Charlottetown, in the province of Prince Edward Island;
2. On the Pacific coast:—
(*a.*) William Head, including Albert Head, in the Strait of Fuca, province of British Columbia, and also including as a sub station the port of Victoria; and,

(*b.*) Vancouver;

3. Every other port, on both coast, each such port being designated an Unorganized Maritime Quarantine Station;

4. And every inland Customs port on the Canadian frontier, between the Pacific and Atlantic oceans, each such port being designated an Unorganized Inland Quaran tine Station.

5. Every quarantine officer at a Quarantine Station in Canada, and every customs collector in his quality of quarantine officer, shall for the purpose of these regulations be a justice of the peace in virtue of the provisions of Sec. 5 of the Act respecting Quarantine, Chap. 68, Revised Statutes.

GENERAL PROVISIONS.

6. Every vessel arriving from any port outside of Canada at any organized Quarantine Station shall be inspected by a duly appointed quarantine officer, at the place duly appointed for such inspection, and shall not be allowed to make customs entry at any port in Canada until it has received a clean bill of health.

(*a.*) If a vessel from an infected port bound for a port in Canada, which is an unorganized Quarantine Station, has first to pass an organized Quarantine Station, it shall be held to call at such station before proceeding to its destination.

7. No person who shall be on board any vessel arriving from any port outside Canada at any organized quarantine station or who shall have gone on board any such vessel after such arrival and before such vessel has been inspected by a duly appointed quarantine officer, shall leave such vessel without the permission of such officer until such vessel shall have been declared by such officer free from infectious disease. Any person violating this Regulation shall be liable to a penalty not exceeding $400.00 and imprisonment for 6 months.

8. Every vessel from any port outside of Canada requiring quarantine inspection shall, on arrival at any port in Canada, display a yellow flag at the fore, for a distinctive quarantine signal, in order to inform the quarantine officer that his services are required, and any vessel arriving at night shall display a red light at the fore for such signal.

9. Coasting vessels from Newfoundland and from ports in the United States contiguous to Canada and free from infectious disease may, from time to time, be excepted from these regulations by order of the Minister of Agriculture.

10. Any of Her Majesty's ships of war or any transport having the Queen's troops on board, accompanied by a medical officer, and in a healthy state, is exempt from quarantine inspection and detention.

QUARANTINE DETENTION.

11. Every quarantine officer shall satisfy himself as to the presence or absence of infectious disease by the personal inspection of those on board or by the sworn statement of the captain or surgeon, in the form hereto appended, or by both.

12. Every vessel with infectious disease on board, or coming from an infected port or country, shall be liable to be detained at a quarantine station for disinfection, together with its passengers, crew and pilot, passengers' luggage and cargo;

(*a.*) A vessel may be detained at quarantine for disinfection during the time necessary for that purpose;

(*b.*) The time during which a vessel may be detained for quarantine of observation is the accepted period of the incubation of the disease quarantined against from the ascertained date of last possible exposure.

13. Any vessel so detained by order of the quarantine officer shall forthwith be anchored or moored in such position as the quarantine officer shall direct.

14. And whilst such ship is so detained no person shall leave the same, nor shall communication be allowed with such vessel, without permission from the quarantine officer.

15. The quarantine officer detaining any ship as aforesaid shall immediately notify the Minister of Agriculture, stating the cause of such detention.

16. Within the meaning of these regulations an infected port or country is a port or country where Asiatic cholera or other epidemic disease has been communicated to one or more persons through the medium of an infected person, personal effects or otherwise. A port or country is not considered infected when a single case or a small number of cases has been imported, and the disease has not been communicated from such cases.

HOURS OF INSPECTION—PUTTING BACK—COSTS.

17. Every vessel may be inspected during any hour of the twenty-four;

(*a.*) With the exception that in times of epidemic the Minister of Agriculture may direct that inspection shall only take place during the hours of daylight.

(*b.*) All quarantine inspections, except those under section 46 (*a*), shall be made without any charge against the vessel.

18. Any vessel shall have the option before breaking bulk to put to sea in preference to being quarantined, as provided by section 9 of the Act intituled 'An Act respecting Quarantine' chap. 68, Revised Statutes.

19. All costs incurred in the maintenance of healthy persons, who may have been exposed to infection, detained for quarantine of observation are to be at the charge of the vessel;

(*a.*) And the master of a vessel shall make arrangements with the quarantine officer for the landing of the necessary provisions and attendance of stewards for serving them in cases where passengers are landed;

(*b.*) Persons actually sick will be treated and taken care of in the quarantine hospitals, at the charge of the Government;

(*c.*) In the event of a vessel being allowed to proceed, leaving its passengers in quarantine, the subsequent transfer of such passengers from quarantine to the port of destination shall be at the charge of the vessel.

(*d.*) The appliances, materials and labour for disinfection are supplied by the Government without charge to the vessel.

QUARANTINABLE DISEASES.

20. The graver quarantinable diseases are: Asiatic cholera, small-pox, typhus fever, yellow fever and the plague. The minor: scarlet fever, enteric fever (typhoid), diphtheria, measels and chicken-pox.

(*a.*) In addition to the above recital, it is the duty of every quarantine officer to satisfy himself as to the presence or absence of any other contagious or infectious disease.

(*b.*) With respect to leprosy it is the duty of every quarantine officer, particularly on the Pacific coast, to satisfy himself as to the fact of the presence or absence of such disease among the passengers; and in the event of any case of such disease being found, the person affected shall not be allowed to land, but must be taken back by the vessel to the place whence he or she came.

PILOTS FURNISH INFORMATION.

21. It shall be the duty of every pilot to furnish the master of every vessel arriving at any port of Canada with a copy of these Regulations, under the penalty hereinafter prescribed.

RELATING TO VACCINATION.

22. Every passenger shall be required to furnish evidence, to the satisfaction of a quarantine officer, of having been vaccinated, or having had the small-pox.

23. The production of a certificate by a ship's surgeon, called "a protection card," and his testimony under oath verifying the truth of such certificate, may be taken by a

quarantine officer as evidence of such vaccination and protection. Such quarantine officer shall, however, from time to time, make personal examination of holders of such certificates to satisfy himself of the manner in which they have been issued.

24. Any person not having shown satisfactory evidence of having been vaccinated, or of having had small-pox, shall be vaccinated by a quarantine officer; or in the event of refusal shall be landed at the quarantine station, subject to detention for observation, and the expense of the maintenance of such person during such detention shall be a charge against the vessel.

(*a.*) A vessel arriving at any quarantine station in Canada will be less liable to the detention if the vaccination of all steerage passengers not showing proof of vaccination within seven years is insisted on before embarkation. The ship's surgeon should satisfy himself of such fact in the case of every passenger early during the voyage or at the time of embarkation if possible, in order to be able to answer the questions put to him by the quarantine officer.

25. In the event of small-pox having occurred on any vessel, every person on board not showing satisfactory evidence of having been vaccinated within seven previous years, or of having had the small-pox within that period, shall be vaccinated by or under the supervision of the quarantine officer; or in the event of refusal, shall be landed at the quarantine station, subject to detention for observation, and the expense of such person or persons during such detention shall be a charge against the vessel.

EXAMINATION.

26. The quarantine officer shall examine the surgeon or any officer of any vessel, under oath, touching the state of health of such vessel and of every person on board, in the form of the questions appended to these regulations.

ISOLATION.

27. Every vessel provided with an isolated hospital for men, and another for women, on the upper deck, ventilated from above and not by the door only, may, if the quarantine officer is furnished with satisfactory evidence that such hospital accommodation has been promptly and intelligently made use of, be allowed to proceed after the landing of the sick and the disinfection of such hospital as has been used; any vessel however, arriving with any infectious disease, without having such special isolated and ventilated hospital accommodation, or if having it, without satisfactory evidence that it has been promptly and intelligently made use of, shall be liable to be detained for disinfection at a quarantine station.

MAILS AT RIMOUSKI.

28. In the case of a vessel carrying Her Majesty's Mails and arriving by the St. Lawrence, clearance certificate shall be had from a quarantine officer at Rimouski on Grosse Isle, and in the case of every other vessel from Grosse Isle only, unless special permission to the contrary be obtained from the Minister of Agriculture;

(*a.*) With the exception that during a time of cholera or other epidemic, the permission to a mail steamer from an infected port or country to land passengers at Rimouski may be suspended by direction of the Minister of Agricuiture;

(*b.*) And, in such conditions, the mails only to be landed at Rimouski, and the vessel to proceed to Grosse Isle for inspection;

(*c.*) In the event of cholera having occurred on board of such vessel during the voyage, the outer bags containing the mail matter to be left on board the steamship for disinfection at Grosse Isle.

DISINFECTION OF LUGGAGE.

29. During a time of cholera or other epidemic, the luggage of immigrants or passengers by every vessel arriving at any port in Canada, whether from an infected or

healthy port or country, may by direction of the Minister of Agriculture be disinfected in each case.

(*a.*) When this disinfection is carried out at a sub-station, subsequent to the inspection and clearance at the main station, the clearance granted by the quarantine officer shall be conditional on the landing of immigrants and their luggage for disinfection.

(*b.*) The supervising officer of such disinfection to count the immigrants as they land, and if he finds the number tallies with that marked on the clearance of the quarantine officer and has satisfactory evidence that all their luggage has been landed with them, he shall punch the clearance at the place marked for that purpose, which shall then become valid for customs entry.

PASSENGER'S CERTIFICATES.

30. Every maritime quarantine officer shall punch each immigrant's 'International passenger certificate' where such are in use, in such manner as to convey to inland health officers the result of the quarantine inspection, as provided by such card or certificate.

(*a.*) Every maritime quarantine officer shall punch the schedule list of immigrants by destination, Province (or State if destined for the United States) where such is in use, which shall be furnished by the ship's surgeon on forms supplied by the Government, and shall forward such lists forthwith to the Secretary of the Board of Health in the Province or State to which such immigrants are destined.

STEAM TUGS.

31. Any steam tug or other vessel which shall have towed or otherwise communicated with any vessel of the class of vessels subject to quarantine or quarantine inspection shall thereby be held to the same regulations and requirements as apply to the vessel communicated with;

(*a.*) If the communication between the vessel and the steam tug is confined to attachment of a rope, afterwards loosed, the quarantine officer may decide to release such tug from quarantine detention.

RAGS.

32. Rags coming from a port or country in which infectious disease prevails, may be prohibited, and the name of any port or country so affected shall, from time to time, be published in the *Canada Gazette:*

(*a.*) Rags arriving from prohibited ports at a quarantine station shall be liable to be burnt or otherwise treated on the order of the Minister of Agriculture based on a report of the quarantine officer.

NEW MERCHANDISE.

33. New merchandise in general may be accepted without question.

IN TIMES OF EPIDEMICS.

34. Passengers during a period of epidemic disease should be notified by steamship agents to dispense as far as possible with luggage that may be injured by wetting, in case of having to undergo disinfection—such as fabrics, of which the dyes are likely to run,—as the owners will be compelled to assume all risks of injury.

35. Vessels during a period of epidemic disease should dispense as far as possible with woollen hangings, curtains, carpets and upholstering, substituting non-absorbing coverings.

36. Every vessel carrying cargo, and liable to be disinfected, should have provided a plain frame shaft, allowing a clear inside space of 12 inches each way, placed in the

main hatch, in a sailing vessel; and one in each hatch of a steamship, divided by bulkheads. The frame work of this shaft to be set before loading and to extend from the hatchway to the bottom of the vessel. This simple arrangement would receive the fumigating pipe and avoid shifting cargo.

PASSENGERS.

37. Passengers, for the purpose of these regulations are divided into two classes, cabin and steerage. Steerage passengers are those occupying compartments other than those of first and second cabin.

METHODS OF DISINFECTION.

38. The methods of disinfection at the quarantine stations of Canada shall be as follows:—

(*a.*) Exposure to steam not less than thirty minutes, steam to be of a temperature of not less than 100° Centigrade (212° Fahrenheit) nor greater than 115° Centigrade (239° Fahrenheit);

(*b.*) Articles that would be destroyed by the above method, to be disinfected by thoroughly wetting with a solution of mercuric chloride, of one part to one thousand, or approximately one drachm to one gallon, wine measure, applied by means of a brush, or by drenching, or by immersion, or;

(*c.*) Where sulphur dioxide is used, it is to be provided by burning not less than three pounds of rolled sulphur per 1,000 cubic feet of space, or if it is used in liquid form, in the same proportionate strength, and the period of exposure to be not less than six hours, or;

(*d.*) Where formaldehyde gas is used, it is to be employed of not less than two per cent per volume strength, the time of exposure to be not less than twelve hours. The gas may be made by one of the following methods:

(1) From methyl (wood) alcohol by means of special lamps, using not less than 600 grammes (750 cubic centimetres, 1⅓ pints) of methyl alcohol for each 25·5 cubic metres (1,000 cubic feet) of space, the time of exposure to be not less than twelve hours.

Lamps used for generating formaldehyde gas from methyl alcohol should change not less than one litre (1·0 quart) of the alcohol within an hour.

(2) From an aqueous solution, containing forty per cent of the gas, known under the names of formalin, formal or formalose. The gas is best evolved from these solutions by the addition of from ten to thirty per cent of a neutral salt, preferably calcium chloride or sodium nitrate, and heating the mixture in a special boiler. One litre of a forty per cent solution of formaldehyde gas will evolve about 1,425 litres (50·1 cubic feet) of the gas at 20° C. (68° F.) and will be sufficient for seventy-one cubic metres (2,505·5 cubic feet) of space.

After the disinfection of apartments (steerage, cabin and forecastle) by formaldehyde gas, the latter should be neutralized by ammonia gas, evolved from water of ammonia by heat, or by evaporation from water of ammonia sprinkled upon the floor.

NOTE.—The quantity of water of ammonia required for neutralization after each of the above named methods is as follows:—After method (1) 1 litre (1·01 quart) of water of ammonia for each 1,000 cubic centimetres (1·01 quart) of wood alcohol used; after method (2) 1¼ litre (1·26 quart) of water of ammonia for each litre (1·01 quart) of formalin; after method (3), 1 litre of water of ammonia for each 150 grammes (5 ounces) of trioxymethylene.

Formaldehyde may also be employed in the ordinary steam disinfection chamber, where this is provided with a vacuum apparatus and special apparatus for generating and applying the gas. The gas should be applied in a dry state in not less than 20 per cent per volume strength, the time of exposure to be not less than one hour. Clothing, bedding, &c., thus disinfected, should be exposed *in situ* to an equal amount of ammonia gas generated by the special apparatus attached to the chamber, using one litre of water of ammonia to each litre of formalin; or compressed ammonia gas may be used.

NOTE.—The special apparatus must consist of a generator, constructed of copper, for evolving formaldehyde gas from its solutions, and a similar one of iron for evolving ammonia gas from neutralization.

39. The disinfection of iron vessels shall be as follows, as may be required :—

(*a.*) *Holds.*—After mechanical cleansing, the hold to be thoroughly washed with an acid solution of mercuric chloride, 1 to 800 (mercuric chloride one part, hydrocholoric acid two parts, water 800 parts), applied to all surfaces by means of a hose. If danger is apprehended from the poisonous effects of the mercury deposited on the surfaces, they can be subsequently washed down with clean water. Fumigation by sulphur dioxide or by formaldehyde may also be employed.

(*b.*) *Steerage.*—The same treatment should be given the steerage as the hold, but when there is a steam pipe provided for each compartment (for the prevention of fire), steam disinfection of the steerage should be practised. The temperature in all parts of each compartment to be not less than 100° C. (212° Fahr.);

(*c.*) *The forecastle or apartment for crew.*—After mechanical cleansing the application of mercuric chloride in the manner hereinbefore prescribed, or sulphur dioxide or formaldehyde, or steam disinfection, if facilities are provided for the same, should be employed.

(*d.*) *Officers' quarters, cabin, state-rooms, &c.*—Each compartment to receive the same treatment, under the same conditions as hereinbefore specified, it being borne in mind that the decorative metal work in cabins, saloons, &c., would be injured by the use of the mercuric chloride solution, and therefore in such cases other forms of disinfection are to be used as determined by the quarantine officer.

40. The disinfection of wooden vessels shall be as follows, as may be required :—

(*a.*) Fumigation by sulphur dioxide made by burning not less than 3 pounds of rolled sulphur to each 1,000 cubic feet of space; or by the use of liquid sulphur dioxide in the same proportionate strength; and the period of exposure to be not less than twenty-four hours.

(*b.*) Or fumigation by formaldehyde as above detailed.

(*c.*) Washing or flushing with acid solution of mercuric chloride (1 to 800). Cabins, forecastle and other apartments to be thoroughly washed with mercuric solution.

41. In all classes of vessels, all clothing, bedding, curtains, &c., to be subjected to steam for thirty minutes at from 100° C. (212° Fahr.) to 115° C. (239° Fahr.)

42. In all classes of vessels, the bilges to be first flushed with sea or river water, pumped out, and then treated with acid solution of mercuric chloride in large quantity, and allowed to remain in long contact.

UNORGANIZED MARITIME QUARANTINE STATIONS.

43. At every port at which there is no regular quarantine station, the collector of customs shall be the quarantine officer for the purpose of these regulations; and in the event of disease, such collector may for the purposes of these regulations call in the services of a medical man, who shall, while so acting, be held to be a quarantine officer; and every such port shall be designated an unorganized maritime quarantine station.

44. Every vessel arriving at an unorganized maritime quarantine station from an infected port, or on board of which any death from infectious disease or outbreak of infectious disease has occurred during the voyage, shall remain outside until it receives permission to enter from the quarantine officer.

45. All the regulations applicable to regularly organized maritime quarantine stations shall also apply to every unorganized maritime quarantine station in so far as circumstances will admit, and particular the provisions in relation to inspection, anchoring or mooring, disinfecting, customs clearings, putting back to sea before breaking bulk, questions to ship's surgeon or officers, and penalties.

46. Any collector or sub-collector of customs in his quality of quarantine officer at any unorganized maritime quarantine station in Canada, if he is informed of or has reason to suspect the presence of any of the graver quarantinable diseases recited in section 20 of these regulations, shall order a medical inspection to be made of the vessel bringing such disease;

(*a.*) In the event of a vessel arriving at an unorganized maritime quarantine station with quarantinable disease on board, the master shall pay a fee of $4 for each medical

inspection ordered by the quarantine officer, and such fee or fees must be paid before customs clearance is granted.

(*b.*) If no disease is found on board a vessel arriving at an unorganized maritime quarantine station and ordered to be inspected by the quarantine officer, the cost of such inspection shall not be a charge against the vessel, but will be defrayed by the Government.

(*c.*) If the disease found on board a vessel, or the history, conditions, or circumstances of a vessel be such as may seem to the collector or sub-collector of customs to be beyond the capabilities for isolation or disinfection existing at an unorganized maritime quarantine station, he shall at once report the same to the Minister of Agriculture, who may, at his discretion, order that the vessel proceed to an organized quarantine station for quarantine clearance, before being allowed to make customs entry. And in such case the expense of the transfer of the vessel of the unorganized maritime quarantine station shall be a charge against the vessel.

UNORGANIZED INLAND QUARANTINE STATIONS.

47. Every inland port on the frontier of Canada between the Atlantic and Pacific oceans, at which there is a collector or a sub-collector of customs, shall for the purpose of these regulations, be constituted an unorganized inland quarantine station.

48. Every collector or sub-collector of customs at every such inland frontier port shall be the quarantine officer.

49. Any collector or sub-collector of customs in his quality of quarantine officer at any unorganized inland quarantine station in Canada, if he is informed of or has reason to suspect the presence of any of the graver quarantinable diseases recited in section 20 of these regulations shall, in time of cholera or other epidemic disease, order a medical inspection to be made of the car, carriage, vehicle, boat or thing bringing such disease;

(*a.*) And such quarantine officer is empowered to detain such car, carriage, vehicle, boat or thing, until such medical inspection shall have been made to his satisfaction;

(*b.*) A medical man making such inspection by order of the quarantine officer shall, while engaged in such service, be the quarantine medical officer.

50. The fee payable to such quarantine medical officer for each such inspection shall not exceed the sum of $4, and in the event of any quarantinable disease being found, such fee shall be payable by the company or owner of the car, carriage, vehicle, boat or thing, bringing such disease.

51. The customs collector or sub-collector in his quality of quarantine officer shall, on the report of the quarantine medical officer, in a time of epidemic disease, in the event of any of the graver quarantinable diseases being found, cause the detention of the car, carriage, vehicle, boat or thing, bringing any person ill with such infectious disease until the requirements of these regulations are in his judgment satisfied;

(*a.*) Any such person shall not be allowed to enter Canada until in the opinion of the quarantine medical officer he or she can safely do so;

(*b.*) Any car, carriage, vehicle, boat or thing, bringing such person to the frontier shall have the option of returning as an alternative to quarantine detention; or

(*c.*) The customs collector or sub-collector in his quality of quarantine officer shall in his discretion, on the report of the quarantine medical officer, cause the removal and isolation of such person in any car or boat, set apart for the purpose, or in any suitable building sufficiently separated from other buildings to prevent contact or infection;

(*d.*) And such quarantine officer may cause the disinfection of the car, carriage, vehicle, boat or thing bringing such person, by means of sulphurous fumes, or any other mode of disinfection prescribed in these regulations adapted to the circumstances of the particular case.

52. In the event of cholera or other epidemic disease prevailing in any part of the United States through which a railway crossing the frontier of Canada runs, the Governor in Council may, on an order published in the *Canada Gazette* or in an extra of the *Canada Gazette*, made on a report of the Minister of Agriculture, and where there may not happen to be at that point of the frontier any adequate quarantine arrangements

and apparatus to cope with an inroad of such epidemic disease, direct the complete cessation of passenger traffic at such point; or such restriction thereof as may, in the circumstances, be deemed advisable.

QUARANTINE OFFICERS GIVE ALL NECESSARY ORDERS—PROHIBITED FROM RECEIVING FEES OR GRATUITIES.

53. Every quarantine officer is empowered to give any necessary order, or do any necessary act, to enforce these regulations, and it is his duty to report immediately to the Minister of Agriculture any breach or attempted breach of them.

(*a.*) No quarantine officer nor other person employed in the quarantine service of Canada shall directly or indirectly receive or take any fee or private gratuity or reward for any service rendered to any company, or owner, master, or crew, passenger, or other person at or detained in any quarantine, maritime or inland.

(*b.*) Every person to whom the knowledge of any breach of these regulations may come should forthwith report the same to the Minister of Agriculture.

Penalties for customs officers, pilots, masters, surgeons and officers of vessels, &c.

54. Every pilot shall be furnished with printed copies of these regulations, one of which it shall be his duty to hand to the master of every vessel coming from a port outside of Canada, immediately on boarding such vessel, under a penalty of $50.

55. Every collector of customs or customs officer shall be liable to a penalty of $400, and imprisonment for six months, for allowing customs entry of any vessel in the absence of production of a quarantine clearance, in accordance with the requirements of these regulations.

56. Every master of a vessel, pilot, or other person, shall be liable to a penalty of $400 and imprisonment for six months, for any contravention of any of the foregoing regulations. The vessel shall be held liable for any pecuniary penalty imposed on the master.

57. Every ship's surgeon or other officer not answering with exact truth any of the questions contained in the form hereunto appended shall be liable to a penalty of $400 and imprisonment for six months.

58. Every breach of sub-section (*a*) of section 53 of these regulations shall be held to be a malfeasance of office, an offence punishable with dismissal, fine or imprisonment.

Questions to be answered under oath to quarantine officers by masters, surgeons or officers of vessels.

Date

1. What is your vessel's name and your name?
2. From what port and at what date did your vessel sail?
3. What is your cargo and whence taken on board?
4. Are there any rags in such cargo?
5. Has your vessel touched at any place or places on her voyage?
6. Was such place or places, or any of them, to your knowledge, infected with cholera, small-pox, plague or any pestilential fever or disease?
7. How many persons were on board when the vessel sailed? Cabin passengers ; intermediate ; steerage ; cattlemen ; crew . Total .
8. State whether any person on board during the voyage has been, or is now, ill with any of the diseases above referred to, and if so, how many?
9. Has any person died on board during the present voyage, and if so, state all particulars?
10. Has each of the steerage passengers on board been vaccinated or had the small-pox?

11. Did the vaccination of steerage passengers take place at time of, or before, embarking.

12. How many have you vaccinated on your present voyage?

13. *(Question to be asked, in the event of small-pox having occurred during the voyage, of ship's surgeon, if such is on board*—Have you personally during the present voyage, examined each one of the passengers and crew for proof of vaccination within seven years, or of having had the small-pox in that period?)

14. Did you or any of the crew or passengers, within your knowledge, land at any place or places within Canada during the present voyage?

15. Is there any person on board lunatic, idiotic, deaf and dumb, blind or infirm, and if so, is such person accompanied by relatives or guardians?

16. Have you an isolated hospital for men, and another for women, ventilated from above and not from the alley-way?

17. Were such hospitals, or one of them, immediately made use of on the occurrence of disease?

18. Are there any other facts which, in your opinion, should be communicated?

(Signature) *Master.*

(Signature) *Surgeon.*

I, *Master,* / *Surgeon,* / *(here state whether ship's master, or occupying another position on board)* do solemnly and sincerely swear to the exactness and truth of the answers to the above questions signed by me. So HELP ME GOD.

Master.

Surgeon.

SWORN before me at this day of 1 .

Quarantine officer and Justice of the Peace, authorized by Order in Council in virtue of Chap. 68, Revised Statutes, intituled 'An Act respecting Quarantine.'

CATTLE QUARANTINE.

No. 14.

REPORT ON THE CATTLE QUARANTINES IN CANADA FROM NOVEMBER 1, 1898, TO OCTOBER 31, 1899.

(PROFESSOR D. MCEACHRAN, F.R.C.V.S., V.S. Edin., D.V.S. McGill, Chief Inspector of Live Stock for Canada.)

SIR,—I beg to transmit herewith my twenty-third annual report on the cattle quarantines of the Dominion, and to append hereto the reports of the pathologists, and the inspectors employed throughout the country.

It will be seen that the importation of breeding stock has slightly increased as compared with the previous season, and that the exportations have decreased in both cattle and horses, but increased slightly in sheep.

The decrease in exportations via maritime ports is the result of a diversion of trade to the United States; the enormous demand for Canadian animals for feeding purposes by United States buyers has depleted Canada of young stock for several years back and the shortage is now apparent in exportable animals. The shortage in North-west animals is less than might have been expected when the increased demand to supply the mining camps of British Columbia and the cessation of shipping, owing to the difficulty in obtaining space on ships, due to a large number of vessels engaged in this trade having been chartered as transports for South Africa, are taken into consideration.

It is very gratifying to again report the continued healthfulness of live stock throughout the country, but few outbreaks of disease having called for special investigation.

Tuberculosis is rapidly decreasing. *Hog cholera* occasionally breaks out in old centres, but it is also decreasing and has disappeared almost entirely in several of the hitherto most infected centres. *Glanders* is almost unknown in the older provinces, but still continues to be discovered in Manitoba and the North-west Territories, where, however, it is largely, if not entirely, traceable to importations from the southern side of the international boundary line. *Scab in sheep* is at present unknown to exist in any of the maritime provinces, and to but a limited extent in Ontario. One outbreak occurred near Macleod, Alberta, which was stamped out by the owner voluntarily slaughtering the entire flock. Another flock was similarly dealt with in the Rosebud district, north-east of Calgary. The country may, therefore, be said to be almost entirely free from this disease. No scab was discovered in 62,308 sheep inspected at the shipping ports, and but two sheep were reported as affected by this disease on arrival in England. *Mange in cattle*, I regret to say, exists to a considerable extent among range cattle in Alberta and Assiniboia, but, as will be seen by the reports, the entire infected area is under quarantine and effective measures are being employed to eradicate the disease during the coming season.

The Seventh International Veterinary Congress.—I beg specially to call your attention to the conclusions of the Seventh International Veterinary Congress, held at Baden-Baden in August last, which contain valuable suggestions with regard to prevention of disease, many of which I am happy to say, in so far as they apply to this country, are gratifying endorsations of the established methods of your department, and of recommendations made from time to time, especially with regard to tuberculosis.

I have the honour to be, sir,

Your obedient servant,

DUNCAN McEACHRAN, F.R.C.V.S.,

V.S. EDIN., D.V.S. McGILL,

Chief Veterinary Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

IMPORTATIONS AT QUARANTINE PORTS, MARITIME CATTLE QUARANTINES.

—	Cattle.	Horses.	Sheep.	Swine.	Mules.
Levis Cattle Quarantine, Quebec	227	6	696	9	
St. John, New Brunswick	14	20	61		
Halifax, Nova Scotia		2			
Charlottetown, P.E.I.	7				
	248	28	757	9	

Of these 45 cattle and 83 sheep were for the United States.

IMPORTATIONS FROM UNITED STATES.

—	Cattle.	Horses.	Sheep.	Swine.	Mules.
Sarnia, Ont	34			30	
Windsor, Ont	30	6		27	
Emerson, Man	86		28	51	2
North Portal, N.W.T	646	1,316		756	
Coutts, Alta	15	347	7	3	
Lethbridge, Alta	318	568	103	4	
Nelson, B.C	45	37	8,356	194	
Vancouver, B.C	1,706	288	3,943	391	
Victoria, B.C	2	423	731	1	7
Grand Forks, B.C.	48	238		123	
	2,930	3,223	13,168	1,580	9

As will be seen by reference to the reports of the inspectors, no disease was discovered in the animals imported from Europe within the dates of this report.

I have much pleasure in reporting that the duties of the quarantine were most satisfactorily conducted by Drs. Couture, at Quebec, Jakeman, at Halifax, Frink, at St. John, and Leckie, at Charlottetown, P.E.I.

SESSIONAL PAPER No. 8

EXPORTATION OF LIVE STOCK FROM MARITIME PORTS.

TABLE showing numbers shipped during the past five years.

Year.	Cattle.	Sheep.	Horses.	Swine.
1895	99,606	187,338	....	....
1896	101,502	117,428	11,531	.....
1897	117,428	62,406	10,651	....
1898	111,948	47,050	7,057	.....
1899	97,014	62,308	4,980	174

SHIPMENTS FROM EACH PORT.

		Cattle.	Horses.	Sheep.	Swine.
Montreal		89,065	4,866	54,494	.....
St. John, N.B.		6,777	....	.....	....
Charlottetown, P.E.I.	Great Britain	1,069	85	6,402	174
	Bermuda				
	West Indies				
	St. Pierre				
	Newfoundland				
Halifax	Bermuda	39	9	456	....
	West Indies	21	7	478	.....
	Jamaica	43	1	418	.....
	Newfoundland	....	.....	10	....
	Cuba	.....	.....	50	....
	United States	....	8	.....	.....
	Europe	....	4	....	.....
		97,014	4,980	62,308	174

Table showing number from United States in above :—

	Number.
Cattle	14,006
Horses	1,443
Sheep	8,107

It will be seen that there is a marked decrease in the number of cattle exported at these ports, an increase in sheep, and a decrease in horses. This was anticipated in the report for 1898, owing to an actual reduction in the number of cattle in Canada resulting from the large purchases of stockers by United States feeders.

The following table furnished by the Customs Department shows, for the past year, a slight decrease in the total number and a slight increase in the value of cattle exported from Canada to the United States :—

EXPORTATION OF CATTLE TO UNITED STATES.

	Number.	Value.
For year ended September 30, 1898 :—		
Cattle	88,605	$1,270,869
For year ended September 30, 1899 :—		
Cattle	85,301	1,278,590

It is not difficult to foresee a still further reduction in exportations next year from both Canada and the United States. The breeding of cattle at present does not keep pace with the exportation. Prices must rise and farmers and others should not too readily part with any but fat stock.

I have much pleasure in reporting that no disease of a contagious nature was found in the animals sent to the shipping ports for export.

As will be seen by the inspectors' reports, herewith appended, very few animals were kept back from any cause.

Animals kept back in Montreal—

	Cattle.	Sheep.	Horses.
For actinomycosis	24	.	.
" injuries	10	41	..
" strangles	.	..	4
" influenza	..	..	21

Animals kept back at St. John, N.B.—

For actinomycosis	5	..	..
" injuries	2	..	.
" suspected scab	.	2	
Total	41	43	25

Of these, except those affected with actinomycosis, the sheep suspected of scab were rejected, but the injured animals and the horses were sent forward after they had recovered.

I have much pleasure in reporting that the duties of inspection were satisfactorily conducted at Montreal by Doctors Baker, C. McEachern and B. A. Sugden; by Dr. J. H. Frink at St. John, N.B., and Dr. Wm. Jakeman at Halifax, N.S.

EXPORTATION FROM MANITOBA AND THE NORTH-WEST TERRITORIES.

The general freight traffic manager of the Canadian Pacific Railway kindly furnished the following table of live stock carried by that company from Manitoba and the North-west Territories from November 1, 1898, till October 31, 1899, for export from Canadian ports :—

	Cattle.	Sheep.	Horses.	Swine.
Manitoba	3,653	193	..	..
North-west Territories	27,005	....	25	6
	30,658	193	25	6

This is a decrease from last year of 2,417 cattle, 1,155 sheep and 3 horses.

Speaking generally of the exportations during the past season, the quality and condition of the stock were much improved, and it is gratifying to find that breeders are beginning to improve their stock by using thoroughbred bulls. This applies in a marked degree to the ranch-bred cattle. Large numbers have been placed on the ranches during the past two summers, and very few of the old range scrub bulls now remain. If stock raising is to be made profitable, the more pure blood that is infused into the cattle the better they will pay. In fact, Canadians need not expect to hold their own with their competitors, especially the Argentine Republic, unless immediate and strenuous efforts are made to improve the breeding of the herds.

SESSIONAL PAPER No. 8

SCABIES, MANGE, ITCH.

While of frequent occurrence in sheep and occasionally in horses, this disease is rare in cattle.

It usually appears in the autumn as winter is setting in, reaching its worst stage about February or March, recovery appearing to take place as summer advances. It generally is seen to commence at the root of the tail, neck or shoulders, and often spreads over the whole body. The itching is frequently intense and prevents the animals from feeding or resting, consequently they become emaciated. From the abrasion of the skin by rubbing against fences, buildings, tree or rocks, sores are produced and vessicles form from which a viscid fluid exudes. This fluid dries and forms crusts or scabs, which often become hard, ulcers forming underneath; the skin thickens and cracks, the hair falls off, and the animals present a not very attractive appearance.

The mites or acari causing this disease resemble cheese mites and, like them, may be seen by aid of a magnifying glass. Often when numerous and when the animal is held in bright sunlight they may be seen as minute whitish specks by the naked eye, or they may be transferred with the scab to the surface of black paper, when they will be found in clusters readily visible on the black surface, but they are best seen by the aid of a microscope with a lens of low power.

They belong to the order *Acaridae*, class *Arachnidas*, family *Psoroptes* (Dermatodectes).

The *Dermatodectes Communis* is that usually found in enzootic mange in cattle, and only their discovery should be relied upon to warrant the diagnosis. While several other conditions will produce loss of hair *(Alopecia)*, it requires the actual presence of the acari to constitute the mange.

We are indebted to the late Professor Gerlach, of Berlin, for much valuable research work on the life history of these parasites. 'They deposit their ova on the skin; when seven days old, the acari are ready for procreation, and probably about the twenty-third day a second generation appears.' Gerlach makes the following calculation, estimating the product of each female as fifteen and allowing the procreative faculties to be in operation when these are fifteen days old, he gives an increase which affords some idea of the rapidity with which the parasites breed:—

			Females.	Males.
'1st generation after	15 days	.....	10	5
2nd "	30 "	.....	100	50
3rd "	45 "	.....	1,000	500
4th "	60 "	.....	10,000	5,000
5th "	75 "	.....	100,000	50,000
6th "	90 "	.....	1,000,000	500,000

'Thus a male and female will produce 1,500,000 descendants in about three months.'—*Fleming's Sanitary Science and Police.*

It takes fourteen to sixteen days from the date of transference of the acari to the skin before any marked symptoms are noticeable. Therefore, treatment should be commenced as soon as the disease is discovered. We also learn from this that dipping or dressing should be repeated at least within fifteen days so as to kill the fresh crop before they commence breeding.

The disease spreads readily by the cattle rubbing against one another, whereby the acari or the eggs on the diseased animals are transferred to the hair or skin; also by rubbing against a fence, post, tree, rock or wall where an infected animal has previously rubbed.

The hands, clothing, halter, rope, or anything that by contact has attached to it the parasites or their eggs, may spread the disease.

The treatment being followed in the present epizootic outbreak in Alberta consists of immersion in a solution of impure carbolic acid, quick lime, carbonate of soda and

soft soap (a modification of Zundel's prescription for sheep scab*). A tank leading from corrals with an incline into and out of the plunge bath and a dripping pen and chute at the other side, is so constructed that when in proper running order from 600 to 800 a day can be dipped.

MANGE IN CATTLE ON ALBERTA RANGE.

On February 10 last Inspector Wroughton, D.V.S., N.W.M.P., Macleod, Alberta, reported the prevalence of a cutaneous affection existing extensively in range cattle in the Little Bow and Lethbridge districts, as well as in the Maple Creek district. Again, on February 28, he reported as follows:—'Since writing you I have made further investigations and discovered the existence of true parasitic mange.' On March 21, Dr. Wroughton mailed a portion of skin and a slide, showing the acari mounted. At the same date, a letter was mailed from a ranch proprietor reporting having 'received information from the manager that mange or skin disease existed among the cattle; that there was a good deal of it, and that they thought some of it at least was the mange,' and asking 'what treatment has been found efficacious.'

On March 24 I addressed a somewhat lengthy communication on the subject to the secretary of the Western Stock Growers' Association, suggesting that a circular letter be issued to the stockmen informing them of the existence of this contagious disease and of the damaging effect it had on cattle, preventing them from thriving during the summer and resulting in the death of many during the winter, and stating that it was the duty of every cattle owner to give all the assistance in his power towards its extermination. In the communication referred to were also prescriptions and directions for the treatment of the cattle for embodiment in the proposed circular.

I also addressed a similar letter to the president of the Western Stock Growers' Association, to which he replied that a prominent stockman expressed an opinion that it was not mange, but Texas itch, which would disappear during summer. In reply to this, I sent the following letter:—

'D. W. MARSH, Esq.,
'President Western Stock Growers' Association,
'Calgary, Alberta.

'DEAR MARSH,—I have your letter of April 6 with reference to the disease of mange in cattle. I observe that Mr. Andrews and others express the opinion that the disease is not mange due to a parasite, but what has long been known as "Texas itch," which I describe in my report just about to be issued as "Alopecia," or baldness, due to a variety of causes.

'We have been in the habit of seeing this condition among range cattle occasionally, ever since I have been in the business. This disease, however, is a true mange, and the acarus has been demonstrated both by Dr. Wroughton, Fort Macleod, and by ourselves here in Montreal. There is no question whatever as to the parasitic nature of the disease; nor of its serious character.

'In a letter which I received from D. Warnock, M.R.C.V.S., local manager of the New Walrond Ranch Company, who, as you know, is a veterinarian of considerable experience, in writing to him for his opinion of the reports which were reaching me through the Department of Agriculture from the outposts of the Mounted Police, he replied:—

'"A great many of the cattle in the Lethbridge district are affected with mange, and during the severe weather in February numbers of young cattle and even three year old steers died. We have had a few cases of mange here among cattle we brought from Lethbridge last June, but have cured them by frequent applications of sheep dip. Something will have to be done in the way of stamping out mange, or it will cause

*This, if necessary, can be made more effective by the addition of tobacco juice as recommended by Prof. Ostertag, of Berlin.

serious losses in winter. All of our affected animals would have died if they had not been taken in and treated. Affected cattle rub themselves raw, and are pitiful looking objects in cold weather.

'You will thus see that the matter is one requiring immediate and active attention from the association, and, as a matter of fact, it is encumbent upon us to deal with it from the health-of-animals standpoint, and I intend to recommend that a mounted police constable, and staff-sergeant accompany each of the roundup parties, so as to make sure that these cattle are properly attended to.

'I intend to get to Alberta as early in May as possible, and will probably ask you to call a meeting for the purpose of considering how best to deal with this matter, with least inconvenience to the stockmen. It is more than probable that we may have to prevent cattle belonging to the northern ranges found in the Lethbridge district being taken back to their own ranges, for fear of extending this disease on these ranges.

'I trust that the suggestions which I have already made will be carried out, as near as possible to the letter.

'It may possibly be necessary for some joint arrangement to be made to collect all these mangy cattle into one herd and to herd them by themselves in some place where proper dipping and dressing arrangements can be provided for attending to them.

'I trust that the meeting will accept the statement of fact, with reference to this disease not being that form of alopecia which disappears when the green grass comes, as it is not, being a true parasitic disease which must be treated by some application which will destroy the parasites.

'The postscript to your letter is somewhat alarming, and I trust that when the actual facts are known, a large discount may be taken off the number reported dead. I think it will be found that a very large percentage of these will be found to be cattle brought in from Ontario, known by the stockmen as "doggies."

'Yours very truly,

'(Sgd.) D. McEACHRAN,

'*Chief Inspector.*'

I also handed the following letter to the secretary of the Western Stock Grower's Association, with a request that he send it as a circular letter to each member of the committee of the association, which was done. On the suggestion of two or three members it was also published in the Macleod *Gazette*:—

'WESTERN STOCK GROWERS' ASSOCIATION,
'OFFICE OF SECRETARY-TREASURER,
'MACLEOD, ALBERTA, June 1, 1899.

'DEAR SIR,—The serious menace to successful stock-raising in the territories through mange in cattle being permitted to exist and extend among the herds, calls for more than ordinary measures being resorted to to arouse in the minds of the cattlemen a full appreciation of its importance.

'I regret to learn from the most reliable sources that this disease exists in cattle owned in Alberta from the boundary line as far north as Mosquito Creek and from the mountains as far east as this territory extends. It also exists in the adjoining territory of Assiniboia.

'It is a mistake to suppose that this is a non-contagious disease or alopecia. It is a true scabies, or mange. It is becoming more prevalent since domestic cattle have been introduced on the ranges in large numbers, because these cattle herd closer together, and hang around buildings and fences, and by rubbing against them readily transfer the acari, or their eggs left on the wood by infected animals having previously rubbed themselves.

'Many animals present a mangy appearance owing to irritation produced by lice; some also from feeding on coarse herbage. These conditions are easily distinguished

from mange. In mange there is considerable irritation about the neck, root of the tail, and in bad cases it may extend over the whole body. By rubbing against fences, trees or rocks the skin becomes abraded and sores form, which become covered by thick scabs, the skin wrinkles and the hair falls off. As a result of this constant irritation they feed but little, become emaciated from want of rest and sleep, and thus are unable to live through the winter and many die.

'The suggestion that every owner should bring his infected cattle to his home ranch, if carried out would most assuredly extend and perpetuate the disease, by infecting corrals, buildings and fences, as well as by direct contact with healthy animals, besides it would be a very troublesome and expensive method, nor could it be relied upon as effective, as it is well known that many cattlemen are at times not as careful as they ought to be. Clearly, mutual co-operation is the common sense way of dealing with it. I would suggest that the association assume the expenditure necessary for the erection of a dipping station on the most suitable location, where all mangy animals would be sent to be herded and dipped till cured. This would require the services of three or four men for, say, two months; the dipping vats and corrals would cost, say, $300. No owner would object to pay a fair share of this necessary expense, rather than lose time and go to ten times more expense by attempting to dress them at home. It will be readily understood, also, that those who have no mangy cattle now should be the most desirous of stamping out this contagious disease, knowing that unless it is done their cattle must inevitably be infected sooner or later; consequently, every cattle owner is interested and should contribute towards the expense.

'Another reason why a general combined effort should be made now is, that this being a contagious disease, quarantine measures must be enforced under the "Animal Contagious Diseases Act," the regulations governing which have been communicated to you by the secretary of the association, as applied to sheep scab, and these apply equally to mange in cattle and horses, and you will readily see that such measures, if rendered necessary through the indifference of the stockmen themselves, will be attended by very great inconvenience.

'I trust, therefore, you will attend the meeting called to consider this subject and arrange for the necessary preparations being made, so that advantage may be taken of the round-up to collect into one herd every mangy animal on the range.

'Yours, very truly,

'(Signed) 'DUNCAN McEACHRAN,

'*Chief Inspector of Stock.*'

After the meeting at Calgary, it was found to be necessary to place all the infected herds under quarantine, which was done by Colonel Herchmer, Commissioner of the North-west Mounted Police, from the Canadian Pacific Railway track south to the international boundary, and from the Rocky Mountains east to the eastern boundary of Alberta. Subsequently it had to be extended to include Medicine Hat and Maple Creek districts. The following is the Order in Council dealing with this disease:—

AT THE GOVERNMENT HOUSE AT OTTAWA,

FRIDAY, the 14th day of July, 1899.

Present:

HIS EXCELLENCY IN COUNCIL.

Whereas a serious outbreak of mange in live stock exists in the North-west Territories, and it is necessary that prompt and active measures be taken with a view to eradicating the disease,

Therefore, His Excellency, in virtue of the provisions of section 27, chapter 69, of the Revised Statutes of Canada, intituled: 'An Act respecting Infectious or Contagious Diseases affecting Animals,' and by and with the advice of the Queen's Privy Council for Canada, is pleased to make the following regulations, and the same are hereby made and established accordingly, to come into force at once.

1. It shall be unlawful for any person to have in his possession or under his charge an animal affected with the disease of mange without causing it to be treated with some dressing, dipping or remedy for mange.

2. No animal being affected with mange, or animal which has been in contact with other animals suffering with mange, or has been in any field, stable, cow-shed or other premises in which mange is found to exist, shall be allowed to be removed therefrom without a written order from an inspector authorized by the Minister of Agriculture for that purpose.

3. All sheds, outhouses and places used by animals affected by mange must be thoroughly cleansed and disinfected by scrubbing with hot water and carbolic acid—one pound to four gallons—and afterwards whitewashed with hot lime to which chloride of lime—one pound to one gallon—has been added, to a height of at least five feet from the ground or floor.

4. In order to provide for the segregation or isolation or otherwise dealing with animals affected with the disease of mange, a veterinary inspector, or other person appointed by Order in Council, acting under the direction of the Minister of Agriculture, may declare any farm or place, or common, or yard, or any building, where such diseased animals are found, to be an infected place within the meaning of the Act aforesaid.

5. No person whatever, except a veterinary inspector or other person duly appointed as aforesaid, and acting under the direction of the Minister of Agriculture, shall remove any animal from such infected district, and then only for the purpose of carrying into effect the provisions of said Act, under a penalty of two hundred dollars.

6. A veterinary inspector, or other person duly appointed as aforesaid, acting under the direction of the Minister of Agriculture, may make a selection of a particular place or places within or without the limits of an infected district for the purpose, in such cases in which it may be considered advisable, of isolating and segregating such animals as may have been exposed to the disease of mange. Such veterinary inspector, or other person duly authorized, as aforesaid, shall alone have the power to order the removal of such animals as he may consider advisable to or from such selected places.

7. Such duly appointed veterinary inspector or other officer, acting under the directions of the Minister of Agriculture, may, under the provisions of section 13 of the Act aforesaid, order any animal found to be affected with mange, or in contact with animals so affected, to be slaughtered.

8. Any market, or railway yard, or pen, or wharf, or part or parts of such, or other place where animals are exposed for sale, or where, or in which they may be placed for the purpose of transit for removal to market, or from any province or territory, for the purpose of exportation, shall, in the event of any animal affected with the disease of mange being found therein by a veterinary inspector, or other person duly appointed by Order in Council, and acting under instructions from the Minister of Agriculture, on a declaration to that effect made by him, be held to be an infected place within the meaning of the Act aforesaid; no animal being allowed to be removed from such infected place, except on order of such duly appointed veterinary inspector, or other person aforesaid, under a penalty of two hundred dollars.

9. All sheds, outhouses, or places used for animals affected by mange must be thoroughly cleansed and disinfected under the direction of a veterinary inspector or duly appointed person.

10. Any person contravening the provisions of any of the clauses of the above regulations shall, for every offence, incur a penalty not exceeding the sum of two hundred dollars.

11. The Minister of Agriculture is hereby empowered to authorize any of his duly appointed veterinary inspectors to cause any animals suffering from mange to be collected and treated with such dressing, dipping or remedy as may be prescribed by the chief veterinary inspector, all expense of such collection and treatment to be paid by the owners of the animals, and to be a charge against the animals and their owners until such payment be made.

JOHN J. McGEE,
Clerk of the Privy Council.

The disease being more prevalent in the southern district of Alberta, it was decided by the stockmen most interested to proceed with the erection of a dipping station, and preparations were made and the work proceeded with under the direction of Veterinary Inspector Wroughton, D.V.S., of the North-west Mounted Police, assisted by Mr. W. F. Cochrane, Manager of the Cochrane Ranch, and Mr. Howell Harris, Manager of the Circle Ranch, Lethbridge. A suitable location had been procured on the Old Man's River near Rocky Coulee, on government land. Vexatious delays, however, hindered the completion of this work till late in the season, when the roundup work had finished.

A cattle foreman and assistants were hired to receive and herd the cattle, a sergeant and two constables were detailed to see the work carried out, and constables were sent out with the roundups to see that all mangy cattle were gathered and sent to the station, but the gathering was done in a half hearted way, and, as Dr. Wroughton's report shows, only 686 head were subjected to treatment at this dipping station, whereas it was expected that three times that number would have been treated.

By reference to Col. Herchmer's report it will be seen that the total number of cattle quarantined and treated for mange in the Territories, was 2,018, probably less than half the infected.

The existence of this disease and establishment of quarantine increased very considerably the work of the police veterinary inspectors, who, owing to their having to inspect all animals sold in the country, or being exported, were kept busy. I am glad to say that such was the excellence of the service, that scarcely a justifiable cause of complaint occurred. Care was taken that no mangy cattle were allowed to be shipped, but the number of otherwise exportable cattle which were kept back was small.

The effect of the dipping and dressing was to greatly lessen the disease, but as hundreds of infected cattle were left on the range, it is to be expected that the work will have to be done over again and commenced earlier in the season, and gone about more vigorously to accomplish its eradication.

Too much care cannot be given to the cleansing and disinfecting of the corrals, fences, and buildings, by the free application of lime wash, to every five gallons of which a pound of commercial carbolic acid has been added. This with the sun and drying winds of Alberta will in most cases prove efficacious in destroying the *acari* and their eggs left on the wood.

Cattlemen should bear in mind that much valuable and expensive work in dipping and dressing of herds may be rendered useless by leaving even a few infected animals on the range. Every mangy animal, and every animal suspected of being mangy, should be gathered and dressed. Owners will study economy and best serve their own interests by sending every such animal to the dipping chutes, and stockmen and police will fall short in their duty if they fail to gather every diseased and suspected animal.

It is to be hoped that work will be commenced early next spring and that the active co-operation of the stockmen, aided by the Mounted Police and quarantine officers, will result in not one single animal whose skin contains one pair of these fast breeding parasites being left on the ranges.

For further information on the subject see the reports of Col. Herchmer and Police Veterinaries Wroughton, Mathews, Stevenson and Tracy (Appendix No.)

HOG CHOLERA AND SWINE PLAGUE.

I regret to have to report the continuance of this disease in certain localities, chiefly in Ontario.

During the first six months of the year the disease was active in western Ontario, but during the past six months few cases have been reported there.

NUMBER OF FARMS INFECTED.

	Farms.
Western peninsula of Ontario	66
Toronto district	19
Niagara Falls district	5
Ottawa district	54
Berlin "	12
Port Arthur district	4
Manitoba "	11
North-west Territories (Alberta)	4
British Columbia	3
Total	178

NUMBER OF ANIMALS SLAUGHTERED AND AMOUNT OF COMPENSATION PAID.

Actually diseased	2,166	
In contact	2,579	
Total	4,745	$15,048 82.

The details of the operations in this connection will be found in the reports, herewith appended, of the inspectors in charge of the infected districts. Inspector Joseph Kine, County of Kent, reports that the disease under the quarantine measures enforced, is rapidly disappearing. Dover Township, previously the hotbed of the disease had but two outbreaks in twelve months.

With a view of giving the farmers reliable information as to the nature and infectious character of the disease, and to suggest simple preventive measures, the following bulletin was issued and widely disseminated among swine breeders throughout the Dominion. It has had the good effect of simplifying the work of the inspectors, owners of deceased hogs being more alive to the necessity of stringent measures.

FARMERS' BULLETIN.

Hog Cholera and Swine Plague.

The growing importance of the swine industry in Canada, and the prospects of its rapid extension, more especially in Manitoba and the Territories, render it necessary that those now engaged in hog raising, and those about to commence this profitable branch of live-stock breeding, should be informed of the nature of their diseases and especially the measures necessary for the prevention of hog cholera and swine plague, two allied diseases which, in other countries, occasion enormous losses. It is estimated that in the state of Iowa alone, in a single year the losses amounted to from $12,000,000 to $15,000,000. They are preventable diseases, requiring only the exercise of common-sense precautions against the causes which operate in their dissemination. These I have endeavoured to outline in the following pages.

The Minister of Agriculture trusts that the farmers to whom this bulletin is addressed will read it carefully and preserve it for future reference, for their own and their neighbour's information.

HOG CHOLERA.

Hog cholera is extremely contagious and infectious. No other disease is more so; it can be conveyed to healthy swine in an endless number of ways, both by direct contact and intermediary agents, buildings, railways, platforms, wagons, crates, clothing, boots of attendants, &c.

The pathogenic (disease producing) agent is the hog cholera bacillus. This bacillus has been demonstrated to possess different degrees of pathogenic power under different conditions, which are not always equally favourable for its development. Dr. Theobald Smith has shown, experimentally, that the bacilli become more pathogenic the oftener they are passed through the tissues of experiment animals, increasing in virulence up to the twelfth of the series. They will live in water from two to four months, and may remain alive and active in the soil from two to three months.

Our experience goes to support the result obtained by experiments. We know that when the disease first appears in a district it is often so mild, and the usual symptoms so undefined that it is difficult for even men of experience to recognize it as genuine hog cholera, hence we are not surprised to find not only farmers, but often veterinarians, also, protesting that in the absence of the usual text-book symptoms they cannot believe it to be genuine hog cholera.

From his experiments, Dr. Theobald Smith deduces the following conclusions:

'(1.) The chief carriers of the infection are the swine themselves. This disease, having its chief seat in the intestines, a discharge of bacilli from the ulcers of chronic cases, or of such as have survived an attack, may take place long after the subsidence of an outbreak, or after they have changed hands. Infection may be thus carried over in the herd until a new susceptible generation of young pigs appears to continue the losses. Outbreaks occurring without any traceable importation of infection from without, are very probably due to latent infection in the herd itself.

'(2.) The custom prevailing in some parts of the country of not promptly removing the dead hogs, or of allowing them to be gnawed at or even partially consumed by the living, is a potent cause for the perpetuation and strengthening of the infective agent. In such cases the bacilli consumed may cause mild unrecognizable attacks, with discharge of bacilli from the bowels, subsequently.

'(3.) Preventive inoculation with living cultures may disseminate and perpetuate the disease, because the attenuated vacinal cultures may regain their normal virulence in the bodies of swine after a certain lapse of time.

'(4.) The waves of epizootic which appear to sweep over the country at long intervals may be due to a sudden increase of virulence of the specific bacilli, after they have passed through the body of swine for some years.

'(5.) Pathogenic bacteria are always a menace, and no pains should be shunned to restrict their dissemination and multiplication in every way, by quarantine, by disinfection, and by the destruction of the dead with fire if possible.'

HOG CHOLERA AND SWINE PLAGUE ARE DUE TO DIFFERENT BACILLI.

The two diseases, while distinct, are usually seen conjoined in an outbreak of hog cholera; in fact, Professor Welsh asserts that the bacilli of swine plague are always to be found in throats of swine, but they remain inert, at least non-pathogenic, until the hog cholera bacillus, by its effect on the intestines induces that disease, when they become active, and descend in the air tubes, produce a pneumonic affection to which the name of swine plague has been given. The two diseases thus occurring in the same herd perplex the uninitiated and lead to divergencies of opinion.

SYMPTOMS.

The similarity of the symptons with those of several other swine diseases, render it necessary that post mortems and bacteriological investigations be added to the clinical examination, before a reliable diagnosis can be made.

Thus, gastric and intestinal derangements from hotel swill and kitchen refuse feeding, lung and intestinal worms, swine plague, unsanitary housing, exposure to cold and damp will induce febrile conditions, bronchial irritation and other symptoms seen in hog cholera.

The common symptoms are: Increased temperature, which is variable; intolerance of cold, causing the animals to bury themselves in the litter, from which they are driven with ruluctance; supersensitiveness of the skin, red blotches on the thighs, belly, neck and pubis; watering from the eyes, white at first afterwards becoming purulent; staggering gate, sometimes a cough, which is aggravated when the animal is moved; short breathing, especially when there is also swine plague present; costiveness, followed by diarrhœa in the later stages; increasing debility, and, in young pigs, death after two days' illness.

The mortality is greater in sucking pigs and shoats. In adult pigs, the symptoms are not well defined; in them it assumes a more chronic character. They usually have it in a mild form, appear to recover, but the peculiar button ulcers in intestines continue sometimes for years, rendering the excrement infective.

SYMPTOMS OF SWINE PLAGUE.

The general conditions found in both diseases are the same, the predisposing causes are identical. The bacterial study of them shows each to be due to its own special bacillus, that causing hog cholera being motile in liquids, whereas that causing swine plague is not motile in liquids; and Dr. Veranus A. Moore has shown that in hog cholera bacillus, from three to nine flagella are demonstrated, while no flagella have been found in that of swine plague. These bacilli will live in water from ten to fifteen days, and in soil from four to six days. The same general symptoms prevail in both, the fever, chilliness, sensitiveness of the surface, redness of the ears, legs, belly and pubic regions. The cough is more marked, as is the difficulty of breathing, when the animals are caused to move. There is no diarrhœa, nor such marked debility or reeling gait incident to the disease.

Swine plague attacks young pigs more than adults, while the reverse is true of hog cholera. Practically, however, we find few outbreaks of the one in which the other is not more or less prevalent in the same herd, and often in the same animals, and the post mortem examination frequently reveals the intestinal ulcers and the broncho-pneumonia, the solidification of one or more lobes of the lung which, in some cases, are adherent to the ribs or diaphragm by fibrinous effusion, and occasionally white fibrinous bands on the interlobular tissue give a portion of the lung a well-marked marbled appearance.

COMPLETE RECOVERY CAN SCARCELY EVER BE SAID TO OCCUR.

Even in very mild cases, on post mortem examination, it is invariably found that ulceration of the intestinal coats has occurred, and although cicatrization has taken place to a considerable extent, the pathogenic bacilli will be found in the diseased part of the intestine.

Hence, it will be seen that so-called recovered swine are always dangerous.

The following extract from the report of the Departmental Committee of the Board of Agriculture of Great Britain, appointed to inquire into the etiology, pathology and morbid anatomy of swine fever, 1895, points to this chronic infective form as of frequent occurrence: 'There are also, and always have been, many cases of the obscure chronic form of the disease, in which the morbid changes go on slowly for weeks and months, and finally attain an excessive state of development, without being attended by any of the symptoms which are usually accepted as diagnostic of swine fever.

'Some very important information as to the obscure forms of swine fever was obtained by the committee by the examination of swine which had been isolated for a period of two months on infected premises; at the end of the time they had been

certified to by a veterinary surgeon to be free from swine fever, and would, in the ordinary course have been released. In several of these instances, instead of being released, the swine were, at the request of the committee, slaughtered, and the organs sent for examination. In each set of specimens, characteristic lesions of swine fever were detected.'

FEEDING HOGS ON HOTEL SWILL AND KITCHEN REFUSE.

Certain foods favour the pathogenic power of the bacilli. Hotel swill, although not necessarily producing hog cholera, may contain pork in one form or another, ham, bacon, or sausage, in which the bacilli are present, and may thus be the infecting medium.

The hotel swill barrel often contains soap, polishing pastes and other chemicals and refuse, rendering the heterogenous mixture poisonous and productive of disease, and by inducing gastric derangements facilitates the admission of the infecting bacilli into the circulation.

Most farmers keep a swill barrel in which sour milk and sour whey are collected. To this they add kitchen refuse and such cereals as barley, oats, pease, corn, &c.; not unfrequently animal matter as well. This barrel is left exposed to the sun's heat, with a result that besides toxines and fermentative products, various forms of animal life are developed and, being introduced to the digestive organs, lead to various derangements of the stomach and intestines, presenting symptoms closely resembling swine fever, lacking only the contagious character and post mortem lesions.

VERMINOUS BRONCHO PNEUMONIA.

To such feeding as described can be traced the frequent occurrence of verminous broncho pneumonia, so common in badly-kept pigs, which is often mistaken for hog cholera or swine plague.

We frequently find minute thread worms in the bronchial tubes of pigs, and simultaneously in the intestines, the ova of which are taken into the stomach in such food as above described. The lung worms find the proper location for their development in the bronchial tubes, whence they are coughed up; other worms find a location in the stomach and intestines, whence the ova, escaping in the faeces, are again taken into the stomachs of other pigs; thus they pass from one to another, giving rise to the suspicion that the disease is hog cholera or swine plague, instead of verminous broncho pneumonia. This quite coincides with the observations of the Bureau of Animal Industry, report 1895 to 1896, page 174: 'In many instances pigs die from disease brought on directly by improper feeding, and any disease germs found in one or more of such animals by bacteriological methods may have no direct relation to the disease.

'We may thus have, on the one hand, outbreaks due directly to pathogenic bacteria of a high grade of virulence; on the other, we may have outbreaks due to food unfit to nourish the animal or containing toxic substances. We may also have death due to a combination of these two causes, the one or the other predominating, as the case may be. It is probable from our experience that outbreaks of swine diseases due to the virulence of bacteria alone are rare, and that therefore much prevailing disease may be prevented by attention to the physiological laws governing the body.'

ERRORS IN FEEDING.

If swine feeders would but consider that the stomach and intestines of the pig resemble very closely their own, and imagine the household being forced to eat that which they give to the pigs, from a delicate little suckling pig to the fat hog, they might expect their families, young and old, to be attacked by severe gastric and intestinal derangement.

I would strongly urge that the agricultural boiler be brought more into use by the swine raiser and feeder. Boiling food would at least insure freedom from disease germs and worms.

Great improvements can be made in the manner of feeding corn to hogs. Too often the surplus corn is rooted out of the trough, if such is used, and trampled into the mire, where it undergoes fermentative changes and when afterwards eaten produces gastric and intestinal disturbance. This could be prevented by placing the trough on slatted platforms, made of such a size as would admit of their being moved easily, when necessary for sanitary or other reasons.

The management of hogs requires the application of common sense in the housing and feeding, as does the management of other domestic animals. .

Buyers of pork would do well to refuse to purchase it unless they know that the pigs were fed on wholesome food and kept in sanitary surroundings.

HOG CHOLERA AND SWINE PLAGUE ARE COMMUNICATED FROM ONE HERD TO ANOTHER.

1. By *direct communication*, by introducing infective pigs into herds, by sending sows to be bred from one farm to another, and from the infective intestinal discharges of so called recovered sows or boars.

2. By *mediate communication*, by people conveying the infection in their clothing, on their boots, on any utensils or implements, crates, wagons, lumber or fodder, by dogs, carrion birds and, among close neighbours, by rats or other vermin, by infective yards, platforms, railway cars or anything with which diseased animals have come in contact.

During our investigations in western Ontario we have repeatedly observed that this disease spreads rapidly along the banks of a river, due, no doubt, to the practice of getting rid of carcasses by throwing them into the water. This, we have noticed, in large as well as in small streams.

BEWARE OF EMPIRICAL CURES.

In one section of Ontario, much loss has been entailed by quacks selling nostrums, reported to cure the disease. Farmers, as a rule, are too easily imposed upon in this way. Believing in the efficacy of these quack medicines, they commit a serious breach of quarantine regulations in failing to report to the Government the existence of contagious disease in their stock; they often allow the disease to attack their entire herd and, by disposing of partially recovered pigs to neighbours, they spread the disease and cause serious loss to others.

A careful consideration of what is said above as to the infectiveness of so-called recovered pigs will impress all thinking men with the danger arising from keeping such alive longer than to fatten them for slaughter; such should never be sold for removal into any man's herd, even to one's worst enemy, as it may lead to his ruin. *Farmers, think of this!*

PREVENTIVE MEASURES.

Every breeder or feeder of pigs ought to arrange his premises so that he can divide them into perfectly isolated piggeries, so that if, by some misfortune, disease is introduced to one lot, the others may be preserved, through isolation. Breeders and owners would greatly serve their own interests by providing a separate pen as a quarantine pen for probationary detention of all new purchases, in which they would be kept for a few weeks to make sure that they are free from disease.

When the disease has been introduced and discovered in a herd, immediate notice should be given to the Minister of Agriculture, who will cause an investigation to be made, and if the disease is found to be hog cholera, quarantine will be established, the actually diseased pigs immediately slaughtered and the carcasses burned, or deeply buried with lime; all fat enough will be immediately slaughtered and if, on post mortem examination, they are found free from the disease, they will be sold for pork, and the balance fattened as quickly as possible and disposed of if, on examination after death, the flesh is considered fit for food; indemnity being paid for those actually diseased, to

the extent of one-third of their value before they became diseased. For animals in contact, the compensation is three-quarters of their value. Every pig on the farm must be killed and the premises thoroughly disinfected before an inspector can issue an indemnity certificate, which must be accompanied by certificates of satisfactory disinfection; thereafter the Minister will order the removal of the quarantine.

CLEANSING DIRECTIONS.

The flooring, divisions and base boards of the pen should be removed and any loose boards with which the hogs have come in contact, burned; the surface earth or gravel of the pens and yards should be removed to a depth of six inches, freely covered with newly-slacked lime and re-covered with fresh earth or gravel.

The disposal of manure from infected hog pens is seldom sufficiently considered, yet manure is a frequent source of infection. As above stated, the bacilli of swine plague will live in the water from ten to fifteen days, and in soil four to six days; that of hog cholera lives in water two to four months and in soil from two to three months; and in manure they live for an indefinite period, varying according with the season. During the prevalence of these diseases, the manure should be carefully collected from the piggeries and at once mixed with newly-slacked lime, and removed in water-tight wagon boxes to an inclosed yard to which none of the animals on the farms have access. This is the more necessary on account of the impossibility of disinfecting a barn-yard or manure pile during winter weather, or so long as frost continues. When used, it should be ploughed in, not spread as a top dressing. The careless custom of throwing it into a common pile in the barn yard, over which all classes of stock root and trample it down, is one of the means by which the disease is perpetuated and extended.

The bacilli adhere to the hair of the legs of horses and cattle, and by them are conveyed to the streams or rivers at which they drink, rendering the water infective to pigs miles distant.

Sick pigs, if allowed to roam in the barn-yard, under buildings, and to root into stacks of hay or straw, render complete disinfection impossible.

Piggeries should have independent yards, which should be large, with a gentle southerly slope and exposure, and they should be placed at some distance from the barn-yard.

Orchards or small-sized fields should be ploughed after being freely covered with lime.

Lanes and fences should be cleaned in the same manner as the yard; the ground rails of the fences should be burned.

The clothing of all persons who have been attending to or engaged in killing and burning the hogs, should be boiled, and their boots thoroughly cleaned and soaked in a solution of carbolic acid, 1 to 30 of water. The pens, buildings, fences and other permanent structures with which diseased pigs have come in contact, should, when possible, be thoroughly douched with steam or boiling water, scrubbed with a rough brush, and then given a coating of lime wash, to every five gallons of which a pound of commercial carbolic acid has been added. By aid of a spraying pump, cracks and corners may be reached better than by the brush. To be effective, it requires to be done most thoroughly. After cleansing and disinfection, expose the premises to sunlight and air freely for about three months before placing pigs in them again. By some authorities, corrosive sublimate solution, carbolic acid and sulphuric acid, and other chemical disinfectants are recommended. We find the above cheap and easily procurable formula equally effective and more readily made use of by the public.

The following extract made from the report of Mr. M. B. Perdue, V.S., Kingsville, Essex, which has hitherto been the most infected district in the western peninsula, shows the success of the plan followed by the veterinary staff in dealing with hog cholera. He says: 'While the disease is highly contagious, it has been effectually stamped out wherever found by the present method of dealing with it. In no case during the year where premises have been disinfected and released from quarantine have I found a second outbreak among hogs afterwards kept there.'

The same can be said for the Province of Quebec (Annual Report, 1898).

Visiting should be curtailed as much as possible while the disease exists and till the cleaning has been completed, as the disease can be carried on the boots. Horses or dogs from neighbouring farms may carry infection to other farms and should, therefore, be prohibited from entering the premises.

Inspectors should put up notices of infection at the gates leading to farms where the disease exists.

When it is widespread in a district, the district should be close-quarantined and movement of pigs stopped till all infected farms have been placed under control.

There is no other contagious disease of domestic animals that requires, for its eradication, so much persistent co-operation between the owners and the Government veterinary inspectors—whoever trifles with it may as well play with fire among his hay stacks—he is certain to injure himself and very likely to damage his neighbour.

HOW PIGS MAY BE KEPT HEALTHY.

There are no farm animals that can be made to yield as large a profit as well-managed pigs—none that will so readily respond to efforts at improvement, in breeding and feeding— on the other hand, none degenerate so rapidly under a system of neglect and mismanagement. They require warm, dry sleeping places; damp, cold, unsanitary pens are ruinous to the health of pigs. They are the better of exercise in an open straw yard—but they should have a dry, warm, well-lighted pen, with a southern exposure, to retire to. Their food should be sound and sweet, and given at regular intervals. The troughs should be kept perfectly clean by frequent washings. The pens should be cleaned out regularly, as those of cattle or horses.

They should be so constructed that water can be freely employed in washing them out. Thirty per cent creolin solutions should be frequently sprayed over the entire pen.

The young pigs and shoats should be dipped every two weeks in a 10 per cent solution of creolin in tepid water, a barrel of which should be kept in a convenient place. The removal, by this means, of numerous parasites, will greatly relieve the pigs of skin irritation. It will be found that they will thrive much better where this is practised.

The improved sanitation will lessen the tendency to verminous infection, by destroying the ova which, in cold, damp, undrained, consequently unhealthy, corners of underground buildings usually abound.

As treatment of verminous broncho pneumonia by the administration of vermifuge medicines, where large numbers of pigs of all ages are kept is very difficult of administration, owners should do what they can to prevent infection. Spirits of turpentine, in doses varying from 15 drops, in little pigs, to a dessertspoonful in large ones, given in milk well shaken up, twice daily, will be beneficial, especially for intestinal worms. Pine balsam, or resin, may be given mixed in their food—or powdered areca nut, four grains for every pound of the animals weight, in young pigs; in adults, 2 to 3 drachms daily. It is best given in milk on an empty stomach.

For the lung worm affection, turpentine given internally and inhalation of its fumes by burning it on pine shavings, or evaporating it with a spirit lamp in a closed compartment into which the pigs are driven and allowed to remain for a few minutes only, depending on the amount of bronchial irritation produced by the fumes, will destroy the worms and cause them to be coughed up.

This treatment requires great care and judgment to avoid accidents, and if the fumes are strong, it may be sufficient to merely drive the pigs through the compartment.

In this, as in hog cholera and swine plague, 'prevention is better than cure.'

At all seasons of the year, pigs will be benefited by having fresh sods placed in a corner of their pen for them to root among.

D. McEACHRAN, F.R.C.V.S.,

Chief Veterinary Inspector for Canada.

TUBERCULOSIS.

TABLE showing the number of cattle tested in each province during the twelve months ended October 31, 1899.

Province.	Number Tested.	Number Reacting.
Ontario	11,107	130
Quebec	2,154	59
New Brunswick	1,856	41
Nova Scotia	97	7
Prince Edward Island	372	14
British Columbia	112	2
Manitoba	1,109	196
North-west Territories	15	2
	16,822	451

Considering that these animals were tested because they were suspected of being tuberculous, the percentage of diseased ones is extremely small even as compared with the results of the testing during the previous year, when out of 5,698 cattle tested 508 were found to react. This amply justifies us in believing that this bovine scourge is much less prevalent in Canada than elsewhere, and that under the present system it is rapidly lessening; and it strengthens our belief that with a moderate expenditure to enable us to at once get rid of all those showing symptoms, and so presumably infective, fattening the others and quarantining them for life; this disease can be completely eradicated from our herds.

For valuable suggestions as to the prevention of tuberculosis amongst domestic animals, and the use of the flesh and milk of tuberculous animals see 'The Resolutions of the VIIth International Veterinary Congress of Veterinary Surgeons, held in August last at Baden Baden Germany,' herewith appended, also the report of the Pathologist, Prof. J. G. Adami, and his Assistant, Dr. Charles H. Higgins, of the experiments conducted at the Experiment Station at Outremont.

OUTREMONT EXPERIMENT STATION.

The work of this station has been conducted more regularly and much more satisfactorily since the appointment of Dr. Charles Higins, the direction of the station still being conducted by Professor Adami and myself.

By referring to Dr. Higgins' detailed report, it will be seen that while tuberculosis was the principal subject of investigation, other diseases were also dealt with by the pathologists.

TUBERCULOSIS OF THE UDDER ARTIFICIALLY PRODUCED.

In my report for the preceeding year I mentioned the fact that we found a difficulty in finding cows in milk with diseased udders. It was decided, therefore, that udder infection should be produced by inoculation with cultures, (*a*) from bovine tubercle, (*b*) from human, with the view to determine the infectiveness of the two forms of tuberculosis.

The results in each case were similar, viz.:—The production of a localized tumour, attended by a rise in temperature, the swelling being greatest from the bovine culture; and the regular presence of tubercle bacilli in the milk in each case.

SESSIONAL PAPER No. 8

LONG INOCULATION BY BOVINE AND HUMAN CULTURES IN HEIFERS.

Two healthy heifers were inoculated, one with bovine tubercle in the right lung, the other with human in the left. The former died from extensive generalized tuberculosis on the forty-second day, whereas the latter, (inoculated with human tubercle), although she contracted the disease, showed slight clinical evidence.

IN GUINEA PIGS.

Five guinea pigs inoculated with bovine cultures died respectively on the 14th, 15th, 20th, 30th and 35th days.

Three in which human cultures were used died in 18, 23 and 36 days respectively, generalized tuberculosis being found in each case.

IN RABBITS.

Five inoculated with bovine cultures died in thirty-six, seventy, seventy-four and ninety days, one surviving 3½ months. Of three inoculated with human tubercle one only contracted the disease, dying in fifty-two days, the other two being alive after two months.

IN CHICKENS.

Inoculations with both bovine and human cultures failed to produce the disease.

INFECTIOUSNESS OF MILK.

Experiments under this head are interesting and instructive and while confirming what is now well known, viz., that milk from a diseased udder is always virulent, they also prove that milk from cows suffering from tubercle of other organs, but without invasion of the udder, may, at times, contain active bacilli.

Two cats which were fed on infected milk, and the flesh of tuberculous guinea pigs, became affected by generalized tuberculosis.

INFECTION THROUGH COHABITATION.

Two healthy heifers which were tied one on either side of a cow which showed but slight symptoms of pulmonary disease, both contracted tuberculosis in 107 days, while a third heifer, kept in an isolated stall boarded in 5 feet high open above to the ceiling, remained healthy at the same date.

TUBERCULIN TESTS.

The experiments confirm the work of last year as to the unreliability of any but the primary tests unless a long period intervenes.

DISEASED TISSUES SENT FOR DIAGNOSIS BY INSPECTORS.

The assistance given to outside inspectors in diagnosing diseases by microscopic and bacteriological examinations made by the pathologists is of great value, and can be rendered more so by inspectors following carefully the directions furnished to them for preserving and forwarding specimens for this purpose. With the opportunities afforded by the station for immediate experiment with small animals, accurate diagnosis can be made with the least possible loss of time, thus enabling the necessary measures to be at once determined in each case.

PICTOU CATTLE DISEASE.

This disease still continues to affect the cattle in certain sections of Nova Scotia, and is being dealt with by Dr. Townsend, D.V.S., New Glasgow, who reports having caused to be slaughtered from November 1, 1898, till October 31, 1899, 112 cattle for which the sum of $800.63 was paid as indemnity.

Strict quarantine measures continue to be enforced, all diseased cattle being slaughtered, the carcasses burned or buried deep with lime and thorough disinfection carried out, an officer being specially employed to see that this is done. So far all our research work has failed to trace the cause of the disease which is purely local and limited in its invasion. Moreover, it is incurable, few, if any, recovering once they are seriously affected.

The figures show a decrease from the previous year's figures of eleven head, and in indemnity paid, of $88.03.

REPORT ON VISIT TO GERMANY AS REPRESENTATIVE OF THE DOMINION AT THE SEVENTH INTERNATIONAL CONGRESS OF VETERINARY SURGEONS HELD FROM AUGUST 7 TO AUGUST 12, 1899, IN BADEN-BADEN, BY D. McEACHRAN, CHIEF INSPECTOR.

In consequence of repeated requests from the chief veterinary adviser of the Board of Agriculture at London, that Canada should be represented at this International Congress, and it having been decided that I should undertake to do so, I sailed from Montreal on July 27, arriving in Baden-Baden in time to attend the meetings of the congress.

The object of this congress was to discuss the following subjects:—

Preventive measures against the spread of epizooties in consequence of international cattle trade.

The prevention of foot and mouth disease.

The newest suggestions for an effectual meat inspection.

Final result of the endeavours to fix a uniform and anatomical nomenclature in veterinary surgery.

Prevention of tuberculosis amongst domestic animals.

The use of flesh and milk of tuberculous animals.

The prevention of swine epizooties.

The extension of veterinary instruction.

MEMBERSHIP OF THE CONGRESS.

The congress consisted of honorary members, members, and members extraordinary. Honorary members being such persons as have received honorary membership from previous congresses, or who, in consideration of scientific labours and services rendered to the profession and to science, are now elected honorary members by the seventh congress.

The regular members are representatives sent by the principal governments to the congress, representatives of high class agricultural institutes, representatives of veterinary societies, deputies of state and town administrations for the care of public health; also state and town hygienic institutions, certified veterinary surgeons, who, like those included in the above, have paid a personal fee of twelve shillings.

Members extraordinary are agriculturists, chemists, and undergraduates of veterinary science.

The proceedings were conducted in German and French, and short interpretations were made in English at the termination of each address.

It was necessary for members of congress, who wished to take part in the proceedings by an address or speech, to give written notice to the general secretary, giving

their names, and titles, when the chairman would call upon them to speak in order of their application.

The principal sessions were held in the large hall of the Conversation House in Baden-Baden, commencing daily at 9 o'clock. A separate room for discussion of the papers was placed at the disposal of each section, and while all members of congress were supposed to be free to take part in the proceedings of the sections, the actual fact is, that the time of the sections was taken up almost entirely by those who had contributed papers upon the subjects under discussion, and by those who by previous arrangements were called upon by the chairman. No doubt some such arrangement as this was necessary, on account of the very large numbers (something near about 600), at the same time, many who would gladly have taken part in the discussions were thus debarred from doing so.

The arrangements of the Congress were very complete, and visiting members enjoyed the greatest hospitality.

A general banquet took place in the Conversation House, which was very largely attended, and in which some very brilliant oratorical efforts were made by members. Various excursions, smoking concerts, and divers festivals, such as bal-paré and other arrangements of this kind were made for the entertainment of the visitors, which were very highly enjoyed by them.

The extracts from the suggestions, and the conclusions of the reporters (those who read the papers), which are herewith appended, will be of value as being the results of the consideration of these very important subjects by the leading veterinarians of the world, and while it will be seen, as was to be expected, that the considerations tended more to what would affect adjoining States in Europe, yet, while not so applicable to insular countries, such as Great Britain, Canada or the United States, yet contain so much valuable information, that I am induced to include these conclusions in full in this report, in preference to substituting my own impressions, which, on account of want of knowledge of German and French, must necessarily be imperfect, and I would take the liberty of calling special attention to 'the newest suggestions for an effectual meat inspection.'

While much progress has been made in Canada with reference to the eradication of diseases of animals, little or nothing has been done in the way of establishing thorough and common-sense systems of the inspection of the animal food of the people. I am glad to find, however, that of recent years, boards of health in various parts of the Dominion are moving in this direction, and I have no doubt that the various boards of health will find the suggestions and conclusions of the highest of the European authorities appended herewith will be of value to them in formulating a code of regulations governing meat inspection within their municipal boundaries.

The subject of prevention of tuberculosis in domestic animals, will also interest every stock owner in Canada, as well as the boards of health, and for this reason I feel justified in including these conclusions by such eminent authorities as Professor Bang, of Copenhagen, C. Siedamgrotsky, Brunn, Stube, Brussels, as well as the suggestions on the use of the flesh and milk of tuberculous animals, by such men as Professor Ostertag, of Berlin, De Jong, Leyden, and others.

Of equal value, too, in my opinion, will be the suggestions with reference to the prevention of swine epizooties, as will also be, for teaching bodies, the conclusions of Prof. Nocard, of Alfort, Schutz, of Berlin, and others, as to the necessity for the extension of veterinary instruction.

I am happy to be able to report that all the addresses and conclusions will be published in book form in three languages, German, French and English, copies of which will be sent to the various governments and their representatives.

In conclusion, I beg to gratefully acknowledge the great kindness and hospitality which, as representative of Canada, I received from the German officers of the Congress, and numerous members of the profession from the various countries of the world.

It was very gratifying to me to have the privilege of renewing my acquaintance with many of the leading veterinarians of Europe, and to make the acquaintance of others whom I had not had the pleasure of meeting before.

I wish specially to acknowledge the kind attention received from A. C. Cope, Esq., chief veterinary adviser to the Board of Agriculture of England, who was indefatigable in his efforts to promote the comfort and pleasure of all the English speaking members of the Congress. Among those with whom I had the pleasure of associating while there, was Professor McFadyean, Principal of the Royal Veterinary College, London, who with Mr. Cope, represented Great Britain at the Congress. There were also, as representatives of societies, Messrs Malcolm, Trigger, Dawes, Bloye, and Johnston, who represented Australia; these constituted the British representatives.

One feature of the Congress was the presence of three Moors, in their Moorish costume, from Morocco. The United States, South Africa, and South America were also represented.

Among the English speaking portion of the Congress, it was suggested that an effort be made at the VIIIth International Congress to have a special section, which would be more particularly of interest to Great Britain and her colonies, as well as other countries situated in insular positions, to discuss from their standpoints the various subjects under discussion by the general congress. It is to be hoped that this suggestion will be carried out, as it would tend to increase the interest of such a valuable congress to a large number of the members who represent countries outside of Europe. The value of such a congress to Canada is much greater than would be at first sight apparent. It was extremely gratifying to me to find from interviews held with numerous members of the congress that this country is becoming much better known, and the great progress made agriculturally and commercially seems to be a source of wonder, and drew forth from many of the members in private conversations enconiums of praise of Canadian enterprise. The magnitude of the territory, the prospective wealth consequent upon our immense resources in minerals, timber, grain, live-stock, &c., seemed to impress these strangers very much.

Compliments were also paid to the country with particular reference to the development of live stock, and live stock industries; dairy products, and the progressive aims of our agriculturists generally in the improvement of the various breeds of farm animals; and our extensive and thorough quarantine system for the prevention of, and the dealing with, contagious diseases of animals in Canada, were also favourably commented upon.

The result of such views held by the members of that great congress, a large nnmber of whom are the advisers to their various governments in all matters relating to live stock and agriculture generally, must be to simplify and improve our international commercial relations with the different European countries represented.

As a matter of fact, much practical benefit in this relation has already been demonstrated, and more is likely to follow, for it can be readily understood that, when the veterinarian is consulted by his government with reference to conditions existing in other countries, he will more confidently and more correctly be able to advise his government with reference to any international arrangement which may be under discussion through his having met and become familiarly acquainted with the persons occupying positions similar to his own in such countries.

I hope, therefore, that Canada will be represented for all time at such congresses, as she cannot well afford to ignore the benefits to be derived therefrom.

I have the honour to be, sir,

Your obedient servant,

D. McEACHRAN,

Chief Inspector.

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

RESOLUTIONS OF THE VIITH INTERNATIONAL CONGRESS OF VETERINARY SURGEONS.

I.—Preventive measures against the spread of epizooties in consequence of international cattle trade.

The VIIth International Veterinary Congress considers an effective fight against epizooties, in the interest of the individual States as well as of the public economical welfare, both useful and desirable. The means to be employed are a uniform application of scientific principles and an efficient regulation of the veterinary department, of the intelligence department respecting epizooties, and of international cattle trade.

But the Congress, considering the difference in the economical development and the conditions of traffic as well as the dissimilitude of veterinary organization in the separate countries, does not think the moment has yet come for laying down definite principles of an international agreement.

II.—The prevention of foot and mouth disease.

It is in the interest of an effectual prevention of foot and mouth disease:

(1) By all and every means to prosecute the scientific investigation of this disease;
(2) To exclude the infected district from free traffic;
(3) To submit the traffic in cattle for sale to a strict veterinary police control in such a way, that the cattle of cattle-traders should be placed under the inspection of the police before sale;
(4) That buttermilk and all other remnants of milk should not be supplied habitually from the cooperative dairies until they have first been submitted to such a temperature as shall insure the extinction of infectious matter;
(5) That the authorities should be required to order in certain cases the slaughter of animals, the proprietors receiving compensation for the resulting loss;
(6) To regulate in the whole country, as far as possible, the initiation, the continuation and the completion of the needful veterinary police rules, whereby special weight is to be laid upon the strict carrying out of the separation and disinfection of the clothes of the attendants, &c.

III.—The newest suggestions for an effectual meat inspection.

(1) The Congress desires to draw the attention of the Governments of the States officially represented to the necessity of the general introduction of compulsory inspection of meat.
(2) None other than certified veterinary surgeons can be summoned as professional men to inspect meat. In places, where it is still impossible to establish a regular veterinary service, lay inspectors with limited powers may be provisionally appointed. These must be trained for their profession as much as possible by veterinary surgeons in the larger slaughter houses, be examined by the state, and constantly be controlled in the exercise of their function by veterinary surgeons. Only veterinary surgeons should be appointed as professional inspectors of meat and as the directors of slaughter houses and cattle sheds.
(3) Instruction in meat inspection at the veterinary colleges must be improved and extended. Meat inspection should be made as far as possible the object of practical examination for a veterinary diploma.

This examination too must take place for the obtaining of the diploma as a veterinary surgeon. Moreover it is required in this case, that the candidate has worked at least eight weeks in the meat inspection of a large public slaughter house, standing under regular veterinary supervision.

(4) As a mattter of principle, all inspection of meat must be founded on sure scientific bases and experimental rules, which should be agreed upon by an international understanding.

(5.) Inspection must be extended to all kinds of butcher's meat and be introduced everywhere. It must include all beasts for the butcher and every kind of meat, that serves for human food and public use, whether it be destined for public sale or private consumption.

(6) The efficiency of meat inspection is only perfect in those places where public slaughter houses exist together with compulsory slaughter. On that account, their erection in as many communes as possible is advisable.

(7.) It is necessary for the inspection of fresh slaughtered meat coming from outside :—

(*a.*) That the flesh of cattle and horses should be brought in at least in quarters, that of swine only in halves, and that of all other animals in an undivided state, and further

(*b.*) That the most important intestines should be in natural connection with the meat.

Fresh meat introduced from foreign countries is subject to the same requirement.

Preserved meat from foreign countries can only be imported if it is kept in a trustworthy, sanitarily unsuspicious manner and its harmlessness can be affirmed with certainty.

(8.) Meat authorized for consumption after inspection must be marked in a proper manner (stamping, leading, etc.)

(9.) Meat proved to be harmless but of inferior quality must be sold under declaration at certain places ("Freibänke") under the supervision of the authorities.

(10.) The introduction of a universal and compulsory insurance for slaughter cattle under State control is urgently required in the interest of meat inspection and the stamping out of cattle diseases.

(11.) The results of meat inspection should be collected for scientific and economical purposes in statistics arranged on a definite plan, in which international uniformity should be aimed at.

IV.—Final result of the endeavours to fix a uniform Anatomical Nomenclature in Veterinary Surgery.

The Congress agrees to the propositions of the Nomenclature Commission and wishes to employ the money necessary for the place the 2,500 Marks reserved for this purpose. Further needful publication of a Uniform Anatomical Nomenclature : in the first amounts should either be requested from the veterinary societies or paid from the Treasury of the VIIth International Congress.

V.—The prevention of tuberculosis amongst domestic animals.

(1.) The prevention of tuberculosis in cattle is urgently needed.

(2.) The extinction of bovine tuberculosis on the part of the owners (voluntary extinction) is practicable and should be universally aimed at. It demands the slaughter of dangerous tuberculous beasts as soon as possible, as well as careful protection of calves and healthy animals from infection.

The voluntary extinction of bovine tuberculosis should be encouraged by the State through the dissemination of correct views respecting the character of tuberculosis, respecting the modes of infection, and the importance of tuberculine inoculation and be supported by State grants.

The best mean hitherto known for the prevention of tuberculosis among domestic animals is tuberculine.

Tuberculine should only be supplied under State control. In any case it should be given to veterinary surgeons alone.

(3.) A State prevention of bovine tuberculosis is thoroughly to be recommended.

If it is applied with a certain caution, it can be carried out and will hinder the further increase of the disease and will gradually stop it.

The prevention requires :

(a) the obligation of the veterinary surgeon to give the legal notice of every case of proved tuberculosis in the exercise of his practice;

(b) the quickest possible slaughter of dangerously tuberculous animals (particularly those animals which are affected with mammite, tuberculosis of the matrix, and of the intestines, as well as pulmonary tuberculosis), compensation being granted by the State, and the prohibition of the return of buttermilk from the co-operative dairies, until it has been sterilized.

VI. The use of the flesh and milk of tuberculous animals.

A. Of the flesh.

Granted that a general compulsory inspection of slaughter animals exists before and after slaughter, the following measures are to be prescribed in view of dangers for the health of the people, which may be connected with the consumption of the flesh of tuberculous animals :

(1) Those professional men who carry out meat inspection are expected to examine the slaughtered animals and so to give a guarantee that every case of tuberculosis among the slaughtered animals and in every such case the spread of the tuberculous process will be accounted for with certainty.

(2) The most important part of the meat inspection is the sure detection and the perfectly uninjurious removal of the organs that have been changed by tuberculosis, together with their appendages.

(3) With regard to the flesh of tuberculous animals, the parts affected with tuberculous centres and bound by the corresponding lymphatic glands are to be treated in the same way as the tuberculously altered organs.

If the tuberculous alterations in the meat are confined to the lymphatic glands situated in it, the muscle may, after cutting out the bones, joints, vessels and lymphatic glands and adequate dissection, be handed over, in a sterilized condition, to be used for food.

In the case of fat animals, the melting out of the fat tissue that has been separated with avoidance of the tuberculous centres is likewise permitted.

(4) In the case of local tuberculosis and in that of general tuberculosis healed and limited to the organs of the cavities, the meat may be dealt out raw to be used as food.

If the tuberculous process in the intestines is of considerable extent, the obligation to declare it is to be insisted on.

(5) The whole of the meat, except the melted fat, is to be withdrawn from use as human food, if there exists marked emaciation or the signs of very recent infection of the blood (tumour in the spleen, and swelling of the lungs, liver, spleen, or kidneys.)

(6) In cases where the local character of tuberculosis and the harmlessness of the meat are doubtful (especially when there are tuberculous caverns and incipient derangement of nutrition), the whole of the meat is to be sterilized before being handed over as fit for food.

(7) The sterilized meat and the melted fat is to be sold under declaration.

B. Of the Milk.

(1) The cows, goats, etc., kept for dairy purposes are to be subjected to regular veterinary control.
(2) The milk of tuberculous animals is not to be used for human food, if the animals are emaciated or effected with tubercles in the mammae.
(3) In accordance with the mode of proceeding in the kingdoms of Denmark and Sweden, the emaciated and tuberculous dairy animals are to be immediately removed from the farms and destined for slaughter, compensation being given to owners.

VII.—The Prevention of Swine Epizooties.

(1) Infectious diseases of swine must be combatted separately, by veterinary police, in such a way that swine plague and rouget should be dealt with on different lines.
(2) The veterinary police regulations against swine plague should consist chiefly in the slaughter of sick pigs and in the disinfection of the infected yards. Slaughter is specially recommended in those districts, which are only temporarily infected with the plague.

The various methods of preventive inoculation, which have not yet been sufficiently tested in the case of either of these diseases, are only recommended for those districts, in which the swine diseases have thoroughly established themselves.

(3) In order to combat rouget among swine, besides the general measures of sanitary police, it is to be recommended that all animals exposed to the contagion should be inoculated; the inoculation should take place under the surveillance of the veterinary police.

Lastly, it is desirable that vaccination should be compulsory in places where rouget is constantly reappearing.

VIII. The extension of veterinary instruction.

The Congress resolves:
(1) that the students of veterinary medicine ought to possess the certificate of university maturity;
(2) that the duration of the studies ought to be at least 8 terms;
(3) To impress upon the instruction a more practical direction;
(4) That the study of veterinary medicine ought to extend to all animals useful for agriculture;
(5) That it will be created in the veterinary schools of the sanitary institutes intended for the instruction and experimental study of etiology and prophylaxy of diseases and particularly of epizooties;
(6) That the instruction of meat inspection requires a special instruction of a practical character in the public slaughter house.

IX.—Determination of the Time and the Place of the VIIIth Congress.

The next Congress will take place in 1905 at Budapest. The adherents of the VIIth Congress, that have come from the said city, will be entrusted with the organization of the VIIIth.

SHEEP SCAB.

This disease still reappears occasionally, but to a limited extent. In December, 1898, two sheep were reported to be affected on arrival at Manchester. Our utmost efforts failed to trace it to the farms whence these sheep were drafted.

In January, 1899, it was reported to exist in four small flocks comprising 163 sheep on the Rosebud, northeast of Calgary, but they were quarantined and successfully treated, all but 32 head, which were slaughtered. The number included in the quarantine in this district was 4,782.

In February last the existence of sheep scab on several farms in the Niagara district was reported by Inspector Boulter, which, as will be seen by his report, was completely eradicated.

ACTINOMYCOSIS.

This disease still continues throughout the Dominion. Col. Herchmer reports ninety-eight destroyed and eighty-three successfully treated by the police in the Territories; twenty-nine were rejected by port inspectors, against seventy-one the previous year. Numerous cases have been reported from Winnipeg and other parts of Manitoba and Ontario. It is rarely heard of in Quebec or the Maritime Provinces, except in cattle forwarded for exportation.

GLANDERS.

This disease continues to exist in the Territories owing to importations from the United States immediately south. Col. Herchmer reports 118 glandered horses were destroyed by the police during the year ended October 31, 1899.

As the provincial governments deal with this disease, reports of it, unless specially asked for, are not sent to the department.

ANTHRAX AND SYMPTOMATIC ANTHRAX, OR BLACK QUARTER.

These diseases are rarely met with in the Dominion. A few reports have been received from the Territories. Sixty-nine cattle and ninety sheep are reported to have died from them. Four reports from Ontario and two from Quebec of suspected anthrax show how seldom this disease occurs in Canada. And we must bear in mind that it is quite possible that some of the cases reported would, if properly investigated, prove to have been due to other causes, as in most instances the animals were dead and disposed of before notice was given, the diagnosis in some cases lacks confirmation.

No. 15.

REPORT TO THE HONOURABLE SYDNEY FISHER, MINISTER OF AGRICULTURE AT OTTAWA, ON OBSERVATIONS MADE AT THE EXPERIMENT STATION AT OUTREMONT, P.Q.

(J. GEORGE ADAMI, M.A., M.D., F.R.S.E., Pathologist to the Department, Professor of Pathology, McGill University, Montreal.)

SIR,—I have the honour to report the work done during the last year in connection with the experiment station at Outremont, P.Q., and more especially upon investigations made upon the subject of tuberculosis in cattle and its prevention.

The exact details of the work accomplished will be found in the accompanying report by Dr. Chas. Higgins, the assistant pathologist. Here I would wish to call attention more especially to the conclusions reached by us from the work accomplished during the past year and the bearing of such conclusions upon tuberculosis in cattle and its eradication.

In reporting upon investigations made in connection with the subject of bovine tuberculosis, the pathologist finds himself in a very difficult position. On the one hand, if he makes a simple detailed report of his observations and results, it is most difficult for the ordinary layman to determine the meaning and the value of those details. If, on the other hand, he, as I consider most necessary, attempts to make his report clear to the general reader, he has to steer between two very serious dangers; for, either working continually upon this subject of infection he is likely to see infection in everything, and thus is liable to translate his results as indicating too great a degree of danger in connection with such a matter as tuberculosis in cattle, and, further, is inclined to advise measures too extreme in their nature; or, on the other side, if he attempts to take a wider view of the matter and to see danger only when certain limits are overpassed, then the liability is for the ordinary reader to gain a false sense of security and to believe, not merely that the dangers are moderate in extent, but that they are non-existent. If the pathologist in his report in connection with a subject like tuberculosis manages to give either of these impressions, he does serious harm, and the difficulty is to discover the happy medium.

I am led to make these remarks because our previous report has, by certain English authorities, been accepted and brought forward as evidence that tuberculosis in cattle is relatively harmless, while others, on the contrary, seen in our conclusions that the tubercle bacilli may be present in the milk of cattle showing no tuberculosis of the udders—strong support in favour of preventing the use of the milk of any cattle reacting to tuberculin. The whole of my studies upon this subject, both in connection with the cattle and animals upon which we have experimented and with the wider subject of the prevalence of tuberculosis in man as well as in animals, leads me to take a middle and a conservative course in connection with bovine tuberculosis, while I am forced to recognize the enormous havoc played by this disease, I am at the same time doubtful whether many of the conclusions which have been reached so far with regard to the infectiousness of the condition, have not been altogether too extreme. Our observations in short, it would seem to me, all tend to establish a middle view and to suggest measures which, while thorough and calculated to rapidly diminish the incidence of the disease, call for the least possible loss to the individual and the least possible disturbance to the agricultural interests of the country.

From the end of November, 1898, until the following May, in consequence of certain difficulties in connection with the town council at Outremont and the necessity of removing the establishment to another position, that work, in connection with the

station was of necessity entirely suspended and only in the early part of June was it possible to resume. Our previous report, however, gave a record of the work done until the close of the year 1898.

It is interesting to note that the main conclusion of our last report, namely that the tubercle bacilli may appear in the milk of cattle which are free from any evidence of tuberculosis of the mammary gland, has, since its publication been very fully confirmed, in a paper published at the International Congress of Tuberculosis at Berlin in May, 1899, when Rabinowsitch and Kempner at that Congress came to like conclusions. From the milk of ten animals out of fifteen which had reacted to tuberculin, they were able to gain tuberculosis by inoculating guinea pigs; of these ten animals only two presented, either clinically or under the microscope, tuberculosis of the udder, of the remaining eight none showed tuberculosis of the udder, and four presented either no clinical signs of tuberculosis or at most dubious signs. These observers thus come to a conclusion identical with ours that tubercle bacilli can pass into the milk even in the early stage of tuberculosis in which there is no recognizable disease of the udder and indeed in cases in which the disease can only be recognized by the tuberculin reaction.

Nor indeed were we the first by any means to point out this presence of bacilli in the milk of animals not presenting any recognizable tuberculosis of the udder. As long ago as 1880, Bollinger obtained tuberculosis in the smaller animals by inoculating them with the milk of a tuberculous cow whose udder was not recognizably diseased. In 1884 Steine, employing the milk of fourteen tuberculous cows, gave tuberculosis by intraperitoneal inoculation to the animals of the laboratory with the milk from four of these. While all these four showed advanced tuberculosis, not one of them had tuberculosis of the udder. Bang also in the same year from a study of the milk of sixty-three cows suffering from advanced tuberculosis, came to the conclusion that while the milk of the majority of tuberculous cattle is harmless, nevertheless it might be infectious in the absence of recognizable udder disease. Hirschberger, in 1889, from twenty infected cattle, obtained positive results eleven times, and concluded that even when only a slight pulmonary tuberculosis was present the milk might be infectious, the danger being great in cases of advanced generalized tuberculosis and again in tuberculosis of the udder.

Ernst of Boston that same year, taking 114 different samples of milk from thirty-six cows which were tuberculous, but whose udders were unaffected, found that milk infectious in 28·5 per cent. So also Theobald Smith and Schrœder in two out of six tuberculous cows showing no udder disease (or in 33·3 per cent) found that the milk was infectious both by microscopic examination and by inoculation. Schrœder in a further series of thirty-one cows, none of which showed udder tuberculosis, gained tuberculosis in guineapigs from two (or 6·5 per cent) by injecting the centrifugalized milk. Both these cows on being killed showed advanced tuberculosis. On the other hand, Delepine examining altogether twenty-four cows found that he gained tuberculosis in 31·5 per cent of those in which the udder was either certainly or probably diseased; whereas of five cows in which the udder was absolutely healthy, although there was tuberculosis elsewhere, he was unable to produce tuberculosis. Delepine has thus strongly upheld the opinion that where the udder is not diseased there is no danger of infection, and he and the British authorities in general have held strongly to this opinion, which has further been supported in the old country by the evidence of the Royal Commission on Tuberculosis.

Our own researches given in last year's report left no doubt in our minds that it is not necessary to have tuberculosis of the udder for tubercle bacilli to appear in the milk, and in general we may be said to have confirmed the observations of H. Hirschberger above mentioned. As already stated, Rabinowitsch and Kempner (Zeit. f. Hyg., vol. 31, p. 137, 1899), from whose bibliography I have extracted the above, come to like conclusions.

With the new batch of cattle and with the aid of Dr. E. W. Hammond, I made studies upon the milk given in the early part of the year; this again confirmed what we found last year. To place the results in tabular form :—

Cow No. 1.—Seven samples taken during April and May. Tubercle bacilli detected twice (after repeated centrifugalization of the milk). The two samples were of the same date, May 4.

Cow No. 2.—Ten samples examined in milks of May and June. Bacilli detected four times definitely; 5 times they were few and uncertain, and once the films were absolutely free from any signs of bacilli.

Cow No. 3.—Six samples examined in May and June. Three times singularly rare beaded forms found; once no result, twice results were dubious.

Cow No. 4.—Three samples examined, May and June. Only once were small clumps of beaded bacilli found.

Cow No. 5.—Four samples in April and May. Gave throughout negative results.

Here again, as in our previous report upon this microscopical examination, I must again call attention to the rarity of the bacilli found in these cattle showing no udder disease, their tendency to be slightly modified in form and to the fact that they are not present in masses as they tend to be in the milk of cows suffering from active tuberculosis of the udder. It is to be noted that the milk in which these bacilli were detected was received directly from the teat into sterilized flasks.

As I pointed out at the meeting of the Canadian Medical Association at Toronto, in August, I have frankly to admit my doubts as to whether milk from cases in which there is no tuberculosis of the udder, is capable of inducing the disease in man. For the number of tubercle bacilli found in these cases is very small and in general the stunted appearance of these bacilli as again the slow course of the infection in guinea pigs, leads me to believe that in passage through the gland the bacilli have been somewhat attenuated or weakened, while it has always to be kept in mind that the results of *inoculation* into susceptible animals, whereby the milk containing the bacilli is actually introduced within the tissues of the animals, is something very different from that which may follow upon the mere *feeding*. It must be remembered that although in one sense food eaten or drunk is within the system, strictly speaking any bacteria it may contain are not within the tissues until they have by some means or other passed the barrier of cells lining the whole of the digestive tract.

As a matter of fact it has frequently been found that whereas tuberculosis may follow inoculation of some fluid, like the meat juice from tuberculous animals, no results may ensue when these animals are fed with the same. While further, what is true of inoculation into *susceptible* animals, like guinea pigs is not of necessity true of feeding less susceptible animals like man or even children.

While this is the case, since everything points to the fact that children and weakly human beings can be infected by drinking milk containing large quantities of tubercle bacilli, a little consideration shows that it is impossible for practical purposes to make a distinction between cattle which have tuberculosis of the udder and those which, while reacting to the tuberculin test, are free from such disease of the milk producing gland, or again, to make any practical regulations which shall permit the use of milk from one set of animals and prevent the employment of the same from another set. This may be said, however, that where there is tuberculosis of the udder the milk is liable to contain enormous quantities of bacilli and the animal giving it is in the great majority of cases the subject of generalized and advanced tuberculosis. Not only such milk, but the animal producing it ought to be immediately condemned. Concerning this there can be no question.

The general consensus of opinion at the present day is that animals reacting to tuberculin and either showing no clinical signs or at most dubious signs of the disease ought not to be immediately condemned; rather, they should be fed up and slaughtered. This being the case the very practical question remains to be answered, what is to be done with the milk of such cattle? In other countries, acting upon the belief that this milk is free from tubercle bacilli, the milk in general is allowed to be used. But if, as we find, that milk contains tubercle bacilli, though only in small numbers, it does not seem right to allow it to be vended without restriction. The only suggestion that I can at present make in this relationship is that, remembering how diffused is becoming the process of pasteurisation of milk now-a-days, such milk shall be permitted to be sold

and employed commercially upon condition that it is pasteurised. By this means there is no question that this milk will be rendered absolutely free from all infective properties. I may add that this method of pasteurising milk is now becoming so generally employed in European countries that if at the present moment this suggested regulation would seem to be premature, in the course of a year or two it will not be regarded as demanding anything but the ordinary procedure to which indeed all milk employed commercially should be subjected.

I would here call especial attention to certain points brought out into very strong relief by our work at the experiment station. The first of these, to which attention was called in our report last year, is that calves fed upon the milk of their mothers who had reacted to the tuberculin test but had shown no signs of udder disease if kept away from their mothers in a separate byre, showed little tendency to contract the disease. Last year out of seven calves thus fed not a single one reacted to the tuberculin test; this year, as will be seen from Dr. Higgins' report, three calves have been fed from the milk coming from animals reacting to the tuberculin test and having no disease of the udder, while with two at the time of making the report the process of feeding had not continued long enough to permit us to make any positive statement, the third reacted to the test. With regard to this animal there are certain points which make the history a little doubtful, for the animal reacted within five weeks after its birth. This period is singularly early and inasmuch as the mother, while apparently perfectly healthy, had not been tested, there is a possibility that the animal became infected before being brought to the experiment station. Such a case as this, however, we freely confess indicates the possibility that young calves may become infected from their mother's milk or from other milk, even when there is no trace of udder disease.

That this possibility is very slight is seen when we take Röckl's statistics drawn from a study of some 51,000 animals slaughtered in German abbatoirs ten years ago. Thirty-three per cent of the animals from three to six years old showed tuberculosis and 43·4 per cent of those over six years old, but only some 0·6 per cent of the calves under six weeks were found infected and again 0·6 per cent of animals aged from six weeks to one year.

A second point is, that although all our rabbits—guinea pigs and other susceptible animals—are kept under the same roof as the cows, some of whom have died from active tuberculosis, not a single case of spontaneous tuberculosis has developed among these animals. I can only infer therefore that if the infected cattle be herded apart from the other animals, the danger of their contracting tuberculosis is singularly slight. This is an observation wholly in harmony with those which led Bang to establish his well known method of diminishing tuberculosis in a herd.

A third point which is possibly of even greater importance, although confessedly the observation wants further repetition, is that pointed out by Dr. Higgins in the subjoined report namely, that healthy heifers kept in the same byre with definitely tuberculous animals, have not shown the tendency to contract the disease *when kept throughout in their own stalls*, each stall being separated from its neighbour by a partition *five feet high*; whereas when two heifers were placed in the same stall, or more correctly, loose box, as that occupied by a cow showing a moderate degree of tuberculosis of the lungs, both heifers have become tuberculous. Although this is, as I say, a single observation, it is difficult to have a more perfect demonstration of the fact that infection is especially brought about by such cohabitation, and, as further shown by Dr. Higgins' observations, it is largely through the breath and the sputa and by the contamination of the mangers, &c., by the discharge from the mouth and nostrils of the infected animals that the disease is communicated.

These observations are, it may be added, in complete harmony with what has been found in connection with human tuberculosis. As Cornet pointed out some years ago, the dust of the floor and on the walls in the immediate neighbourhood of a bed occupied by a tuberculous patient contains the bacilli and thus in over-crowded hospitals in which there is not sufficient air space for each patient, there has been shown to be a distinct danger to the attendants and others within those walls of contracting the disease from those already infected. In other well arranged modern hospitals, such as Brompton

Hospital, in London, where the patients are kept well apart from each other and given abundant air, this danger of infection is reduced to a minimum, and, as a matter of fact, scarcely any cases have been known in this hospital of the attendants, nurses and others contracting the disease from patients.

In other words, these observations point the moral that it is by proper hygiene and exercise of merely ordinary care for animals kept in byres that will reduce very greatly the danger of the spread of the disease from one member of the herd to another. It may be laid down that,

1. To prevent the spread of the disease in a herd each animal should throughout occupy its own stall.

2. Before any new animal is put into a stall, as a matter of fact that stall should be thoroughly cleaned out, special care being taken to clean thoroughly the manger, while the woodwork should be washed with a disinfecting whitewash (e.g. a mixture of ordinary whitewash and creolin).

3. That since infection is more especially conveyed through the respiratory tract, from the breath and any mucus or discharge coughed up by the infected animals, and since the danger of infection therefrom extends little beyond the head and the area liable to receive such discharge; if the heads of such animals be placed so as to limit the area of infection to their immediate neighbourhood, then the communication of the disease from one animal to another is very greatly lessened. A very simple method of obtaining these results is that introduced at the experiment station by Dr. McEachran, of making the divisions between the byres five feet high.

4. With animals recognized as being tuberculous, our own observations fully confirm those of professor Bang, that failing the means to place the affected animals in a separate building and under a separate roof, the separation of the byres into two portions, the one containing the affected the other the unaffected animals, together with the employment of ordinary sound precautions so that the utensils employed in feeding and cleansing one set of animals is distinct from that employed for the other, is sufficient to very greatly diminish the chances of infection being conveyed from one herd to the other.

5. This year as well as last, we have confirmed, if further confirmation were needed, the observations of Bang and numerous other continental observers, that the calves born to tuberculous cows if kept away from their mothers, do not develop the disease.

In short, under ordinary conditions tuberculosis in cattle is only what I may term 'narrowly infectious'. If we employ the term contagious in its strict sense, as meaning disease conveyed by actual contact, and employ the term infectious to indicate the conveyance of disease, not only by direct contact but also when the germs or virus have persisted for some little time outside the body of the animal first infected, then tuberculosis is more than a mere contagious disease and is truly infectious, for we have abundant evidence that by the contamination of the mangers, food, water, &c., by the sputum of the diseased animals, there may be conveyance of the disease to others. Nevertheless the tendency is for such germs not to be conveyed widely and our observations show that by the adoption of very simple precautions, the danger of the spread of disease in a herd may be very greatly diminished.

I may here add that our observations at Outremont have not included any observations upon the conveyance of the disease by water. But it must be remembered that if healthy animals drink out of the same pail as the infected, or if again the stream of water from which the animals drink in a byre passes from an animal suffering with lung disease to one that is healthy, there is a danger of infection by the mucus and discharge from the one mouth being taken up into the digestive tract of another animal.

For practical purposes these conclusions which, it may be added, are the conclusions to which observers are coming independently in various countries, are of the very greatest possible importance. They show how much can be done to arrest the spread of the disease without calling upon the farmer small or large to make anything of the nature of a sacrifice.

SESSIONAL PAPER No. 8

ON THE RELATIONSHIP OF HUMAN AND BOVINE TUBERCULOSIS.

If at first sight any study between the relationship of human and bovine tuberculosis seems to be somewhat outside the scope of the observations which should be conducted upon cattle at an experiment station, a little further thought and consideration will show that few studies in connection with bovine tuberculosis have a more important bearing. For, while the one main problem in connection with tuberculosis in cattle is upon the effect of that disease directly upon the cattle and upon the well-being of the cattle and their owners, the other problem of equal importance to the owners and of yet greater importance to the community at large, is the danger to the community from the existence of this disease among the herds. The remarkable fact is that, after all these years of study, the exact extent of this danger arising from the possible transmission of tuberculosis from animals to man, has not yet been surely determined. For long years following upon Koch's discovery of the bacillus of tuberculosis, it was taken for granted that the disease occurring in man and animals, in cattle, swine, birds, etc., was produced by one and the same micro-organism and that so the disease is freely intercommunicable. This much is true that from the organs of different species suffering from this disease, one form of bacillus can be grown having peculiar staining properties; in these two respects this form stands apart from other disease-producing bacteria.

But when we come to look more closely into the matter, we find that even when grown outside the body, fine—and constant—differences show themselves between the bacilli isolated from different species. The first advance was made in 1891 by Straus and Gamaleia (Archives de Med. Exper., 1891, No. 3, p. 457) who made out the following differences between the avian and human tuberculosis which have since been frequently confirmed.

1. Cultures made from human tuberculosis are dry and scaly; those from avian, moist, fatty-looking folded and soft.

2. The bacillus of human tuberculosis scarcely ever grows about 41° C. and not at all at 43° C.; that of avian grows rapidly and abundantly at the latter temperature.

3. The inoculation of the human tubercle bacillus into guineapigs and rabbits leads to the appearance of tubercles in the lungs, liver and spleen; that of the bacillus of avian tuberculosis leads to the death of these animals without development of tubercles but with a general infiltration of the organs.

4. The dog is easily infected with human tuberculosis but is relatively very insusceptible to avian tuberculosis.

5. Chickens while easily infected with avian tuberculosis are completely refractory to human tuberculosis.

These views have been in general confirmed. It must not, however, be thought that these and other observations have proved the bacillus of human tuberculosis and of avian to be two absolutely different species, the most that they show is that by passage through numbers of one species, the bacillus obtains altered characters. One can by special methods of growth outside the body obtain eventually cultures of the two forms that are absolutely indistinguishable, and one can, again, by inoculating large quantities of the human tubercle bacilli into guineapigs and rabbits obtain the same general infiltration of tissues without the development of actual tubercles that is gained by inoculation of smaller numbers of the avian bacillus. The difference is a matter of different intensity of virulence, and recently Nocard and Roux (Annales de l'Institut Pasteur, 1898) have shown that by taking a culture of the human tubercle bacilli, placing this very carefully in a sterilized little capsule of collodion and hermetically sealing this and placing it in the bodies of birds, the bacilli thus protected continue to grow into the lymph which diffuses into the interior of the capsule, and growing thus, gradually assume the characters of the avian bacillus.

While this is the case and while these observations upon the tubercle bacilli gained from hens and pheasants, show that we are not dealing with two separate species of organism, they nevertheless prove that variations more or less pronounced do manifest themselves in bacilli, according to the animal in which they develop, variations so marked that eventually it is with difficulty that the micro-organism sets up any active disease process in certain other species of animals.

Perhaps the clearest example of this modification of disease by passage through a succession of animals of one species is afforded by what is now definitely proved with regard to small-pox and cow-pox. For very many years it was held, and the impression still remains, that cow-pox in the cow and small-pox in man are two absolutely distinct diseases, and that in transferring cow-pox to man in vaccination one has an instance of giving protection against one severe disease—small-pox—by causing another disease—vaccinia. The diseases it was held, might be somewhat alike in their general characters, the one being severe and generalized, the other mild and localized, nevertheless in origin and in course they have been regarded as absolutely distinct.

We now know by the results of very many observers, from Ceely and Babcock, generations ago, down to Copeman, Hime and Fischer within the last few years, that, taking the matter from a small-pox pustule and inoculating it into calves, one can after passage through two or three calves, obtain a perfect cow-pox and, what is more, the lymph obtained from these animals, when employed for children, causes a perfectly typical vaccinia or vaccinal eruption and not small-pox. The process requires great care, and it is only with difficulty that one can in the first place infect cows with human small-pox. At the first passage no typical vesicular or pustular eruption is produced, only slight shotty eruptions are found in the skin at the region of inoculation, but if these little shotty eruptions be removed and broken up and inoculated into a second calf, in that calf the result is more marked, there is a tendency to the production of vesicles, and after three or four passages there is gained the development of perfect vaccinia. No clearer example can be afforded than this of the modification of disease by successive passage through a series of animals of one species and of the difficulty that there may be in setting up the disease in animals of another species.

We know perfectly well that if material from small-pox in man be inoculated into or infect another man, that material tends to set up a severe small-pox, but if this same material be instead inoculated into a calf and passed through a series of calves, and now lymph from the last of this series be inoculated into man, what is set up is not a generalized small-pox, but a localized vaccinal pustular eruption.

With such an instance as this before us, it is of the greatest importance for us to determine whether anything of the same kind occurs in connection with tuberculosis. Is it a simple and easy matter for cattle to become infected with tuberculosis from man? On the other hand, is it easy for human beings to be infected with tuberculosis from cattle? If the answer to both these questions is in the affirmative, then it is absolutely necessary for us, if we wish to eradicate the disease, to adopt most stringent regulations, both with regard to the contact of individuals suffering from the disease with those who are healthy and with regard to the inspection and condemnation of all food stuffs intended for human consumption emanating from diseased herds. If, on the other hand, the answer be negative; if, for example, we find that while cattle under certain conditions are capable of being infected, nevertheless under ordinary conditions they are with difficulty infected from man, or again, find that under ordinary conditions the typical bacillus that is passed through several cattle is modified in its infective power as regards man, then it will be seen that not only is the conveyance from one species to another very greatly lessened, but also that the regulations to be propagated by the central government need not be so stringent, nor again the cost to the country and to the individual of eradicating the disease so great as to place the attempt at eradication outside the bounds of practical politics.

In consequence of the general acceptation of Koch's statements that the bacillus of tuberculosis is one and the same from whatever animal obtained, it is only quite recently that any full and careful studies have been made upon the peculiarity of human and bovine bacilli, respectively. Indeed, it is only last year that there appeared the first full and careful study of the difference between the two forms of microbes in an article contributed to the *Journal of Experimental Medicine* by Professor Theobald Smith, of Harvard University. The paper is of so much importance and at the same time so full that it is deserving that some fairly complete abstract of the results gained be here given.

Theobald Smith obtained the cultures of the tubercle bacilli from seven different sputa of human beings suffering from phthisis and six different cattle suffering from the disease. With these he compared cultures obtained from a pig (probably of bovine origin), from a cat, a horse and from a pet coati (*Nanuanarica*, probably infected from human sputum, its owner being tuberculous). Bacilli in all cases were isolated by inoculating guineapigs with the tissue or sputum. With regard to the cultures, he found :—

1. That bovine and other animal bacilli (except those from the coati, which probably came from man) grew less vigorously for a number of generations than the human sputum bacilli. One sputum bacillus, however, he regarded as atypical.

2. Bovine bacilli were much less influenced by certain modifications of the medium of growth.

3. Bovine bacilli tend to remain short ; human bacilli are either more slender from the start or become so during cultivation.

With regard to pathogenesis, he found that the great susceptibility of guineapigs to tubercle bacilli rendered it impossible to distinguished marked differences when these animals were employed. On the whole, the bovine bacilli showed a much greater virulence. This was especially seen when subcutaneous rather than intraperitoneal inoculations were made. The action of the tubercle bacilli from the pig, horse and cat was nearly the same as the bovine cultures. In connection with this observation, I may recall that of Dr. Higgins in the following report, to the effect that two cats at the Experiment station, fed with the material of animals suffering from or inoculated with material from bovine tuberculosis, succumbed to the disease.

Employing rabbits, Theobald Smith found that intravenous injection of bacilli into the ear-vein, demonstrated a very sharp distinction between human and bovine cultures. Thus, rabbits inoculated with bovine bacilli succumbed after seventeen to twenty-one days ; of those inoculated with sputum bacilli, only one succumbed after thirty-five days ; the others, when killed, had, all but one, increased in weight ; some a little, others much. With bovine bacilli, the rabbits showed an extreme condition of miliary tuberculosis, more especially in the lungs, liver and spleen ; with sputum bacilli from man, similarly injected, the lungs contain tuberculous foci, very much less frequent and more transparent than those seen in the previous set of cases. The liver and spleen contained numerous tubercles scattered sparsely over the organ, while the kidneys, which had been little affected in the previous set of cases, showed markedly frequent whitish foci of fair size. Microscopically examined, the tubercles in the lungs of the first series (bovine bacilli) showed rapid tissue destruction in the tubercles and the presence of very large numbers of tubercle bacilli, whereas in the rabbits inoculated with human bacilli, the breaking down of the tubercles (necrosis) was very little shown and the tubercle bacilli were very scarce. Or to epitomize :—

1. Bovine cases died in from seventeen to twenty-one days.

2. These show rapid evolution and increase of the pulmonary tubercles, with very great increase of the tubercle bacilli in them.

3. Death of the sputum rabbits (with one explainable exception) did not ensue till after one and a-half to three and a-half months. The original weight had been more or less exceeded.

4. The pulmonary tubercles in the sputum rabbits developed very slowly with very little tendency towards necrosis. The bacilli were present in very small numbers only.

5. The swine and cat cultures are to be classed with the bovine ; the horse culture stands intermediate.

Passing now to the results of inoculating these various cultures into cattle. Ten cattle were taken. Five inoculated with the sputum bacilli obtained from man ; one with the bovine taken from the swine, and four with bovine cultures. A summary of the outcome of these experiments shows the following facts :—

1. The bovine cases either remained stationary in weight or lost slightly, while the sputum cases gained from 75 to 85 pounds.

2. There was marked fever in the bovine cases for three weeks after the inoculation, practically none in the sputum cases.

3. There were well marked differences in the lesions produced:—In the sputum cases a localized tuberculosis was produced in the lung in the region of inoculation. The contents of the tumour were soft and converted into a gritty mass *inclosed in a well defined capsule*, the disease did not spread from this point nor were the tubercles visible in the lymph glands of the thorax except in one gland in one case. In the pleura on killing the animals some two months after inoculation, there was evidence of inflammation which showed abortive tubercles.

Among the bovine cases on the other hand there was developed (*a*) diseminated tuberculosis of the lungs, (*b*) tubercular deposits on the lungs, pericardium diaphragm and ribs resembling closely the pearly disease in cattle with extension of the eruption to the pleural wall of the other side of the chest, (*c*) extensive tuberculosis of nearly all the lymph glands of the thorax, and (*d*) slight tuberculosis of other organs, spleen, liver and kidneys in two out of three cases.

One of the sputum cases showed absolutely no signs of disease; two showed very slight lesions and three showed local lesions without dissemination. Of the bovine cases two died of generalized disease, two showed extensive lesions and one showed less extensive lesions; in the swine cases the lesions were less extensive than in the bovine.

These results are of great significance. They would seem to show clearly that *in cattle treated identically and given equal quantities of growths of tubercle bacilli emanating from man and from cattle respectively, in the former only a localized and thus non-infectious disease is produced, in the latter, a generalized and consequently infectious disease develops.* Or, in other words, that even if cattle become infected from man, there is under ordinary conditions, little liability for those cattle to set up a disease spreading to other animals.

With these observations of Theobald Smith may be compared those of other observers: Thus Bollinger (Munch. med. Woch., 1894, No. 5) so long ago as 1875, inoculated fluid from a human tuberculous lung into the peritoneal cavity of a calf; the calf was killed in 7 months and now a pearly disease was found on the peritoneal coverings along and in the retroperitoneal and mesenteric glands; all the other glands of the body were normal.

Here again one has evidence of the tendency of the disease to be localised; even after 7 months there was no miliary tuberculosis of the lungs or of the abdominal viscera—purely a tuberculosis confined to the peritoneal surfaces and the lymph glands of the abdominal cavity. Baumgarten (Jahresbericht, 1891, p. 666, foot note) mentions an experiment in which cultures of human bacilli had but little local effect after intraoccular inoculation upon the calf, whereas material from a pearly nodule in the cow produced typical and local miliary tuberculosis in another calf. Sidney Martin (Report of the Royal Commission on Tuberculosis, 1895, appendix p. 18) also concludes from a series of experiments upon four calves fed with tuberculous material from a cow, and six calves fed with human sputum containing large numbers of tubercle bacilli, that in the case of tuberculous sputum we are dealing with material which is less infective than bovine tuberculous material. Upon this Continent, Frothingham, previous to Theobald Smith, had carried out experiments of a similar character, (Report of the Massachusetts Cattle Commission, 1897). Two calves received suspensions of a culture of human bacilli obtained from the liver of a child, the inoculation being made into the peritoneal cavity; in both only slight local nodules were produced, some resembling spontaneous tubercles, others tending towards granulation tissue. Two other calves were inoculated in the trachea, and in the liver and lungs of one a small number of tubercles devoid of tubercle bacilli were found, while a large local abscess formed in the tract of inoculation into the trachea; in the other calf lesions were absent. Three additional calves inoculated subcutaneously with sputum containing many tubercle bacilli showed lesions equally slight. The observations of Crookshank (Trans. Path. Soc., London, 1891, p. 332) are invalidated by the fact that the animal which was inoculated with the sputum, evidently obtained at the same time suppurative micro-organisms and died of pyæmia. (If, however, his results be taken in conjunction with those of other workers, then very possibly they indicate that if a calf or cow be lowered in its vitality by septic disease, then there is a possibility for human tuberculosis to gain a foot-hold in its system and to become generalized.)

Theobald Smith concludes that it would seem as though the sputum bacillus cannot gain lodgment in cattle through the ordinary channels.

The observations made by us at Outremont go far to confirm these observations of Theobald Smith; the full details will be found in the accompanying report by Dr. Higgins. It will be seen very clearly that whereas our calves died with rapid spreading miliary tuberculosis when inoculated with the bovine tubercle bacilli, the course of the disease in a calf of a similar age inoculated with similar quantities of human bacilli was totally different; the animal kept in good health, and upon making a post mortem four months later absolutely no lesions were found. The only objection to these observations is that possibly the human bacilli were attenuated by long growth outside the body. It is, however, to be noticed that these cultures were sufficiently virulent to set up very definite tuberculosis in guineapigs, killing them in fifteen days, a period distinctly shorter than usual.

We are now engaged in gaining fresh cultures of human tubercle bacilli from patients suffering from tuberculosis, in order to make fresh inoculations and place this matter absolutely beyond doubt. So also, in order to make parallel observations with human and bovine tuberculosis similar to those made by Nocard and Roux in connection with the human and avian, we have in process observations upon the effect of inclosing human tubercle bacilli in capsules placed in the tissues of cattle to see whether by this means we can modify the characters of growth of the human bacillus and convert it into bovine.

It will be seen that our own observations, coupled with the observations of others, so far support us in the belief that there is relatively little danger, *under ordinary conditions*, of the transmission of phthisis from human beings to cattle or, to translate this into its practical application, *if ordinary care be taken in the management of cattle there is relatively little danger of a healthy herd being rendered tuberculous by the presence upon the farm of attendants and other human beings suffering from pulmonary tuberculosis or phthisis*, while again *it would seem possible for veterinarians to undertake the eradication of bovine tuberculosis at a time when the medical profession and the community in general is taking no adequate steps to eradicate human tuberculosis.*

Here a few words may be said upon the converse problem with regard to the transmission of tuberculosis from cattle to man. Inasmuch as this is a question that we cannot by any means settle at the Experimental station, I feel that it is scarcely in place here to discuss in detail the various cases that have been brought forward of such presumed transmission. I can but state that it is a matter of extreme difficulty to find cases in the literature in which, without a shadow of a doubt, there has been such transmission. In my paper given at Toronto (Canadian Journ. of Med. & Surg., Dec. 1899) I have already briefly discussed this matter. On the whole the evidence goes to show that in those cases where the transmission has been most clearly made out, it has been children and young adults (who are the most susceptible members of the community) who have been infected, and the animals causing the infection have been cattle suffering from advanced disease of the udder, so that enormous numbers of tubercle bacilli have been taken into the system through the digestive tract, and the system has, as it were, been overpowered by the large numbers of bacilli. The most that we can urge from such observations, without going beyond the facts at our disposal at the present, is the periodical inspection of dairies and the condemnation of all animals showing emaciation and definite clinical evidence of the disease, and most certainly of all animals showing the tuberculous infection of the udders.

It is remarkable how very rare this last class of cases would appear to be in this country or at least within a radius of some 200 miles of Montreal. So far, in the course of months of investigation and inquiry for such animals, we have been able to learn of the existence of but a small isolated collection of cattle showing tubercular udder disease. The only point that can be undertaken experimentally in connection with this portion of the subject is the isolation of tubercle bacilli from various cases of both chronic and acute tuberculosis in man and the careful cultivation of these to see whether we can obtain evidences of differences in cultural characteristics and in virulence of the bacilli from different sources.

We have begun this work, but the process thereof must be very slow and even if we do obtain from any cases of tuberculosis in man bacilli having the general characteristics of the bovine variety, even then it must be remembered that we cannot absolutely state that we have here proof positive of the transmission of the disease from cattle to human beings. We shall only have obtained one further link in the chain of evidence that such transmission does occur.

There are certain other points in the subjoined report which are worthy of note. In his first observations upon tuberculin, Koch pointed out the remarkable fact that in guineapigs which had been rendered tuberculous, reinfection with tubercle bacilli led to only a relatively abortive secondary disease; there was a localized ulceration with marked tendency to sloughing and necrosis and to little spread from the region of this second inoculation. The impossibility of gaining any cattle showing well marked tuberculosis of the udder led us to observe whether the same abortive tuberculosis was set up in cattle by reinoculation, or whether on the other hand we could in such animals experimentally produce the condition of ulcerative and progressive tuberculosis of the udder. In the course of these observations it was found by Dr. Higgins that employing both bovine and human bacilli, the inoculation of the bacilli caused in the first place a remarkable reaction of the nature of a tuberculin reaction. Thus in Cow 1, inoculated with bovine bacilli in the udder, the temperature rose 5·1°; in Cow IV., also inoculated with bovine bacilli, it rose 4°, and what is more, for several days following there was a variable temperature, at times normal and at times as high as 106°, only upon the 5th day did the temperature return to the normal permanently. In the 3rd Cow, in which human bacilli were inoculated into the udder, the temperature rose 4°, and as in the previous case, remained high for three days; in all three animals there, a definite localised tuberculosis developed. As a result of this inoculation evidently an ulcerative tuberculosis was being set up for the milks of all three animals contain very abundant tubercle bacilli. One of the two cows inoculated with bovine bacilli, which before was in a stationary condition, is now loosing flesh and getting weaker and weaker, in short, it presents all the symptoms of a generalised tuberculosis.

It has recently been shown that in human beings affected with tuberculosis, whereas in normal ordinary quiet breathing the breath is free from bacilli and thus is not infectious upon coughing, or again even when speaking, fine minute droplets from the mouth and pharynx are discharged from the mouth and these droplets have been found to contain the tubercle bacilli. Dr. Higgins has devised a very simple and efficacious method to determine the infectivity of the breath of cattle. Taking a plate of glass and ruling it with a diamond into oblongs about 3 x 1, similar to the 'glass slides' employed for microscopical work, he fastens one of these plates of glass in front of animals suffering from pulmonary tuberculosis and allows it to remain there from twelve to twenty-four hours. Such fine droplets as escape from the mouth in coughing are dried upon these glass plates and now when these are brought to the laboratory and the films that have formed on them are fixed and stained, he has been able very definitely and clearly to find tubercle bacilli on the individual glasses.

This is a most simple and most practical method of demonstrating the fact that the expectoration of animals suffering from cough is capable of conveying the bacilli into the neighbourhood and so of setting up infection.

Finally, a few words are perhaps necessary with regard to the tuberculin reaction. This year as last, as will be seen from the subjoined table, we have had frequent examples of the fact that animals retested within thirty days have presented no definite reaction. In view of this fact, I feel it necessary to point out once more the advisability in connection with the importation of high-bred and other cattle into this country, of not relying upon the reports furnished by previous owners, for this fact concerning the absence of reaction is now so generally known and the possibility of preparing cattle so that they give no reaction, is so obvious, that if tuberculosis is to be kept out of our herds, it becomes most advisable that animals so imported be quarantined for a period sufficiently long to permit a second test to be made by the Government inspectors without their being any possibility of veiling the condition of the animal. In my paper at Toronto, already referred to, I recommended a period of six

weeks. I have recently seen from a paper by Nocard (Bulletin de Soc. Centr. de med. Vet., vol. 51, p. 55, 1897), that in France previous to the production of Nocard's special tuberculin, a period of forty-five days' detention was demanded. It is to be added that the French Government keeps the preparation of this special tuberculin a secret. Until we can discover a tuberculin of this nature which will give with certainty a reaction even two or three days after a previous reaction has been obtained, such quarantine is, it seems to me, the only sure method of preventing the possible entry into this country of infected animals.

I have the honour to be, sir,

Your obedient servant,

J. GEORGE ADAMI.

No. 16.

REPORT ON OBSERVATIONS MADE AT THE EXPERIMENT STATION AT OUTREMONT BY CHARLES HIGGINS, B.S., D.V.S., &c.

SIR,—I beg herewith to transmit this my report covering the investigations upon contagious diseases at the Outremont Experiment Station, together with reports upon specimens, sent by inspectors from the various parts of the Dominion for diagnosis, covering the period between June 1, 1899, and October 31, 1899.

It has been my aim in conducting the experiments to undertake only such as could be properly conducted, special attention being given in every case to the details in connection with the inoculation and the subsequent care of the inoculated animal.

Work being especially desired upon the subject of tuberculosis, I communicated with Dr. D. E. Salmon, Chief of the Bureau of Animal Industry of the United States, Department of Agriculture, concerning cultures, and received through his kindness a culture each of the human and bovine germs. This was done with the view of saving time; material not being at hand from which to isolate cultures, nor were there cultures to be had in the city. It is with these germs that the experiments noted have been conducted.

TUBERCULOUS COWS AND EXPERIMENTS WITH THEM.

The history of these five cows prior to their being sent to Outremont is, that they were dairy cattle which had reacted to the tuberculin test and were procured for experimental purposes. All five of these animals gave good reactions to the tuberculin test applied on June 20–21, which was 102 days after the original test. A record of this test is as follows:—

—	Date of Test.	Temperature before injection.	Temperature after injection.							Reaction in Degrees.
		6·00 p.m.	6·00 a.m.	8·00 a.m.	10·00 a.m.	12·00 m.	3·00 p.m.	6·00 p.m.	8·00 p.m.	
Cow I.....	June 20–21....	102	102	102	104	104	104	103·4	102·6	2·0
Cow II.....	"	102·2	102·2	101·8	105·4	106	105·4	102·6	101·8	3·8
Cow III.....	"	102·2	101·6	102 2	104	106	106·2	103·6	102·4	4·0
Cow IV.....	"	102·4	102·4	104·6	106	106	105·2	102·6	102	3·6
Cow V.....	"	101·6	101·6	102·4	104	104	104·8	103·8	103	3·2

RE-INFECTION TUBERCULOSIS IN TUBERCULOUS CATTLE.

An attempt has only been made to set up a focus of re-infection in the udders for the purpose of obtaining milk impregnated with infectious material. These inoculations were made upon animals I. and IV. with pure cultures of bovine bacilli and upon cow V. with pure cultures of human bacilli. In each case the point of inoculation was the upper part of the right fore-quarter of the udder. There was in every case a marked tuberculin reaction which was sustained for considerable time in cows IV. and V. These reactions were as follows :—

COW I (Bovine bacilli used).

Aug. 3—Normal temperature at 4.30 p.m., 101·2° F.

Aug. 4—Time, 12 noon, temperature, 106·3; 3.30 p.m., 104 : 5 p.m., 103·1 : 7 p.m., 102·2.

The temperature has been constantly normal since the inoculation.

COW IV (Bovine bacilli used).

Aug. 3—Normal temperature at 4.30 p.m., 102·4.

Aug. 4—Time, 12 noon, temperature, 106·4; 3.30 p.m., 105·2; 5 p.m., 104·2; 7 p.m., 103·1.

Following this for a period of four days the temperature was variable, at times normal and again as high as 106° F. Upon the fifth day after the inoculation the temperature was reduced to 101·3° and has remained at or near this point since.

COW V (Human bacilli used).

Sept. 26—Normal temperature at 5.30 p.m. was 102°F.

——	6 a.m.	8 a.m.	10 a.m.	12 noon.	2 p.m.	4 p.m.	6 p.m.
September 27	102·4	101·3	105·	106·	105·3	105·3	105·3
" 28	105·1	105·1	103·4	103·4	105·1	105·	.....
" 29.....	.....	102·3	.....	104·	104·	103·	103·3

On the 30th the temperature was 101, where it has remained with slight variations since.

In the case of each animal a tumor-like mass was formed at the point of inoculation. With cow No. I, this enlargement is of greater size than it is in either of the other animals, being about the size of a closed fist clearly visible to the naked eye, differentiated from the remainder of the udder by a well marked depression.

The physical condition of the animals has not changed materially in the case of cows Nos. I and V, but cow IV is loosing flesh, looks unthrifty and is getting weaker and weaker, presenting symptoms of a generalized tuberculosis, although the flow of milk is maintained and the appetite excellent.

The milks of all three are impregnated with tubercle bacilli, as a result of this reinfection.

EXPERIMENTS WITH BOVINE AND HUMAN TUBERCLE BACILLI.

An endeavour has been made to determine the pathogenesis and the variation in the lesions, in connection with the bovine and human germs. The work accomplished

I consider as merely preliminary, time being one of the greatest essentials in the carrying out of these investigations.

Two yearling heifers which had not reacted to tuberculin and which did not show physical evidence of tuberculosis were inoculated; one (heifer V) with a bovine culture well up and deep in the right lung, the other (heifer VI) being inoculated well up and deep in the left lung with a pure culture of human tubercle bacilli. The heifer inoculated with the bovine germ succumbed in 42 days; the lesions presented being those of an extensive generalized tuberculosis. There was not at the point where the needle passed through the pleural cavity a tubercular abscess or any disturbance whatever to indicate its passage as reported by other observers.*

It is perhaps worthy of note to mention that bacilli were found on glass plates exposed in such a manner as to receive a portion of the products of coughing and expiration.†

The heifer inoculated with the human germ shows but slight clinical evidence of disease, being in excellent condition, after a period of three months, and has gained flesh since the inoculation.

TABLE I.

Designation of Animal.	Material used for Inoculation.	Animal used.	Date of Inoculation.	Dose in cubic centimeters.	Estimated number of bacilli in 1 c.c. of the preparation.	Mode of Inoculation.	Initial weight.	Final weight.	Died in
33	Bovine	Guinea Pig..	Aug. 3.	2·0	Not estimated.	Abdomen	506	465	15 days.
34	"	"	" 3.	2·0	"	"	521	552	14 "
37	"	Rabbit	" 11.	2·0	90,000	"	1460	.....	Still alive
38	"	"	" 11.	1·0	90,000	"	1500	1215	90 days.
39	"	"	" 11.	1·0	90,000	"	1789	1635	70 "
40	"	"	" 11.	0·5	90,000	"	1616	1485	74 "
41	"	Heifer V....	" 29.	5·0	77,000	Right lung...	....	.....	42 "
42	Human	Heifer VI..	" 29.	5·0	84,000	Left lung	....	.....	Still alive.
43	Bovine	Guinea Pig..	" 29.	0·5	77,000	Abdomen	272	282	30 days.
44	Human	"	" 29.	0·5	84,000	"	240	227	36 "
45	Bovine	Rabbit	" 29.	1·0	77,000	"	1928	1500	36 "
46	Human	"	" 29.	1·0	84,000	"	2050	1500	52 "
47	"	Chicken	Sept. 26.	1·0	88,000	Breast muscle.	990	.....	Still alive.
48	Bovine	"	" 26.	2·5	90,000	Abdomen	1147	.. ..	"
49	"	"	" 26.	1·5	90,000	Breast muscle.	1160	.....	"
50	Human	"	" 26.	1·5	88,000	Abdomen	1785	...	"
51	Bovine	"	" 26.	1·5	90,000	Breast muscle.	1552	.....	"
52	Human	"	" 26.	1·0	88,000	"	1635	.....	"
53	"	Rabbit	" 26.	1·5	88,000	Lung	1955	.....	"
54	"	"	" 26.	2·0	88,000	Abdomen	1945	.....	"
55	"	Guinea Pig..	" 26.	1·5	88,000	"	424	357	23 days.
56	"	"	" 26.	1·5	88,000	Subcutaneous.	387	352	18 "
57	Bovine	"	" 26.	1·0	90,000	Abdomen	387	330	20 "
58	"	"	" 26.	0·5	90,000	"	382	304	35 "

GUINEA PIGS INOCULATED WITH TUBERCULOSIS.

The guinea pigs used in connection with the human and bovine inoculation experiments were used mainly to determine the pathogenesis of the germs used and not with a view to comparative results, for with few exceptions I do not consider them large

* Theobold Smith, Jour. Expt. Med. Vol. III, Nos. 4 and 5, 1899.

† The modus operandi consisted in the cutting of an ordinary 7 x 9 light of glass into sizes similar to the ordinary laboratory glass slides but not breaking them apart. This plate of glass was fastened in front of the animal and allowed to remain 12-24 hours, with the smooth side exposed, when it was taken down and carried to the laboratory, such portions being broken out as were desired for examination. This is the simplest and most practical of any method yet tried for such purposes.

enough for comparative purposes; it having been pointed out by Theobald Smith, that guinea pigs of not less than 600-800 grammes should be used; there being little or no difference in the duration or lesions of the disease produced by bacilli from bovine or human sources, with those weighing 400 grammes or under. There were inoculated with bovine tuberculosis five guinea pigs, dying in fourteen, fifteen, twenty, thirty and thirty-five days. Three were inoculated with human tuberculosis, dying in eighteen, twenty-three and thirty-six days. In all cases there was an extensive generalized tuberculosis.

RABBITS INOCULATED WITH TUBERCULOSIS.

In all there were eight rabbits inoculated. This number is too small to admit of reliable conclusions in the comparison of the germs of bovine and human tuberculosis. These animals were also used to determine the pathogenesis of germs used for other inoculations.

Of those inoculated with bovine tuberculosis there were five, dying in thirty-six, seventy, seventy-four and ninety days, one being still alive after three and a-half months. Three were inoculated with human tuberculosis, one dying in fifty-two days, the other two being still alive after a period of two months.

CHICKENS INOCULATED WITH TUBERCULOSIS.

No positive results have been obtained up to the present time. Six were inoculated, three with bovine tuberculosis and three with human tuberculosis. Check guinea pigs inoculated at the same time with the same preparations, died in eighteen and twenty-three days inoculated with human tuberculosis; and twenty and twenty-five days inoculated with bovine tuberculosis.

The chickens have shown no ill effects from the inoculation, and have shown a steady gain in weights from that date, which was September 26.

INFECTIOUSNESS OF MILK.

Concerning the work upon the infectiousness of milk, the accompanying table is self-explanatory. (Table II.) The majority of these experiments were made with the milk of cow No. II., as bacilli were found in it with more regularity and with a greater degree of positiveness by microscopical examination than was the case with the other animals. This animal, after severe physical examination, seemed to reveal greater evidence of udder disease than did the others, but the autopsy did not reveal the condition which it was expected would be found in the udder. It is indeed unfortunate that this animal which calved on October 9, died two days later from traumatic pericarditis, as she was the animal with which it was desired to repeat the previous experiments, at the same time conducting others to give a more extended knowledge for comparison with the work of others.

The work accomplished goes to confirm the results of other workers, namely, that an animal without tuberculosis of the udder itself, while the lesions found in other parts of the body are not extensive, may at times excrete active tubercle bacilli through the milk. In detecting tubercle germs in the milk great care is required in the microscopical examination to discover them in the small numbers found, a chance of error being possible, as other germs (especially the smegma bacillus) retain the colouring matter in much the same manner as does the tubercle bacillus, and these germs are many times taken for tubercle, till the results are repeated and verified beyond a doubt.

FEEDING CALVES UPON TUBERCULOUS MILK.

There is beside the work recorded in the table upon the infectiousness of milk, another series of experiments being conducted; the bringing up of calves, using as a diet milk from tuberculous animals. We have in the case of calf No. I. a reaction on

June 20–21 to the tuberculin test indicating the presence of tuberculosis. There are two other calves subjects of similar experiments which have not at the present time been subjected to the tuberculin test, neither being old enough.

To recapitulate upon the subject of the infectiousness of milk, we have the following results :—

Cow I.—3 guinea pigs inoculated.		None tuberculous.
" II.—10 guinea pigs and 3 rabbits.		Two guinea pigs contracted tuberculosis.
" III.—3 guinea pigs inoculated.		None tuberculous.
" IV.—3 "	"	One tuberculous.
" V.—3 "	"	None tuberculous.

This makes a total of 22 guinea pigs and 3 rabbits inoculated, 3 guinea pigs contracting tuberculosis, or 1·2 per cent of all the animals thus inoculated. With this we have one calf contracting the disease through drinking infected milk.

TABLE II.

Number.	Milk of Cow.	Animal Used.	Designation of Animal.	Treatment of Milk before Inoculation.	Amount Inoculated.	Date of Inoculation.	Mode of Inoculation.	Initial weight in Grammes.	Final weight in Grammes.	Chloroformed after	Died in	Result of Autopsy.	Presence or absence of tubercle bacilli in organs.
	No.												
1	I.	Guinea pig..	13	Taken during tuberculin test and inoculated soon after being drawn.	15 c.c.	June 21	Abdomen	531	490	.... ..	31 days..	Peritonitis	No bacilli found.
2	I.	" ..	14	" " ..	15 c.c.	" 21	" ..	622	525	.....	28 " ..	"	"
3	I.	" ..	15	" " ..	15 c.c.	" 21	" ..	588	565	93 days..	.....	No tuberculosis	"
4	II.	" ..	1	Nigh fore quarter....	10 c.c.	" 2	" ..	700	579	110 " ..	.....	"	"
5	II.	" ..	2	"	10 c.c.	" 2	" ..	580	492	.....	11 days	Peritonitis	"
6	II.	" ..	3	"	15 c.c.	" 2	" ..	655	595	.....	43 " ..	Tubercle on liver, in omentum and psoæ muscles.	Bacilli found.
7	II.	" ..	4	900 c.c. allowed to sediment 18 hrs., 20 c.c. centrifuged out of this.	8 c.c.	" 8	" ..	602	.....	.. ..	10 minutes	Shock of operation	No bacilli found.
8	II.	" ..	5	" " ..	3 c.c.	" 9	" ..	475	516	.....	40 days..	Peritonitis B. coli found	No bacilli found.
9	II.	" ..	6	" " ..	3 c.c.	" 10	" ..	795	634	102 days..	.....	Tubercular abscess upper right side, peritoneal cavity contained 25 c.c. pus.	Bacilli found.
10	II.	" ..	7	" " ..	3 c.c.	" 13	" .	665	558	.....	10 days..	Gastro enteritis	No bacilli found.
11	II.	Rabbit.. ...	8	Left fore quarter.....	30 c.c.	" 13	" ..	1,495	1,955	134 days..	.....	Normal.	"
12	II.	"	9	"	30 c.c.	" 13	" ..	1,315	1,162	98 " ..	.....	"	"
13	II.	"	10	"	40 c.c.	" 14	" ..	1,115	2,080	133 " ..	.....	"	"
14	II.	Guinea pig..	16	Mixed milk taken during highest temperature of tuberculin test.	15 c.c.	" 21	" ..	550	459	.....	20 days..	Gastro enteritis.	"
15	II.	" ..	17	" " ..	15 c.c.	" 1	" ..	397	384	.....	9 " ..	Peritonitis	"
16	II.	" ..	18	" " ..	25 c.c.	" 21	" ..	570	487	.. ..	32 " ..	"	"
17	III.	" ..	19	" " ..	15 c.c.	" 21	" ..	572	617	93 days .	.....	Normal..	"
18	III.	" ..	20	" " ..	15 c.c.	" 21	" ..	559	....	.	1 day ..	Shock	"
19	III.	" ..	21	" " ..	25 c.c.	" 21	" ..	612	592	93 days..	.....	Old peritonitis, otherwise normal.	"
20	IV.	" ..	22	" " ..	15 c.c.	" 21	" ..	372	365	.....	6 days..	Gastritis	"
21	IV.	" ..	23	" " ..	15 c.c.	" 21	" ..	490	425	.....	12 " ..	Peritonitis	"
22	IV.	" ..	24	" " ..	20 c.c.	" 21	" ..	495	464	.. ..	36 " ..	Tubercles on surface of liver..	Bacilli found.
23	V.	" ..	25	" " ..	15 c.c.	" 21	" ..	392	335	....	12 " ..	Peritonitis.....	No bacilli found.
24	V.	" ..	26	" " ..	15 c.c.	" 21	" ..	530	432	.....	10 " ..	"	"
25	V.	" ..	27	" " ..	25 c.c.	" 21	" ..	645	445	....	35 " ..	Gastro enteritis.	"

CATS CONTRACT TUBERCULOSIS.

There were two cats at the station during the summer that developed a generalized tuberculosis through drinking infected milk, eating guinea pigs and rabbits dead of the disease, together with tuberculous glands from cow No. III.

This fact, together with the statement by other observers that pet birds are very commonly affected with this disease, raises the point that there is a possibility of contracting tuberculosis from the association with these animals.

CO-HABITATION EXPERIMENTS.

Probably the most important and interesting experiments carried out were those of co-habitation, by means of which it has been demonstrated that an animal, showing but slight symptoms of pulmonary disease after a severe clinical examination, was capable of infecting two healthy yearling heifers in 107 days (Heifers III and IV. During the time that these experiments were being conducted there was a yearling heifer (Heifer II) kept in a stall by herself on the opposite side of the passage without particular attention to disinfection other than can be had in any well kept stable. This heifer was tested at the same time as the two which proved to be infected, and found to be free from tuberculosis as indicated by the test; nor was there any clinical evidence of disease revealed after severe clinical examination.

At the autopsy of the two infected heifers lesions were to be found in the mediastinal and mesenteric glands in each case, in the bronchial glands in one and in the glands at the base of the udder in the other. The superficial glands of the flank and brachial region were not affected. The post pharyngeal glands and the glands at the base of the udder were also free from evidences of disease. There was a nodule about $\frac{3}{4}$ of an inch in diameter in the lung of one undergoing caseation.

In order that these experiments may be of more practical value, it is desired that they be repeated under similar conditions. It also seems that it would be advisable to keep the uninfected heifer to ascertain the period an animal may be confined in an infected stable and yet remain free from disease.

TUBERCULIN TESTS.

Tuberculin tests were made as seemed necessary in connection with the work being fully recorded in the following table:—

TABLE

Number.	Designation of Animal.	Date of Test.	Time of injection.	Temperature before injection.	Temperature				
					6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.
1	Cow I	June 20-21	6 p.m.	102·	102·	.....	.....	104·	.....
2	" II	" 20-21	6 "	102·2	101·8	.....	.....	105·4	.....
3	" III	" 20-21	6 "	101·6	102·2	.....	.....	104·	.....
4	" III	July 10-11	6 "	101·8	102·	.....	102·4	.....	103·6
5	" IV	June 20-21	6 "	102·4	104·6	.....	.....	106·	.....
6	" V	" 20-21	6 "	101·6	102·4	.....	.....	104·	.....
7	Heifer II	" 20-21	6 "	102·4	103·	.....	.....	103·2	.....
8	" II	Oct. 9-10	5.30 p.m	102·2	102·	.....	102·	.....	101·6
9	" III	June 20-21	6 p.m.	103·	103·4	.....	.....	102·8	.....
10	" III	Oct. 9-10	5.30 p.m	103·	103·4	.....	106·	.....	106·
11	" III	" 30-31	6 p.m.	102·6	102·6	.....	102·6	.....	102·6
12	" III	Nov. 1-2	6 "	101·8	103·	.....	102	.....	102·
13	" III	" 20-21	6 "	101·6	102·4	.....	102·4	.....	102·6
14	" IV	June 20-21	6 "	102·4	103·2	.....	.....	102·6	.....
15	" IV	Oct. 9-10	5.30 p.m	103·2	103.2	.....	106·	.....	106·
16	" IV	" 30-31	6 p.m.	101·8	104·	.....	104·4	.....	103·6
17	" IV	Nov. 7-8	6 "	102·2	102·2	.....	102·2	.....	102·
18	" IV	" 20-21	6 "	102·	101·6	.....	102·	.....	102·8
19	" V	June 20-21	6 "	103·2	103·	.....	.....	103·	.....
20	" VI	" 20-21	6 "	102·	102·	.....	.....	102·	.....
	Calf I	" 20-21	6 "	102·2	103·2	.....	.....	103·	.....
	" I	Oct. 27-28	6 "	102·	106·6	.....	106·6	.....	106.6
	" I	Nov. 20-21	6 "	102·	103·	.....	103·	.....	104·

III.

After Injection.								Reaction in degrees.	Remarks.
11 a.m.	Noon.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	6 p.m.	8 p.m.		
	104·			104·		103·4	102·6	2·0	
	106·			105·4		102·6	101·8	3·8	
	106·			106·2		103·6	102·4	4.0	
	104·		104·		103·8	103·6	101·8	2·2	
	106·			105·2		102·6	102·	3·6	
	104·			104·8		103·8	103·	3·2	
	102·			100·2		100·4		None.	
	102·		102·		102·2	102·		"	
	102·6			101·		101·		"	
	106·		106·		106·	103·6		3·0	
	103·		102·6		102·6	102·6		None.	Double dose used.
	102·2		102·		101·	101·		"	Mr. Ross' tuberculin used.
	102.2		102·6		103·	102·		"	Double dose used.
	102·6			100·4		100·2		"	
	106·		106·		105·6	105·2		2·8	
	103·6		103·6		102·6	102·3		2·6	Double dose used.
	102·		102·		102·	101·8		None.	Mr. Ross' tuberculin used.
	102·2		102·6		102·6	102·		"	Double dose used.
	103·			100·8		100·8		"	
	102·2			101·		102·		"	
	104·1			103·4		104 3	105·	2·8	
	106·6		106·6		105·8	105·8		4·6	
	103·4		104·		104·	103·2		2·0	2 c. c. used.

The special reactions that were obtained after the inoculations of pure cultures of tubercle bacilli into the udders of infected animals are not recorded here as they have been considered in connection with reinfection tuberculosis. Heifers III. and IV. together with Cow III. furnish us more data regarding tuberculin than do the other animals. We have here a repetition of the unreliability of the tuberculin test when it is applied a second time within too short an interval.

Tests 12 and 17 were made with a specially prepared tuberculin furnished by Mr. M. Ross of the Guelph Agricultural College. It was claimed that this tuberculin would give a reaction immediately after the use of that ordinarily employed. In my hands such was not the case, as no reaction was received immediately following a test with the ordinarily prepared article, nor was there a reaction after the lapse of a week from a previous test which gave a good reaction. Mr. Ross prepared his tuberculin from bacilli isolated from fishes. Other experiments are being conducted with this preparation.

DETAILED ANIMAL EXPERIMENTS.

Cow No. 1.

This was a grade animal eight or nine years of age, in good condition giving about nine quarts of milk per day. Physical symptoms of tuberculosis were wanting after the closest physical examination.

Inoculations.—This was inoculated in the upper portion of the right fore quarter of the udder on the afternoon of Aug. 3, with a 3 c.c. of a pure culture of bovine tubercle bacilli at which time the temperature was 101·2° F. On the day following there was a definite tuberculin reaction as follows :—

Aug. 4.—Time, 12 noon, temperature 106·3 ; 3.30 p.m, 104 ; 5 p.m., 103·1 ; 7 p.m., 102·2.

The temperature from this time on has remained at the normal, no symptoms presenting themselves, save the presence of bacilli in the milk with regularity and the formation at the point of inoculation of a hard tumor-like mass about the size of the fist. Guinea pigs died in fourteen and fifteen days respectively, inoculated with the same preparation. (Vide animals designated 33–34, table I.)

Tuberculin reactions.—This animal was tested with tuberculin upon the 20th and 21st of June, at which time there was a fairly well marked reaction as will be seen by referring to Table III. The inoculation into the udder with a pure culture of bovine tubercle bacilli, Aug. 3, may also be considered as a tuberculin reaction, for inoculating healthy cattle and other animals with pure cultures of tubercle bacilli does not give the characteristic rise and fall in temperature which was obtained in this case.

Milk inoculations.—The milk of this animal has up to the present time been used upon three animals which are designated in Table II. Up to the time that this animal was inoculated with the pure culture in the udder there were no tubercle bacilli found in the milk by microscopical examination.

Cow No. II.

This animal was a grade Ayrshire cow six or seven years of age. She was in apparently good health ; the general condition of the animal also being good. The eye was bright and the coat smooth and sleek. She was giving, June 1, seven quarts of milk. Upon physical examination the only simulation to a tuberculous condition, was the presence of nodules in the udder which have since proven to be non-tuberculous. She gave birth to a calf upon October 9.

This animal was the subject of no inoculation experiments.

Tuberculin reactions.—There has been but one test applied since her arrival at the station which is recorded on Table III, and was applied on the twentieth and twenty-first of June.

Milk Inoculations.—This animal was the one looked to for the most definite results from milk inoculations, as bacilli were found more frequently in her milk than was the case with the other animals, prior to the inoculation of some in the udders which have since given positive results.

Autopsy.—Unfortunately, this animal died on October 11, of traumatic pericarditis. The body was that of a well nourished cow, six or seven years of age and in good condition. Upon the removal of the hide, it was noticed that there was an enormous amount of fat in the connective tissue immediately beneath.

The glands of the flank were examined, but were not found to be tuberculous. Those of the brachial region revealed no evidence of disease. There was no evidence of tuberculosis revealed in the post pharyngeal glands. The glands at the base of the udder were enlarged, and one section revealed numerous small tubercles. The udder itself was greatly enlarged, due to the fact that the period of gestation had just been completed. Nothing was found of a tuberculous nature in this organ, though a very careful search was made for suspicious nodules.

After the removal of the thoracic wall, the lung appeared to be normal, save that it was blood-stained; no evidence of tubercular lesions being discovered after a very careful examination. The peribronchial glands were examined and found to contain a few small tubercles, some of which were undergoing caseation, but these glands could not be considered as being extensively diseased. The anterior and posterior mediastinal glands were in about the same condition, but not extensively diseased.

The traumatic pericarditis, which caused the death of the animal, was the result of the presence of a darning needle 3½ inches long, the course of which was traced from the stomach, by a continuous band of fibrous tissue, to the heart.

The liver was normal, with the exception of the lower border of the right lobe, presenting a number of small decolourized spots, having what appeared to be a prick in the centre. These spots were the result of pricks made by the needle in its course from the stomach to the heart.

The spleen was normal in consistency and appearance. The mesenteric glands were not tuberculous. Nothing abnormal was noted in the walls of the intestines or upon their surfaces, either exterior or interior.

The kidneys were normal with no evidence of tuberculosis. The cause of death in this case was due to the presence of a foreign body near the heart, which had set up an extensive pericarditis.

Cow No. 3.

This was a grade cow three or four years of age, in good condition, no cough, eye bright, and giving, June 1, about ten quarts of milk. No physical evidence of tuberculosis could be detected, save a slight enlargement of the post pharyngeal glands. The general look about the head would give the impression of a healthy animal. There was no enlargement of the glands of the flank; no evidence of disease about the lungs, nor could anything simulating a tubercular condition be found about the udder.

1. *Tuberculin reactions.*—The tuberculin test was applied to this animal upon June 20 and 21 (*vide* Table III. for result of this test), and again on July 10 and 11.

Although this last reaction is not so marked as the one on June 20 and 21, still there is a definite reaction, and it must be borne in mind that this is the third time that this animal has given definite results to tuberculin.

2. *Milk.*—The milk was examined but no tubercle bacilli could be found. A few inoculations were made with the milk, but without positive results. (*Vide* Table II.)

This animal was killed by order of Dr. Adami on June 12 at the kennels of the Montreal Hunt with the following results:—

The glands of the flank were not affected, nor were those of the brachial region. The post pharyngeal glands contained a very few minute tubercles. The glands at the base of the udder revealed no evidence of tuberculosis nor was there any indication of disease found in the udder itself after a very careful and minute search.

The bronchial glands were found to be slightly affected as also were the anterior and posterior mediastinal; but nothing was found in the lungs simulating a tubercular condition.

The spleen was normal and without evidence of tuberculosis.

The liver was normal. The kidneys did not show any tubercular masses.

The messenteric glands showed a few small tubercles. Neither the internal or external coats of the intestines revealed the presence of tuberculosis.

Cow No. 4.

This was a grade cow eleven years of age, and giving seven quarts of milk on June 1.

A very careful physical examination did not lead to the detection of symptoms of tuberculosis, although the tuberculin test indicated its presence. The coat of this animal was in good condition, the eye bright, no enlargement of superficial glands, nor were suspicious nodules present in the udder. Bacilli were detected in the milk a very few times, but not with any regularity and always in very minute quantities, only one or two appearing upon a coverslip preparation.

The animal was with calf, but gave milk up to the date of birth, which was September 2. The calf was rather small but vigorous, and is now in good condition (October 31).

1. *Inoculations.*—She was inoculated in the upper part of the right fore quarter of the udder with a pure culture of bovine tubercle bacilli. This preparation of bacilli proved fatal to guinea pigs in fourteen and fifteen days, respectively (*vide* animals designated 33 and 34 on Table I.) On August 3 and the following day there was a rise in temperature, indicating a definite tuberculin reaction, which was as follows :—

August 3.—Normal temperature at 4.30 p.m., 103·4.

	12 m.	3.30 p.m	5 p.m.	7 p.m.
August 4.....	106·4	105·2	104·2	103·1

After this, for a period of four days, the temperature was variable, at times normal and again as high as 106°. Upon the fifth day after the inoculation the temperature was reduced to 101·3°, and has remained at or near this point since.

2. *Tuberculin reactions.*—This animal was tested with tuberculin on June 20 and 21 with the result as recorded in Table III.

Milk Inoculations.—Three guinea pigs were inoculated, with the result that one died of tuberculosis (*see* Table II).

Cow No. 5.

This was a grade cow about six years of age and giving, on June 1, about five quarts of milk. Her general condition was good, the eye bright and the coat was in good condition. Upon physical examination it was noted that the post pharyngeal glands were slightly enlarged, but other superficial glands were not especially prominent. The udder did not contain hard masses or other suspicious conditions. In the right lung there seemed to be an area definitely tuberculous; mucous râles were and have been many times since, distinctly heard.

Inoculations.—This animal was inoculated in the right fore quarter of the udder with a pure culture of human tubercle bacilli (fatal to guinea pigs in eighteen and twenty-three days respectively), with the following result :—

The temperature before inoculation on September 26, at 5.30 p.m., was 102°. On the following days it was as follows :—

Date.	6 a.m.	8 a.m.	10 a.m.	12 m.	2 p.m.	4 p.m.	6 p.m.
	°	°	°	°	°	°	°
September 27.....	102·4	101·3	105·0	106·0	105·3	105·3	105·3
" 28.....	105·1	105·1	103·4	103·4	105·1	105·0	
" 29.....	.....	102·3	.....	104·0	104·0	103·0	103·3

On the 30th the temperature was 101 where it has remained with slight variations since.

It is to be noted here that the reaction following this inoculation of human tubercle bacilli was somewhat different than that received in the case of cow I, though it does to a certain extent correspond with the reaction obtained in the case of cow IV. This variability in the reactions was probably due to the extent of the lesions in the animal prior to the inoculations and the subsequent inflammatory process set up.

There were on June 24 two heifers placed with this animal, one on either side to determine the length of time that was necessary to develop tuberculosis by cohabitation. It was demonstrated that infection had taken place after a period of 107 days. I will not specially detail the methods used here, as this comes up again in the consideration of the individual heifers (III. and IV.), and also has been dealt with in connection with the remarks upon cohabitation.

Tuberculin Reactions.—This animal reacted to tuberculin on June 20 and 21, as recorded in Table III. The inoculation with the pure culture of tubercle bacilli can also be called a tuberculin reaction. Thus we have this animal reacting three times, the first being before coming to the station.

Calf No. 1.

This animal was born about the middle of May in the village of Outremont, where the mother still lives. There is nothing of particular interest concerning the previous history of this calf or its mother. Since it has been at the station it has been fed on the milk of cow No. 1, principally, but it has been impossible to confine it to that of any one individual, for no single cow has given sufficient milk during the entire period to sustain the life of the calf. He was tested on June 20 and 21, giving a definite reaction.

He was again tested on October 28 and 29 giving a definite tuberculin reaction as recorded on Table III.

Calf No. II.

This calf was the product of Cow IV., and was born at the station on September 2. It has been fed on the milk of this cow, though it has not been allowed to suck its mother, having been fed from a pail. Nothing has been done with it save the feeding of this milk. No tuberculin test has yet been made.

Calf No. III.

This is the product of cow No. II. and was born on October 9, two days before the death of the mother. It has been fed principally with the milk of cow No. I. There has been nothing else done with this animal save the feeding on this milk. There has been no tuberculin test made yet.

HEIFERS.

There arrived on June 7 six yearling heifers which were purchased in the townships, to be used as subjects for experimentation. Their history prior to their coming to the station is of no interest.

A brief history of their condition is of interest at this time; on the day following their arrival all developed symptoms of broncho-pneumonia, remaining about the same for two days, during which time there was an elevated temperature and increased respiration, after which they seemed to be improving.

Subsequently they were placed out of doors in the yards during the night, and upon being taken again into the stable in the morning, the temperature would be found to be normal. This practice was continued till June 15, at which time they were placed in the stable on account of rainy weather (which caused the yards to be muddy), not being turned out at night, when they again showed symptoms of pneumonia. It was

for this condition that heifer I was killed by order of Dr. Adami. The condition at the autopsy will be found in connection with their respective numbers. All were tested with tuberculin on June 20 and 21, as recorded on Table III., but none reacted at that time.

This pneumonic condition in all the animals was probably due to the change in the mode of living (from roaming over pastures to being inclosed in a warm stable).*

Heifer No. 1.

Autopsy.—She was killed at the kennels of the Montreal Hunt June 17 at 4 p.m., the lesions noted being those of a slight broncho-pneumonia. The surface of the lung presented areas of congestion, a condition which is sometimes seen in certain forms of what is termed "transit pneumonia."

At the posterior border of the liver there was a blood clot about the size of a pigeon's egg, due to a rupture of the liver tissue, which was gradually healing. The rupture of the liver was without doubt due to the rough handling in transit. Aside from the lesions mentioned, there was nothing of particular interest seen at the autopsy. The post pharyngeal, brachial and the glands of the flank and base of the udder were examined for evidence of tuberculosis, but none were found even after thorough microscopic examination. The glands of the mediastinum and bronchi did not reveal the presence of tuberculosis. The glands of the mesentary were also free from disease.

Heifer No. 2.

This was a grade yearling heifer, with the general history recorded for the six received at the station June 7, 1898.

This animal was not inoculated, but was the subject of the following very interesting experiment; it having remained in the same stall during the entire period (nearly five months), receiving in common the same treatment as the other animals (concerning food and attention), being turned out nights during the hot summer months and day times as the weather has been cooler; but always isolated in a stall by herself whether she was inside or outside of the building. The stable during the experiment was what might be termed an infected one; there having been at different times animals in various stages of the disease (tuberculosis) in stalls on either side of her, separated only by a partition five feet in height. During six weeks of this period an animal which had been inoculated with bovine tuberculosis (heifer V.), and in the sputa of which tubercle bacilli were found by receiving expiratory fluids coughed up on glass plates, placed in front of her. This animal though thus exposed failed to contract the disease. During the period of exposure no special precautions were taken which might not be conformed with in any well regulated cow stable. The cow stable was whitewashed once during this experiment.

Tuberculin Tests.—A record of the tests applied to this animal may be had by referring to Table III., by which it will be seen that she has not reacted, and at this date (October 31) presents no clinical symptoms and is evidently not infected.

Heifers No. III. and No. IV.

These were grade yearlings in good condition. They are considered together on account of their being used for cohabitation with the same animal.

Heifer III was placed on the right side of cow No. V., while its mate, heifer No. IV., was placed on the same animal's left, on the 24th day of June, 1899. These three

* A condition similar to this was seen by the author last spring in the city of Fitchburg, Mass., in cattle that had been shipped only about 100 miles. Part of the animals were confined in a low studded stable with many other animals, while the rest were placed in a pasture. Those in the stable developed a pneumonic condition, while those out of doors remained healthy. One of the animals that had remained inside was killed, the lung showing the marbled appearance which has often been seen in cases where animals have contracted sporadic pneumonia from rough usuage during transit; 'transit pneumonia,' together with the climatic changes and the exposure during the transportation.

animals were fed out of the same feed box, from the same hay rack, and watered from the same bucket. No partition was allowed between their heads or anything which would interfere with the free breathing of one another's exhalations. The result obtained is this, that after a period of 107 days (from June 24 to October 9), both of these yearlings reacted to tuberculin.

Tuberculin Tests.—The first test, which was negative, was applied June 20 to 21. The next test was applied October 9 and 10, and there was a positive reaction. Other tests were applied, a full record of which occurs in Table III.

Autopsy, Heifer No. III.—This animal was in good condition with no physical evidence of tuberculosis after the closest clinical examination. She was killed on November 22.

The glands of the flank and brachial region revealed no evidence of tubercolosis. No nodules were found in the post pharyngeal glands. The glands at the base of the udder were free from evidences of tuberculosis.

Thorax.—The bronchial glands were found to contain small tubercles. The posterior mediastinal glands were diseased, one containing a nodule about ½ inch in diameter. There was a tuberculous nodule in the right lung ¾ of an inch in diameter undergoing caseation. Aside from the lesions mentioned there was nothing to be noted in the thoracic cavity.

Abdomen.—A lymph gland at the point where the portal vein emerges from the liver was tuberculous. The mesenteric glands were enlarged showing small tubercles. The liver, spleen and kidneys were free from evidences of disease.

Autopsy, Heifer No IV.—In the animal no physical evidence of disease could be detected. She was killed November 22.

The post pharyngeal glands were free from disease. The glands on the flank and brachial region were free from tubercles. The glands at the base of the udder were inflamed with small tubercles.

Thorax.—The bronchial glands revealed no lesions. The posterior mediastinal presented a few small tubercles. The lungs were examined very carefully, but no suspicious nodules were found. The heart and its valves were normal.

Abdomen.—The spleen was free from disease. The liver was normal, as were also the kidneys. The mesenteric glands presented a few small tubercles. There was no evidence of tuberculosis either in the internal or external surface of the intestines.

Heifer No. V.

This was a yearling heifer, one of the six which arrived at the station on June 7, 1899. A record of the tuberculin test can be seen by referring to Table III.

Inoculation.—This animal was inoculated well up and deep in the body of the right lung on August 29, with 5 c. c. of a preparation of bovine bacilli and bouillon which contained about 77,000 bacilli to the cubic centimetre.*

No clinical symptoms were noted till September 12, fourteen days after the inoculation, at which time the temperature rose to 107° and remained elevated till October 9, from which time it gradually dropped, indicating approaching death. The animal

* In making this preparation the procedure recommended by Theobald Smith (Jour. Expt. Med., vol. III., 4 & 5, 1898), was followed, which is as follows:—'The suspension was made by thoroughly rubbing the growth from blood serum upon the inside of dry sterile test-tubes with a heavy spatula-like platinum wire. This procedure results in the breaking up of clumps, and the coating of the tube with masses of bacilli. Bouillon was then poured in and the thoroughly stirred suspension allowed to stand for several hours until the coarser particles had subsided. The resulting suspension was diluted, if necessary, until its density was nearly equivalent to that of a bouillon culture of typhoid bacilli twenty to twenty-four hours old and nearly as homogeneous.' In the above quotation agar should be substituted for blood serum, as blood serum had not been used up to the date of the last inoculations. In addition to the above technique, I prepared coverslips and counted the number of bacilli, estimating the number per cubic centimetre. In estimating, a piece of glass tubing was drawn out fine, in order to get a very small drop, and the number of drops per cubic centimetre calculated by actual experiment. The preparation was well shaken to secure uniformity, a sample taken with the fine tube, and a drop placed on a cover glass, spreading it well over the entire surface, and counting the number of bacilli in a given number of squares. Averaging the results of the count and multiplying by 6,000, will give approximately the number of a circular 18 mm. cover glass providing a $\frac{1}{12}$ Leitz oil immersion and a No. 2 Leitz eye piece are used.

during the latter days of its life suffered considerably from dypsnœa. She lost flesh from the outset of the elevation of the temperature, and ate scarcely anything during the last five days of her life.

Autopsy.—On October 12, the animal being in a semi-conscious state, within a few hours of death, was killed at 11.30, a post mortem being immediately performed.

The body was very much emaciated, the coat staring and hide-bound.

The skin was removed, and beneath it there was a fair amount of adipose tissue, considering the condition of the animal. The glands of the flank, situated just beneath the hide, were examined and found to be tuberculous. The glands at the anterior portion of the shoulder were also tuberculous. The post pharyngeal glands contained tubercles. The trachea and pharynx contained no evidence of tuberculosis. The glands at the base of the udder were slightly enlarged and tuberculous. No tubercles were seen in the udder tissue.

After the removal of the hide and the fore and hind limb on the right side, the animal was placed on the left side, with the right side exposed superiorily. The ribs were cut along the back at their junction with the vertebra and at the sternum, after which the thoracic and abdominal walls were removed.

Upon opening the thoracic cavity an extensive miliary tuberculosis was noted in the lung. An examination of the pleura revealed small areas of tubercular pleurisy. No sign was seen of the initial focus of the disease where the pure culture was inoculated into the lung, the condition being that of a general tuberculosis more distinctly marked in the anterior lobes. The posterior lobes, while not free, did not reveal the extensively diseased condition that was seen in the case of the anterior. Section revealed but a repetition of the condition seen upon the surface. The bronchial tubes were thoroughly examined in order to determine whether the disease spread by the air passages. The disease was not particularly localized in their neighbourhood. The left lung showed the same evidence of tuberculosis as was seen in the right, but not so extensive; there being emphysema present, with an exudation of lymph into the interlobular spaces due to the laboured breathing of the animal during the last few days of its life.

The peri-bronchial glands were enlarged to a greater or less degree and tubercular. Those of the mediastinum were greatly enlarged, the posterior of which was about nine inches long.

The heart was very carefully examined for evidence of disease, which was found to be present in the form of a pericarditis, seen more particularly toward the apex on both the right and left ventricles. Pericarditis was also seen on the right auricle. The valves were normal in all instances.

The thoracic duct was examined, but nothing abnormal was noted.

The liver was extensively diseased at the posterior border of the right lobe, the area being about eight inches long and three broad, forming a very broad based triangle with the base anteriorly. The line of demarcation between the diseased portion and that portion slightly diseased was very distinct. The tubercular masses were commencing to undergo caseation in many instances.

The gall bladder was greatly distended with bile, which was darker than normal and quite thick. Lymph glands near the gall bladder were greatly enlarged and showed on section many tubercles varying in size from a pin head to that of a pea. The spleen was tuberculous and small masses undergoing caseation were found in the tissue. About the lower third of this organ there was a tubercular peritonitis. The right kidney on section revealed no evidence of disease. There was at the hylus a lymph gland about three-quarters of an inch in diameter containing tubercles. Nothing abnormal was noted in the condition of the left kidney. The mesenteric glands were found to be diseased in every case, but not materially enlarged. The intestines also showed evidence of disease. There were on the mucous surface at various intervals numerous hemorrhagic spots throughout the small intestine. Nothing abnormal was noted in the condition of the intestine or its mucus surfaces at the ileo-caecal valve. There was a tubercular peritonitis of the abdominal walls. Several spots were seen, with a greater or less number of small pearly tubercles just beneath the peritoneum.

The condition presented was that of an extensive miliary tuberculosis.

Heifer No. VI.

A grade, yearling Ayrshire which was in good condition upon her arrival on June 7 and up to the date of inoculation. She was tested with tuberculin on June 20–21. (*See* Table III.)

Inoculations.—This animal was inoculated August 29, well up and deep in the left lung, with 5 cubic centimetres of a preparation of human tubercle bacilli, containing 84,000 bacilli per cubic centimetre. There has been up to the present time (November 1) nothing to indicate the presence of disease in the general condition or temperature record of the animal; yet a guinea pig and a rabbit inoculated with the same preparation succumbed in thirty and fifty-two days respectively, the post mortem examination revealing a generalized tuberculosis in each case. (*See* Table I., animals 44–46.)

SPECIMENS RECEIVED FOR DIAGNOSIS.

There have been, during my connection with the work, fourteen specimens forwarded for diagnosis. This branch of the work is one which is important, and inspectors should be encouraged in sending in such specimens. It would tend to increase the knowledge and extent of various contagious and infectious diseases in the Dominion, aiding materially the veterinary inspectors, by confirming or disproving their diagnoses.

In connection with rabies or hydrophobia it is especially desired that material be sent in order that it may be definitely determined how extensive this disease is. In the United States this disease is reported as being rare, but from the opinions expressed by prominent veterinarians at the recent meeting of the American Veterinary Association, it would appear that it is quite common, though in some sections of the country known under a different name.

On the whole, the specimens which were received were found to be in good condition. A reference to the following table will indicate the nature of the specimens received and the diagnosis in each case.

TABLE IV.

Specimen Number.	By Whom Sent.	Date of Arrival.	Material Sent.	Condition on Arrival.	Suspected Trouble.	Diagnosis.	Date of Sending Report.
82	Dr. J. H. Frink, St. John, N.B.	June 10	Tumour	Good	Tuberculosis	Tuberculosis	June 10.
83	Dr. Johnson Gibbons, Vancouver, B.C.	" 23	Bones of animals suffering from multiple fractures near Blaine, W.S.	Dry		Osteomalacia and rachitis	" 26.
84	Dr. A. A. Leckie, Charlottetown, P.E.I.	" 23	Lung	Good		Broncho-pneumonia	June 28.
85	Dr. F. Fisher, through Dr. A. E. James, Ottawa, Ont.	" 30	Liver, spleen and intestine.	Poor; badly decomposed.	Anthrax	Diagnosis impossible as specimen was decomposed	July 3.
86	Dr. A. E. James, Ottawa, Ont.	July 5	Intestines and lungs.	Good	Hog cholera	No hog cholera	" 5.
87	Mr. C. Bouthellier, Ste. Thérèse, Que	Aug. 3	Blood	"	Anthrax	Anthrax bacilli found	Aug. 3.
88	Dr. R. A. McLoughry, Moosomin, N.W.T.	" 15	Dried scab from teat of cow	Dry		Diagnosis impossible from specimens and nature of same	" 16.
89	Mr. C. Bouthellier, Ste. Thérèse, Que	" 18	Blood	Good	Anthrax	Anthrax bacilli found	" 18.
90	Dr. Couture, Pt. Lévis Quarantine, Que.	" 23	Pus from abscess on jaw	"	Actinomycosis	No actinomycosis found	" 24.
91	Dr. A. E. James, Ottawa, Ont.	" 24	Lung, liver, spleen and iliocœcal valve.	"	Hog cholera	Reported as hog cholera by Dr. Adami	" 25.
92	Mr. C. Bouthellier, Ste. Thérèse, Que	" 30	Blood of horse	"	Anthrax	No anthrax	" 31.
93	Dr. A. R. Coleman, Jarvis, Ont.	" 31	Lungs and heart of ferret	"	Tuberculosis	Deposit of bone in lung tissue; no tuberculosis	Sept. 29.
94	Dr. J. A. McCormick, Ormstown, Que.	Sept. 1	Pus from abscess on jaw of sheep.	"		Eggs of nematode parasite found	" 1.
95	Dr. A. G. Fortune, Walkerton, Ont.	" 25	Muscle and spleen	"	Anthrax or symptomatic anthrax.	Symptomatic anthrax bacilli found	" 25.

SESSIONAL PAPER No. 8

A CATTLE DISEASE AT L'AVENIR AND COWANSVILLE, QUEBEC.

An obscure disease was reported among cattle in the vicinity of L'Avenir during the latter part of July. Later a disease of similar nature was reported from Cowansville.

Concerning my investigations, the appended reports give full information as to the symptoms, character and post mortem lesions in two cases.

Investigations concerning a Disease occurring among Cattle at L'Avenir, Quebec.

MONTREAL, July 28, 1899.

SIR,—Acting upon your instructions, I proceeded to the office of Mr. J. C. St. Amant, of L'Avenir, P.Q., arriving there on July 25, at once commencing my investigations.

I visited nine different farms and found anywhere from one to eight milch cows in various stages of the disease. There were many more cases reported to me as occurring among the herds on farms to the north and west.

The symptoms were much the same in all instances. The animals were very stiff, showing great difficulty in walking, the back arched, they were hide bound, the pulse usually normal, but in some cases accelerated. The respirations were accelerated in all. The temperature ranged from 103° to 107° F. The fæces were hard and dry where the fever was high. Animals turned out fat in the spring had become very thin, and among the worse cases mere shadows. During the present year the symptoms presented were said to be more aggravated during the month of June, at which time it was very dry, and that the animals had improved considerably after the rains which occurred during the middle of July. The more acute symptoms are noted the first thing in the morning, the joints cracking audibly upon the animals being moved. After they have moved about for a time they seem to move more easily, but not without symptoms of pain. The flies trouble the diseased animals a great deal, but not the healthy ones Those that are diseased are avaricious for bones and sticks.

The stables in which the animals are kept in winter are similar to those usually found in any dairy section. They are poorly ventilated, with little light, and the animals are not usually allowed out during the winter months.

All varieties of pastures were to be seen. Some were stony and high, others low and swampy, still others were covered with wood of both new and old growth, and the soils were both deep and shallow. The formation of the rock in this immediate section is slate. Most of the pastures with a shallow soil had a slate bed rock or hard pan. The nearest limestone formation was about six miles away, and I was unable to ascertain whether the disease prevailed or not where limestone occurred. The water in most cases comes from springs, there being both hard and soft.

By different farmers various measures were employed to combat the disease, with little success in any instance.

I will cite the history of the trouble as given to me by Léon Raché, who seems to have suffered more particularly than others, and in all instances the history given was about the same. He has had this trouble in his herd for the past eight years, not having noticed it before that time. Eight years ago he lost six during the summer, which is the earliest indication of the affection. There have been during the last four years a limited number of cases. He lost in all about twenty-five cows during the eight years. The animals had had good feed, good pasture, water and care. It was his opinion that when an animal was once attacked it was best to destroy it, as it never recovered.

There was a disposition on the part of some of the farmers seen to conceal this trouble, thinking that they would lose their animals without remuneration, or the right to send their milk to the cheese factory.

To me the trouble would seem to be a lack of some of the elements of the soil, possibly lime; or a disease of germ origin. Whatever the nature of the disease, the

milk from the affected animals is not fit for consumption or for the use of the cheese and butter factories on account of the elevated temperature of the affected animals.

Diseased animals were seen on one farm and not on the next where only a fence separated the pastures, the conditions concerning stabling and feeding being very similar. It appears to have been spreading from the centre, which is the farm of Mr. Raché.

I desired very much to kill one of the animals when there, but was unable to do so, as no one seemed inclined to offer a subject and I did not have the authority to pay anything for an animal. The use of bone meal was recommended to supply the deficiency which it seemed might exist in the soil.

In order to arrive at any definite conclusion it would be necessary to kill one or more of the affected animals and note the lesions. The farmers were willing to sacrifice an animal for a small sum, but did not feel as though they could afford to give an animal outright.

I would recommend that some one be authorized to go there with the power to kill an animal, or more than one if necessary, and pay a small sum for such animal or animals which would probably not exceed $10, in order to arrive at some definite conclusion regarding the trouble. It would also be well at the same time to ascertain whether it is a localized condition, or whether it extends to some distance from L'Avenir. To the east I was able to arrive at a definite boundary on one of the main roads. It would also be well to have a chemical analysis of some of the soils to ascertain whether or not there is a deficiency in the chemical constituents.

I found also among some calves belonging to a Mr. Gagnon, a condition of the skin about the head and neck simulating 'Favus.' I recommended the use of a mange mixture, but think that tincture of iodine, or a solution of corrosive sublimate, $\frac{1}{500}$ would prove more efficient in this trouble. He lost one calf only two weeks ago.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) CHAS. HIGGINS,

Assistant Pathologist.

Dr. M. C. BAKER,
Acting Chief Inspector,
Montreal.

Preliminary Report on a Disease occurring at L'Avenir and Cowansville, Quebec.

MONTREAL, August 18, 1899.

SIR,—The result of the autopsy, held August 9, upon a cow belonging to James Johnson, of Cowansville, Quebec, was as follows:—

The animal was in an emaciated condition, hide-bound, the coat being in fairly good condition, having in this case been shed before the animal was taken sick. The back was arched, the feet drawn under the body, and the animal was very stiff, being reluctant to move unless urged.

Upon opening the thoracic cavity there was nothing abnormal to be noted in the condition of the heart and lungs. The bronchial and mediastinal glands were normal. The abdominal cavity presented very little fat, the spleen was normal, the intestines filled with semi-fluid fæces which were normal in appearance and consistency. The mesenteric glands were normal. The liver showed slight indications of degeneration. The left kidney was normal in appearance and slightly larger than is usual. The right kidney was anæmic, the cavities containing numerous small calculi varying in size from a millet seed to that of a pea. (This has no connection whatever with the disease, being merely an accidental condition.)

Examination microscopically from smears of the liver revealed a micro-organism very similar in appearance to the *bacterium coli communis*. The cultures from this

case have revealed nothing as yet. There was no appearance in the other organs of this organism. (The appearance of this germ is, I consider, due to the loss of vitality of the animal, it having gained entrance to the liver in some manner from the intestinal tract, having no direct connection with the disease, simply being a secondary condition.)

Acting on your instructions, I proceeded on August 14 to L'Avenir, for the purpose of holding an autopsy on one of the animals at that place. I decided after my arrival there that the best subject was one belonging to Moïse Charpentier.

The animal was a cow, six years of age, greatly emaciated and hide-bound. The eyes were dull and there was temperature of 103° F. She was very stiff, the legs drawn well under the body, and the back arched. The glands situated immediately under the hide at the shoulder and flank were normal. The udder and the glands at its base were normal. On opening the thorax nothing abnormal was noted; the heart, lungs and glands were seen to be normal on section. On opening the abdominal cavity little fat was to be seen. The spleen was normal in size, colour and consistency. The intestines and their contents were normal. The liver was slightly friable and showed evidence of degeneration. It was normal in size and colour. The gall bladder contained about 150 cubic centimetres of fluid. The kidneys were normal. Cultures were taken from the various organs, and those from the liver revealed on the day following a growth of the *bacterium coli communis*. The same microbe showed in blood preparations from the liver.

Microscopical examination showed fatty degeneration of the liver and its cells in an acute stage. (I consider here also the presence of the *bacterium coli* as being merely due to the lowered vitality of the animal from some other source.)

This disease is one which is exceedingly baffling, as it is seen on all varieties of soil and also under various hygienic conditions. I do not consider it to be of a contagious nature. All the theories which I have been able to formulate have been at variance with the conditions existing.

In order to arrive at the exact nature and the primary cause of this disease, I think it is necessary that a complete study be made of it on the ground, authority being vested allowing the one so investigating it to have ample opportunities for autopsies on animals in order to determine the exact conditions of the organs in a series of animals.

At the same time it would be necessary to determine whether or not there was anything deficient in the food of the animal, and also whether there was anything obtained by the animal which would lead to the condition found.

This trouble extends over a very large section of the country, just how much, I am unable at this time to state, but in talking with the farmers on my last visit, I learned of remote cases the existence of which was previously unknown to the residents.

I have the honour to be, sir,

Your obedient servant,

CHAS. H. HIGGINS,

Assistant Pathologist.

Dr. M. C. BAKER,
Acting Chief Inspector,
Montreal.

Concerning the nature of this disease, its cause and prevention, there is little to be added to the reports already given. I received from Mr. Moïse Charpentier and Mr. Décoteau samples of water which were tested for arsenic and found free. I was led to do this as there are, about six or seven miles from the locality where the disease occurs,

copper mines; thinking that possibly there was arsenic in the water which, while not in large enough quantities to produce arsenical poisoning, might together with other agencies aid in producing the affection.

SUMMARY OF THE WORK OF THE OUTREMONT EXPERIMENT STATION.

I.—Reinfection in Tuberculous Cattle.—Definite foci were established in cows I. and IV. with germs from bovine sources; in cow V., with germs of human origin. There was an enlargement in every case at the point of inoculation. Subsequent to the inoculation bacilli have been found constantly in the milk. In each case the inoculation was followed by a definite tuberculin reaction.

II.—Inoculations with Human and Bovine Tuberculosis.—In all there have been twenty-four animals inoculated.

Bovine.—Five guineapigs, five rabbits, three chickens and one heifer.

The guinea pigs died in fourteen, fifteen, twenty, thirty and thirty-five days, of a generalized tuberculosis.

The rabbits died in thirty-six, seventy, seventy-four and ninety days, of a generalized tuberculosis.

The three chickens are still alive (one month after inoculation) and have steadily gained in weight.

The heifer died in forty-two days, of a generalized miliary tuberculosis. There was no abscess at the point of inoculation.

Human.—Three guineapigs, three rabbits, three chickens and one heifer.

The guinea pigs died in eighteen, twenty-three and thirty-six days, of a generalized tuberculosis.

One rabbit died in fifty-two days. Two are still alive (one month after inoculation).

The three chickens are still alive (one month after inoculation). All have gained in weight.

The heifer is still alive (two months after inoculation).

I do not feel prepared to make any statement concerning the identity of the human and bovine germs with the small amount of data on hand. For cattle, in the instance of the two heifers used, it is shown that the bovine germ is the more virulent.

III. Infectiousness of Milk.—For inoculation purposes there have been used twenty-two guinea pigs and three rabbits. Three guinea pigs, or 1·2 per cent contracted tuberculosis. It cannot be said from this that these three samples were all that contained living bacilli, as many of the inoculated animals died of septicaemia.

Cow I.—Three guinea pigs inoculated. None tuberculous.

Cow II.—Ten guinea pigs and three rabbits inoculated. Two guinea pigs contracted tuberculosis.

Cow III.—Three guinea pigs inoculated. None tuberculous.

Cow IV.—Three guinea pigs inoculated. One contracted tuberculosis.

Cow V.—Three guinea pigs inoculated. None contracted tuberculosis.

One calf has become tuberculous after feeding upon tuberculous milk. With two other calves no results have yet been obtained (October 31).

IV. Two cats contracted a generalized tuberculosis feeding on tuberculous material.

V. Cohabitation.—Two heifers contracted tuberculosis after cohabiting 107 days with a cow (cow V.), which cow presented but slight symptoms of pulmonary disease. Lesions of tuberculous nature were found at the post mortem in both heifers, but were not extensive.

VI. Tuberculin Tests.—The unreliability of repeated tests was shown. The tuberculin prepared by Dr. Ross gives no definite results, but needs further trial to lead to conclusions as to its effectiveness.

VII. Specimens received for diagnosis.—It is desirable to have a greater number sent in order to confirm reports of contagious diseases, also as an aid to inspectors in verifying diagnoses made by them.

VIII. Cattle disease at L'Avenir and Cowansville.—The investigations are not sufficiently complete to arrive at the exact cause. It is not of germ origin. Probably due to lack of chemical constituents of the soil.

I have the honour to be, sir,

Your obedient servant,

CHAS. H. HIGGINS, B.S., D.V.S.

Assistant Pathologist.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 17.

REPORT ON THE TESTING OF CATTLE FOR TUBERCULOSIS.

(A. E. MOORE, D.V.S., TRAVELLING INSPECTOR.)

SIR,—I herewith submit the following report of work done by me during the past year from November 1, 1898, to October 31, 1899 :—

TUBERCULOSIS.

I beg to report that during the year I have tested for tuberculosis 542 head of cattle ; 464 being in the province of Quebec, and 78 in the province of Ontario. Of this number 56 animals were found tuberculous, and 1 suspicious.

Of those tested this year, quite a number were family cows, and in a number of instances there were reactions among these, and on post mortem nearly all showed an advanced stage of disease, thus illustrating the importance of testing family cows. I attended the killing of 40 head, the owners being anxious to get rid of the diseased ones. About two-thirds of these were fit for food, the remainder being either too far advanced with the disease, or too thin in flesh for food.

HOG CHOLERA AND SWINE PLAGUE.

Hog cholera and swine plague were reported to exist in many parts of western Ontario, and acting on your instructions I visited these places for the purpose of investigating and reporting on these diseases. There were a great many pigs sick and unthrifty, but there were only a very few cases of hog cholera. In some where there was doubt a careful post-mortem was performed, and cultures made which were submitted to the pathologist for microscopical examination, and in only a few instances was disease found.

Sickness among pigs in these districts was mainly due to either exposure to cold and wet, injudicious feeding, or bad drainage, and in many cases all the above conditions were found.

Many were suffering from a rheumatic condition, with weak legs and soreness of the body, often seen where pigs are fed on highly carbonaceous foods, or kept in wet pens. Others were suffering from a verminous bronchitis and intestinal worms, and still others from indigestion, due to eating spoiled foods, such as wheat that had been wet in cargo, or the refuse from factories and breweries.

The following are some of the districts that I visited: the farm of H. George & Sons, of Crampton, Ontario. There was no disease found there; all their pigs were in good condition. The townships of Waterloo and Woolwich, Ontario, had been in quarantine for some time for hog cholera. The disease assumed a very mild type in these districts, making it more difficult to diagnose. An immense number of hogs were kept in these townships, and many were poorly fed and housed.

Several farms near Oshawa, Ontario, have had an outbreak of hog cholera, but all the hogs are dead, the carcasses burned, and the premises properly disinfected. This outbreak started from a dealer's herd.

At the farm of J. R. Brower, Belleville, Ont., four hogs died suddenly. They had been fed exclusively on corn meal. Two more were sick, and on post mortem of one of these, I found the stomach much congested, and covered with patches of dried corn.

In Brampton and Oakville, Ont., there were many sick and unthrifty pigs, but only one place where hog cholera was found, which was at the farm of Horace Death. All his pigs were killed, and the necessary precautions taken. Mr. Death obtained manure from the Toronto stock yards, and probably brought the disease to his place in that way. I visited many farms in Oakville and found nothing but what was due to bad management in the care of the pigs.

In the above cases where bad management was the cause there was improvement in the health of the swine as soon as they were properly fed, or the cause, whatever it might be, was removed.

ACTINOMYCOSIS.

Actinomycosis is quite prevalent in the vicinity of Mount Forest, Ont. Dr. Willet Tanner, V.S., of that place has treated about 200 cases within the last two years. I visited at least twenty farms where this disease existed, and found two or three cases in each herd, and in one herd there were ten head. The disease has been quite prevalent in this district for some years, but the majority of cases have yielded to the iodide of potash treatment, the animals being turned to beef as soon as possible. There were a few very bad cases and even some deaths from the disease.

ANTHRAX.

Mr. C. F. Bouthellier reported cattle dying on his farm in Ste. Thérèse. I visited Ste. Thérèse and found that the disease was bacillus anthrax. Seven cattle have died on his premises, and those of an adjoining neighbour. Disinfection has been carried out as far as possible. The carcasses were either burned or buried in lime.

BLACK LEG.

I visited seven farms in the neighbourhood of Mount Forest, where young cattle and calves had died of black leg, nineteen animals dying in all, and one man losing as many as nine yearlings. In conversation with some of the farmers, I found that this disease had existed for years there.

In Oshawa, Ont., three young animals had died of black leg on one farm, where eight head had died three years previously. All the carcasses were promptly burned, or buried in lime, and the graves have in all cases been fenced off.

REPORT ON DISEASE AMONG COWS AT L'AVENIR, QUE.

This disease was noticed in the neighbourhood of L'Avenir about six years ago. This year it has been far more prevalent, affecting cows in ten or twelve herds, and all the way from two or three to six or eight animals in each herd. The symptoms resemble those of rheumatism, that is, arched back, stiff, and slightly enlarged joints,

especially those in the hind quarters. There was a considerable amount of atrophy in the muscles of the hips, a slight elevation of temperature in some cases. In nearly every case it was new milch cows that were affected. They show signs of stiffness soon after they are turned out to grass in May and June, and improvement is noticed as soon as the pasture improves, after the warm rains. The pastures in this neighbourhood are good.

At the time of my visit the animals were all improving, consequently I did not have the opportunity of seeing any in an advanced stage of the disease. I found the urine normal; there was no albumen or sugar, or an excess of urea in it. I sent samples of the soil where these cows pastured to Prof. Shutt, of the Central Experimental Farm, for chemical analysis.

I am inclined to believe that this condition is due to a debilitated state of the animal. After being closely stabled all winter, then suddenly turned out to grass when it is very short and of poor quality, the weather cold and wet, and the cow calving at this time, puts a great many hardships on the animal all at once, and renders her system weak.

I have the honour to be, sir,

Your obedient servant,

A. E. MOORE,

Travelling Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 18.

REPORT OF INSPECTOR AND LECTURER.

(T. V. DAUBIGNY, V.S.)

MONTREAL, July 24, 1899.

SIR,—I beg to submit the report of my work for the period elapsed between July 1, 1898, and June 30, 1899.

STATEMENT OF MY WORK.

On August 17, 1898, at the request of Dr. McEachran, I proceeded to Nominingue (Que.), to test by means of tuberculin six head of cattle belonging to Mr. de Bellefeuille, advocate of Montreal. My report was forwarded to the department a few days later.

From February 7 to the 15th of the same month, I delivered lectures on the contagious diseases of live stock, in the following localities:—

Thurso	February	7	Good meeting.
Ste. Scholastique	"	8	"
Ste. Thérèse	"	9	"
Ste. Geneviève	"	10	Few people.
St. Vincent de Paul	"	11	"
L'Assomption	"	13	Good meeting.
St. Esprit	"	14	Large meeting.
Joliette	"	15	"

On the 16th, it was not practical for me to accompany Mr. Chapais to St. Norbert, as I had received word from the Quebec Government to proceed to Montreal, on that day, for veterinary school inspections.

From March 13, 1899, to the 20th of the same month, I gave lectures on the same subject, at the following places :—

Acton	March	13	Good meeting.
Lawrenceville	"	14	"
St. Césaire	"	15	Large meeting.
St. Athanase	"	16	"
Longueuil	"	17	Few people.
St. Ours	"	18	Large meeting
St. Louis de Gonzague	"	20	"

My lectures deal with all the diseases of live stock which may affect man especially, but I dwell more at length on bovine tuberculosis, or consumption, and on actinomycosis (commonly, lump jaw.)

I may say that in most places, farmers in a pretty large proportion seem to have doubts as to the existence of tuberculosis and as to its being contagious. However, at the closing of each lecture, I noticed that several of them were disquieted, as evidenced by the information which they sought to obtain from me. As for antinomycosis it is better understood, for very few farmers are not acquainted with lump jaw. So, it must be hoped that, in the future, they will give more attention to their herds and do away with all those which are tainted with the disease.

In Montreal, every week, at the eastern abattoirs, the city inspector confiscates one or more head of cattle affected with actinomycosis, and often he detects tuberculosis.

I know that these diseases exist in the province of Quebec, and without doubt also in the province of Ontario, for several of the animals seized at Montreal came from that part of the country.

In concluding, sir, I beg to say that practical lectures are of a nature to benefit the public weal and welfare, since, hardly two years ago, actinomycosis was little, or not at all, spoken of, and to-day, the health officers in the various cities give the greatest attention to this disease.

I have the honour to be, sir,

Your obedient servant,

T. V. DAUBIGNY,

Inspector and Lecturer,

380 Craig St., Montreal.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 19.

CATTLE QUARANTINE.

(M. C. Baker, D.V.S.)

Montreal, November 15, 1899.

Sir,—I beg to report that during the year ending October 31, 1899, my duties have been chiefly confined to inspecting the cattle and sheep shipped via Canadian Pacific Railway. There were inspected and passed for shipment at the Canadian Pacific Railway stock yards the following :—

	Cattle.	Sheep.
November, 1898	7,007	3,068
May, 1899	4,053	436
June, 1899	8,162	3,294
July, 1899	6,581	2,091
August, 1899	6,021	2,958
September, 1899	7,188	6,544
October, 1899	8,736	4,569
Totals	47,748	22,960

Of these 5,663 cattle and 8,170 sheep were from the United States, the remainder Canadian. During the year there were rejected as follows :—

Cattle—	
For actinomycosis	15
For lameness or injuries	3
	18
Sheep –	
For injuries	17

During the summer there was reported as prevailing rather extensively in the neighbourhood of L'Avenir, Que., a disease among the dairy cattle there. Acting on your instructions Drs. Higgins and Moore were sent to investigate and their reports have been forwarded to you.

A report having reached me that a similar disease prevailed near Cowansville in the counties of Missisquoi and Brome, Que., I spent two days there visiting a large number of affected farms. I could not determine anything of a contagious character in this disease. The disease is characterized by a peculiar form of lameness, somewhat resembling rheumatism. In some farms I found nearly all the cows were, or had been affected; on others only a small percentage—no fatal cases; though some of the animals owing to their inability to walk about and graze became emaciated, and consequently failed very much in their milk, causing serious loss to the farmers.

The disease is more noticeable in the early summer months, rarely, if ever, seen whilst the cows are stabled. As a result of my investigations I concluded the cause was a deficiency in the grasses of some nutritious principle necessary to the animals, and most likely to some of the elements that are required in bone forming material. I I was assisted in arriving at this conclusion by the fact that some of the farmers had noticed a marked improvement was produced in the condition of the lame animals by

feeding bone meal, of which they seemed to be excessively fond. I made one post mortem examination but failed to discover anything that could account for the condition. Thinking that something might be discovered by a chemical analysis of the bones of this animal I sent some of them to the chemist at the Central Experimental Farm, Ottawa, along with similar bones of a healthy animal, of the same age to enable him to establish a comparison between the healthy and diseased. I have not heard the result of this analysis. I am quite convinced that the farmers specially of this province need to take some measures to restore the pastures, as many of them are becoming more or less run out, and as most, if not all, are so rough and stony as to be impossible to cultivate, their restoration is bound to be a matter of difficulty and I would recommend that the subject, if it has not been so already, be taken up by the agriculturists and chemists of the Experimental farms, and suggestions or advice as to how this can be done to be distributed among the farmers. I feel that the improvement of their pastures is one of the most serious questions that can engage the attention of the dairymen of the country. The improved facilities provided by the Government for the shipment of their dairy products, resulting, as it has, in greatly increasing their value, should stimulate them to adopt any reasonable measures to increase the productiveness of their dairies, and to obtain this result the cows must get more and better feed from the pastures.

I therefore believe that practical suggestions as to how their pastures can be best improved will be heartily welcomed by them and adopted by the majority, if not all in time.

ANTHRAX.

During the month of August a few animals died from anthrax in the county of Terrebonne. Dr. Moore was sent to see that the carcasses were destroyed and the premises disinfected. The disease was purely local. The origin of the contagion was not clearly established. It is a noticeable coincidence that such local outbreaks have occurred in some place or other during the month of August of nearly every year. In most cases it is reasonably certain that improved drainage will minimize, if not entirely remove, the danger from outbreaks of this disease.

On the whole I am happy to be able to report that the live stock of this country are remarkably free from disease.

I have the honour to be, sir,

Your obedient servant,

M. C. BAKER, D.V.S.,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 20.

CATTLE QUARANTINE.

(CHARLES McEACHRAN, D.V.S.)

MONTREAL, October 31, 1899.

SIR,—I beg to report that since November 1, 1898, there have been inspected, found free from infectious and contagious diseases and shipped from the port of Montreal, 4,866 horses. Of these 1,435 came from the United States.

During that period there were held back and quarantined until fit to be shipped, four for strangles and twenty-one for influenza.

There were inspected and shipped during :

	Horses.
November, 1898	414
May, 1899	679
June, 1899	872
July, 1899	793
August, 1899	790
September, 1899	559
October, 1899	759
Total	4866

I have the honour to be, sir,

Your obedient servant,

CHARLES McEACHRAN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 21.

CATTLE QUARANTINE.

(B. A. SUGDEN, D.V.S.)

MONTREAL, Oct. 31, 1899.

SIR,—I have the honour to report that during the past season, November 1, 1898, to October 31, 1899, the following cattle and sheep have been inspected and passed for shipment at the Grand Trunk Railway Stock Yards, Montreal :—

		Cattle.			Sheep.
Nov.	1898.....	4,003	Nov.	1898.....	2,573
May,	1899.....	7,119	May,	1899.....	538
"	" U.S.A.....	2,856	"	" U.S.A.....	2,104
June,	"	6,471	June,	"	2,928
"	" U.S.A.....	1,165	"	" U.S.A.....	1,304
July,	"	6,070	July,	"	5,335
"	" U.S.A.....	1,371			
Aug.,	"	6,048	Aug.	"	7,683
"	" U.S.A.....	659			
Sept.,	"	3,500	Sept.,	"	7,104
"	" U.S.A.....	16			
Oct.,	"	1,930	Oct.,	"	3,965
"	" U.S.A.....	111			
	Total.....	41,319		Total.....	33,534

During this period sixteen cattle were refused shipment, nine for actinomycosis, and seven for injuries received on the cars.

There were also twenty-four sheep rejected.

I have the honour to be, sir,

Your obedient servant,

B. A. SUGDEN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

No. 22.

REPORT ON POINT LEVIS CATTLE QUARANTINE STATION.

(J. A. COUTURE, D.V.S.)

QUEBEC, October 31, 1899.

SIR,—I have the honour to send you my annual report for the last twelve months. There came into this quarantine—

Horses	6
Cattle	227
Sheep	696
Pigs	9
	938

being a total of 938 animals. Of this number forty-five cattle and eighty-three sheep went to the United States. I am happy to report that there has been no contagious diseases of any kind among all these animals. From the different reports we have from the importers we believe that the number of cattle and sheep that will be imported into this country next year will be larger than this year. As our accommodation has been taxed to its utmost capacity, especially during the month of August, I beg to suggest that some sheep sheds be put up in order to leave for the cattle those that can better accommodate that class of animals.

I have the honour to be, sir,

Your obedient servant,

J. A. COUTURE, D.V.S.,

Assistant Inspector.

ANNUAL report of horses arrived at this port during the last twelve months.

April 1, 1899.—Two horses, via I. C. R., from Acadia, Me., owned by Louis Dion, Honfleur, Lake St. John.

July 18.—Three horses, via Vermont Central, Grand Trunk Railway and Richelieu boat, owned by Chas Taylor, White River Junction, Vt.

August 25.—One horse, via Grand Trunk Railway, owned by Matthew Swift of Quebec.

Total six.

J. A. COUTURE, D.V.S.,

Assistant Inspector.

ANNUAL report of swine arrived at this quarantine during the last twelve months.

June 21, 1899.—S. S. Yola, from London, Eng., two boars and seven sows, Yorkshire breed. Owner, D. D. Flatt, Hamilton, Ont. Discharged July 12.

J. A. COUTURE, D.V.S.,

Assistant Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

STATEMENT of Cattle Imported at the Lévis Cattle Quarantine

Date of Arrival.	Steamer.	Line.	From.	Shorthorn.				Simmanthelar.				Ayrshire.				Galloway.			
				Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.	Bulls.	Cows.	Calves.	Total.
1898.																			
Nov. 9..	Gloriana.....	Hans	Antwerp....	....	....	....	....	2	16	..	18	..	..	..	..	..	..	..	..
1899.																			
April 27..	Amarynthia....	Donaldson..	Glasgow ..	2	21	....	23	..	..	..	..	..	..	..	..	..	..	..	..
May 11..	Tritonia.....	" ..	"	1	2	....	3	..	..	..	..	..	..	..	..	..	..	..	..
" 11..	"	" ..	"	....	....	....	..	..	..	..	..	1	1	1	3	..	..	..	..
" 11..	"	" ..	"	....	....	..	....	..	..	..	..	..	6	4	10	..	..	..	..
June 14..	Lake Superior ..	Beaver	Liverpool.	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..
" 14..	" ..	"	" ...	2	15	6	23	..	..	..	..	..	..	..	..	..	..	..	..
Aug. 2.	Lackonia.....	Donaldson..	Glasgow....	9	41	....	50	..	..	..	..	..	..	..	..	..	..	..	..
" 2..	"	" ..	"	....	....	....	....	..	..	..	..	..	..	..	..	3	5	..	8
" 2..	"	" ..	"	1	3	2	6	..	..	..	..	..	..	..	..	..	..	..	..
" 10..	Tritonia.....	" ..	" ...	....	5	1	6	..	..	..	..	..	..	..	..	..	..	..	..
Sept. 6..	Lackonia. ...	" ..	"	3	6	1	10	..	..	..	..	..	..	..	..	..	..	..	..
" 12..	Albanian.....	Leland....	Antwerp ...	....	....	....	....	2	25	..	27	..	..	..	..	..	..	..	..
" 29..	Kastalia.....	Donaldson..	Glasgow....	....	8	3	11	..	..	..	..	..	..	..	..	..	..	..	..
" 29..	"	" ..	"	..	21	5	26	..	..	..	..	..	..	..	..	..	..	..	..
				18	122	18	158	4	41	.	45	1	7	5	13	3	5	..	8

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for the twelve months ended October 31, 1899.

Hereford.				Grand Total.	Owner.	Address.	Date of Sailing.	Date of Discharge	Remarks.
Bulls.	Cows.	Calves.	Total.				1898.	1899.	
..	..	..	..	18	F. A. Poth & Sons..	Philadelphia, U.S...	Oct. 21..	Feb. 19 .	
..	..	..	..	23	John Isaac.....	Markham, Ont.....	April 14..	July 12 .	
..	..	..	..	3	W. H. Cochrane....	Hilihurst, Que.....	" 29..	" 27.	
..	..	..	..	3	Robt. Ness	Howick, Que.....	" 29..	" 27..	
..	..	..	..	10	Wm. Wylie..... ...	"	" 29..	" 27..	
1	2	..	3	3	F. W. Stone estate..	Guelph, Ont.....	June 3..	Aug. 31..	
..	..	..	..	23	W. D. Flatt.....	Hamilton, Ont.....	" 3..	" 31..	
..	..	..	..	50	H. Cargill & Sons...	Cargill, Ont.....	July 21..	Oct. 19..	
..	..	..	..	8	D. McCrae.....	Guelph, Ont.....	" 21..	" 31..	
..	..	..	..	6	Thos. Russell.....	Exeter, Ont.....	" 21..	" 19..	
..	..	..	..	6	John Miller & Son..	Brougham, Ont.....	" 31..	" 28..	
..	..	..	..	10	Art. Johnston.....	Greenwood, Ont . .	Aug. 26..	....	In quarantine.
..	..	..	..	27	F. A. Poth & Sons..	Philadelphia, U.S...	" 27..	.....	"
..	..	..	..	11	W. D. Flatt.....	Hamilton, Ont.....	Sept. 15..	....	"
..	..	..	..	26	John Isaac.....	Markham, Ont.. ...	" 15..	.....	"
1	2	..	3	227					

J. A. COUTURE, D.V.S.,
Assistant Inspector.

STATEMENT OF SHEEP IMPORTED AT THE LEVIS CATTLE

Date of Arrival.	Steamer.	Line.	From.	Shropshires.			Rambouillets.			Cotswolds.			Hampshires.			Lincolns.		
				Rams.	Ewes.	Total.	Rams.	Ewes.	Total.	Rams.	Ewes.	Total.	Rams.	Ewes.	Total.	Rams.	Ewes.	Total.
1899.																		
July 15	Montroyal	Elder Dempster	London	..	..	..	..	..	..	..	..	..	5	10	15	..	..	..
" 15	"	"	"	..	..	..	..	..	..	..	..	..	..	..	..	9	19	28
" 15	"	"	"	11	48	59	..	..	..	4	4	8	1	6	7	..	..	..
" 21	Montfort	"	Bristol	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
" 26	Monteagle	"	"	15	32	47	..	..	..	..	..	..	1	2	3	..	..	..
Aug. 3	Monteray	"	"	31	7	28	..	..	..	..	..	..	..	..	..	..	..	..
" 3	"	"	"	..	6	6	..	..	..	..	..	..	..	..	..	..	..	..
" 3	"	"	"	1	10	11	..	..	..	..	..	..	..	..	..	..	..	..
" 3	"	"	"	45	133	178	..	..	..	22	20	42	2	1	3	1	2	3
" 3	"	"	"	4	18	22	..	..	..	..	..	..	5	4	9	..	..	..
" 10	Tritonia	Donaldson	Glasgow	4	20	24	..	..	..	..	..	..	..	..	..	..	..	..
" 13	Antwerp City	Hans	Antwerp	..	..	..	58	57	115	..	..	..	..	..	..	..	..	..
Sept. 12	Yola	Elder Dempster	London	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..
				102	274	376	58	57	115	26	24	50	14	23	37	12	23	35
Oct. 30	Yola	Elder Dempster	London	..	..	..	..	..	..	..	..	..	..	..	..	34	..	34
																		69

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QUARANTINE, TWELVE MONTHS ENDED OCTOBER 31, 1899.

Oxfords.			Southdowns.			Leicesters.			Dorsets.			Grand Total.	Owner.	Address.	Date of Discharge.
Rams.	Ewes.	Total.	Rams.	Ewes.	Total.	Rams.	Ewes.	Total.	Rams.	Ewes.	Total.				
..	..	..	..	..	..	..	..	..	..	..	..	15	T. L. Springer	Jeromeville, Ohio, U.S.	July 29..
..	..	..	..	..	..	..	..	..	..	..	..	28	E. W. Patrick	Ilderton, Ont.	" 29..
12	5	17	3	8	11	..	..	..	2	2	4	106	D. G. Hanmer	Mt. Vernon, Ont.	" 29..
..	..	..	..	..	..	1	3	4	..	..	..	8	A. W. Smith	Maple Lodge, Ont.	Aug. 5..
1	..	1	..	..	..	1	..	1	..	..	..	52	John Campbell	Woodville, Ont.	" 9..
2	1	3	3	3	6	..	..	..	..	..	..	37	Geo. Allen	Allerton, Ills., U.S.	" 17..
..	..	..	..	..	..	..	..	..	..	..	..	6	Hon. John Dryden	Brooklin, Ont.	" 17..
..	..	..	..	..	..	..	..	..	..	..	..	11	W. C. Edwards	Rockland, Ont.	" 17..
..	2	2	..	..	..	..	..	..	..	..	..	228	Robt. Miller	Stouffville, Ont.	" 17..
..	..	..	..	..	..	..	..	..	..	..	..	31	John Milton	Marshall, Mich., U.S.	" 17..
..	..	..	..	..	..	..	..	..	..	..	..	24	John Miller & Son	Brougham, Ont.	" 26..
.	..	..	..	..	..	..	..	..	..	..	..	115	Robt. Miller	Brougham, Ont.	" 26..
..	..	..	..	..	..	..	..	..	..	..	..	1	W. C. Edwards	Rockland, Ont	Sept. 26..
15	8	23	6	11	17	2	3	5	2	2	4				
..	..	..	..	..	..	..	..	..	..	..	..	34	E. W. Patrick	Ilderton, Ont.	
Grand total.....												696			

J. A. COUTURE, D.V.S.
Assistant Inspector.

No. 23.

REPORT ON ST. JOHN, N.B., CATTLE QUARANTINE STATION.

(J. H. FRINK, D.V.S.)

ST. JOHN, N.B., October 31, 1899.

SIR,—I beg to submit annual report of work at this station. The total export of live stock to Great Britain from this port numbered 10,504, made up as follows :—

Canadian Cattle.	Canadian Sheep.	U. S. Cattle.	U. S. Sheep.	Canadian Horses.	Geldings.	Mares.	Carriage.	Draft.	Sheep Condemned.	Cattle Condemned.
6,412	1,624	2,165	...	303	247	56	71	232	2	7

IMPORTATION—BREEDING CATTLE FROM GREAT BRITAIN.

Name of Importer.	Address.	Steamship.	From.	Breed.	No.	Sex.	Total.
W. Greenshields	Montreal.	SS. Alcides.	Glasgow	Ayrshire	2	Female.	6
F. Black	Amherst.	"	"	"	2	"	
N. Parlee	Sussex.	"	"	"	2	"	

IMPORTATION—BREEDING SWINE.

D. C. Flatt	Millgrove, Ont.	SS. Alcides.	Glasgow	Improved Yorkshire.	30	.....	30

Seven export cattle were condemned, five suffering from actinomycosis ; one with disease of the foot ; one injured ; two sheep were turned back, suspected of scab. The facilities for housing export cattle at the yards, prior to being placed on shipboard, are very incomplete, and valuable property is much depreciated for want of suitable shelter, to say nothing from a humane point of view.

IMPORTS—BREEDING STOCK FROM UNITED STATES.

Name.	Address.	Via.	Breed.	Cattle No.	Sheep.	Total.
Sir Wm. Van Horne	St. Andrews	C. P. Railway.	Holstein	12	..	
J. C. Margeson	Lawrencetown	"	Ayrshire	1	..	
Dr. F. W. Young	Oak Bay	"	Jersey	1	1	
P. G. Mahoney	Antigonish	"	Shrops	...	60	
				14	61	75

SESSIONAL PAPER No. 8

IMPORTS, HORSES, FROM GREAT BRITAIN.

Name of Importer.	Address.	Steamship.	From.	Breed.	Stallions.	Mares.	Total.
Isaac Markham..	Markhamville, O	SS. Alcides..	Glasgow..	Clyde'dale	9	... .	.....
Dalgerty & Co.. .	Montreal. ...	" ..	" ..	" ..	7	.....	.....
E. Morris & others	Toronto	SS. Scotsman.	Liverpool.	Shires....	2	2	20

Inspected found healthy and allowed to proceed.

One hundred and fifteen milch cows were inspected here for export to United States.

The testing of cattle for tuberculosis has been carried on quite extensively this year in different sections of the province. The counties in which I was employed chiefly were Carleton, St. John and Kings. Following is a summary :

No. Tested.	Re-acted.	Jersey.	Jersey. Gr.	Ayrshire.	Ayrshire. Gr.	Durham.	Durham. Gr.	Holstein.	Holstein. Gr.	Post Mortems.	Diseased.
902	27	3	4	4	9	1	3	2	1	13	13

DISEASE, ON POST MORTEM LOCATED.

Retro Pharyngeal Gland.	Mesenteric Glands.	Portal Glands.	Liver.	Peritoneum.	Uterus.	Lungs.	Bronchial Glands.	Post Mediastinal.	Udder.	Pleura.
.....	3	3	4	1	1	9	3	2	1	1

It will be observed that ten out of the twenty-seven were pure bred animals. The percentage from the above summary is very low, indeed. It would have been higher if an opportunity had been given me to test cattle on farms which I have known to b infected, but the above statement is accurate in giving the percentage among th ordinary run of cattle in the better agricultural sections.

I have carefully observed the progress and extent of the disease in the province the past twenty years, and the result of these observations may be summarized, viz. :—

1. That the disease has been distributed in a great degree from a few centres where the breeding of pure-bred cattle has been carried on, not only under private but state control.

2. That its contagious nature has been clearly and abundantly established.

3. That as a result of the inspection this year, it appears that in the herds owned by milkmen only isolated cases are found. This may be explained by the fact that these persons are continually changing animals. Few, if any, breed their own stock.

4. That on inspection and test of a herd of animals continuously kept in one stable for two or three years, all are free or many affected.

5. That certain districts appear to enjoy particular exemption where the pasture lands are hilly and mountainous.

6. That farmers of moderate means are anxious to ascertain if their cattle are affected. Breeders of pure stock vigorously assail the tuberculin test, except when their stock has been tested and passed, then it meets with unstinted approval

7. That wilful interference with the work of the inspector during the testing of cattle is not infrequent.

8. That animals have been tested this year the dams of which were known to be tuberculous, and have passed free. These animals were removed from the dams when a few days old.

9. Owners of diseased cattle show but little reluctance in destroying them, but it is very difficult to get them to appreciate the fact that it is of very little use to destroy animals, as far as their personal benefit is concerned, unless the stables are thoroughly disinfected and cleansed.

10. That the properties of tuberculin deserve further scientific research.

11. That sufficient information has been established for the practical control of the disease in the province, and possibly its eradication.

GENERAL CONDITIONS OF LIVE STOCK.

There is but little change in the quality of stock. A marked improvement in condition is noticed in the vicinity of dairying and cheese-making establishments, cattle being much better housed and fed, unprofitable producers being turned off, the exact value of the different animals being determined by the different tests. There is noticeable a great lack of size and quality, even in rich agricultural districts, where beef cattle might be raised profitably. This view is substantiated by the fact that a great part of the beef supply of a superior grade, for people living in cities and towns, is purchased in Ontario and even Chicago. One firm alone in the city of St. John purchased in Ontario the past year twenty-five car-loads of live cattle, representing 500 head, and nine car-loads of dressed beef, or 400 carcasses.

Sheep-raising is not prosecuted with as much vigour as formerly; vast areas of pasture lands are uninhabited; many have retired from the business altogether, owing to the ravages of dogs, which are in no way controlled. It seems strange that one of the finest sheep-raising countries in the world should be comparatively idle from this cause.

Swine.—Considerable attention has been given to the breeding of swine, and a particular desire is noticed to breed those varieties most noted for marketable bacon. Extra heavy fat hogs are not in demand. Moderately fat and comparatively lean pigs are more saleable.

Horses.—Owing to the depreciation in value of horses the last seven or eight years, little breeding has been done, and a sharp demand the past year for heavy and medium draught animals has caused large importations from the upper provinces. Little or no effort is made in the province to breed to a type, and the folly of raising nondescript horses is quite apparent.

I have the houour to be, sir,

Your obedient servant,

JAMES H. FRINK,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 24.

REPORT ON HALIFAX, N.S., CATTLE QUARANTINE STATION.

(WM. JAKEMAN, D.V.S.)

HALIFAX, October 31, 1899.

SIR,—I beg leave to submit my annual report on cattle quarantine at port of Halifax from November 31, 1898, to October 31, 1899.

IMPORTED.

November 6, 1898.—Per ss. *Halifax*, from Boston, Mass. :—2 horses for Cape Breton, the property of A. Sutherland, Esq.

April 5, 1899.—I received a letter from the Secretary of the department advising me to make the tuberculin test on the herd of C. H. Dimock, Esq., of Windsor, N.S., which I carried out on the 17th and 18th of said month, with results as per charts and report forwarded to the department.

June 2, 1899.—I received a letter from the Secretary of the department, requesting me to visit North Sydney, C. B., and apply the tuberculin test to the cows of A. C. Thompson, Simon Gordon, Richard Logan and W. J. Beatons. This I did on June 2 and 3, with the exception of Mr. Beatons' cow, which was due to calve. I am pleased to report that they are free from disease. I also visited the farm of John Mackeen, Esq., of Mabou, C.B., and tested twenty-six head for him, none of which reacted.

August 18, 1899.—On receipt of a letter from the Secretary of the department, requesting me to visit the farm of Angus P. McDonald, Esq., of Boulardarie, Victoria County, C.B., I proceeded to the farm and examined his cattle, but found none sick as per report of September 26, 1899.

EXPORTED.

November 3, 1898.—Per ss. *Taymouth Castle*, of P. and B. line, to Bermuda :—113 sheep, 4 cows and 3 horses.

November 15, 1898.—Per ss. *Beta*, of P. and B. line, to Jamaica :—115 sheep.

December 1, 1898.—Per ss. *Duart Castle*, of P. and B. line, to West Indies :—40 sheep.

December 7, 1898.—Per ss. *Erna*, of P. and B. line, to Bermuda :—5 cows, 1 horse, 35 sheep.

December 15, 1898.—Per ss. *Beta*, of P. and B. line, to Jamaica :—50 sheep.

December 15, 1898.—Per ss. *Labrador*, to England :—3 horses.

January 4, 1899.—Per ss. *Taymouth Castle*, of P. and B. line, to West Indies :—70 sheep.

January 7, 1899.—Per ss, *Erna*, of P. and B. line, to Bermuda :—4 cows.

January 14, 1899.—Per ss. *Beta*, of P. and B. line, to Jamaica :—4 cows, 112 sheep.

January 14, 1899.—Per ss. *Halifax*, to Boston :—1 horse.

January 24, 1899.—Per ss. *Pro Patria*, of French line, to St. Pierre, Newfoundland :—10 sheep.

January 27, 1899.—Per ss. *Duart Castle*, of P. and B. line, to West Indies :—4 cows, 75 sheep, 3 horses.

February 7, 1899.—Per ss. *Erna*, of P. and B. line, to Bermuda :—4 cows, 10 sheep.

February 15, 1899.—Per ss. *Beta*, of P. and B. line, to Jamaica :—1 cow, 103 sheep.

February 23, 1899.—Per ss. *Taymouth Castle*, of P. and B. line, to West Indies :—30 sheep.

March 11, 1899.—Per ss. *Erna*, of P. and B. line, to Bermuda :—10 sheep.

March 18, 1899.—Per ss. *Beta*, of P. and B. line, to Jamaica :—70 sheep.

March 23, 1899.—Per ss. *Duart Castle*, of P. and B. line, to West Indies :—4 cows, 50 sheep.

April 4, 1899.—Per ss. *Greenland*, of P. and B. line, to Jamaica :—2 cows.

April 11, 1899.—Per ss. *Scotsman*, to England :—1 horse.

April 22, 1899.—Per ss. *Taymouth Castle*, of P. and B. line, to West Indies :—6 cows, 56 sheep.

May 15, 1899.—Per ss. *Beta*, of P. and B. line, to Jamaica :—5 cows.

May 19, 1899.—Per ss. *Duart Castls*, of P. and B. line, to West Indies :—4 cows, 67 sheep, 3 horses

May 31, 1899.—Per ss. *Erna*. of P. and B. line, to Cuba :—50 sheep.

June 15, 1899.—Per ss. *Taymouth Castle*, of P. and B. line, to Bermuda :—6 bulls, 56 sheep, 3 horses.

July 5, 1899.—Per ss. *Helios*, of P. and B. line :—30 sheep.

July 13, 1899.—Per ss. *Duart Castle*, of P. and B. line, to West Indies :—1 horse, 60 sheep.

August 11, 1899.—Per ss. *Beta*, of P. and B. line, to Jamaica :—23 cows, 60 sheep.

August 15, 1899.—Per ss. *Taymouth Castle*, of P. and B. line, to Bermuda :—1 horse.

August 28, 1899.—By railroad to Lewiston, Maine :—4 horses, the property of J. A. Leaman & Co., of Halifax, N.S.

August 29, 1899.—Per schooner *Marguerite* to St. Pierre, Nfld. :—6 sheep.

September 7, 1899.—Per ss. *Duart Castle* to Jamaica :—2 cows, 60 sheep.

September 15, 1899.—Per ss. *Beta*, of P. and B. line, to Jamaica :—12 cows, 15 sheep, 1 horse.

October 4, 1899.—Per ss. *La Grand Duchess*, of Plant line, to Boston, Mass. :—3 horses, the property of Dr. Thomas Shearer, of Baltimore.

October 5, 1899.—Per ss. *Taymouth Castle*, of P. and B. line, to Bermuda :—10 cows, 60 sheep, 3 horses.

October 18, 1899.—Per ss. *Beta*, of P. and B. line, to Bermuda :—1 horse.

I have the honour to be, sir,

Your obedient servant,

W. JAKEMAN.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 25.

REPORT ON HEALTH OF LIVE STOCK IN ONTARIO.

(ANDREW SMITH, F.R.C.V.S.)

TORONTO, October 31, 1899.

SIR,—I have the honour to report that very few cases of diseases of a contagious character have occurred amongst the domestic animals in this province, during the past year.

HORSES.

Influenza, as usual, has occurred to some extent, but generally in a mild form. Glanders is seldom met with.

CATTLE AND SHEEP.

These have been generally healthy. On the Toronto cattle market, single cases of Actinomycosis amongst fat cattle are frequently found, these are dealt with by the local Board of Health. This disease, which is due to the Actinomyces, or as called by some the Omyces, a germ that is found on herbage, often on barley straw. The germ is taken into the animal organism, usually into the mouth, it lodges between the teeth or in the gums during the changes of teething. It multiplies and produces the disease. According to the views now held by the most prominent bacteriologists, it is *not* communicable from animal to animal, but must originate directly from the germ on the plant itself. The germ in the animal organism multiplies there, but will not again produce the disease in another animal. The disease is localized in the part affected, and spreads by contiguity of tissue. It *should not be classed* amongst the contagious diseases in the Act relating to "contagious diseases of animals," but would be better left to be dealt with by the veterinary inspectors of the various municipalities.

SWINE.

There was a serious outbreak of hog cholera in the neighbourhood of Toronto last November. Active measures were taken and it was immediately suppressed. In January and February, there was also an outbreak of the disease in East York and in Scarboro. Since that time there has been no outbreak of this disease in the immediate neighbourhood of Toronto. The strict quarantine of farms where the disease existed has had an excellent effect in its suppression. There have been some cases further west.

In the district of Toronto the following persons lost hogs on account of this disease :

Month. 1898.		Number. of Hogs.
Nov. 10	—C. Shannon, Toronto Junction, Ont	202
" 28	—J. Galloway, West Hill, Ont	5
" 28	—R. J. Eade, West Hill, Ont. (allowed for 15)	17
"	—Jessop, West Hill, Ont	27
1899.		
Jan. 19	—J. Cudmore, Doncaster, Ont	35
" 5	—T. Rossitter, Highland Creek, Ont	23
Mch. 3	—J. Pearse, Highland Creek, Ont	24

I have the honour to be, sir,
Your obedient servant,

ANDREW SMITH, F.R.C.V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 26.

REPORT ON POINT EDWARD CATTLE QUARANTINE STATION.

(ARTHUR BROWN, D.V.S.)

SARNIA, October 31, 1899.

SIR,—I have the honour to submit my report of cattle and swine received into the Ontario Cattle Quarantine at Point Edward, from November 1, 1898, to October 31, 1899.

The swine imported were of good quality, a preference being shown for White Chesters.

There have been no diseased animals in the quarantine this year, and I may state that no contagious disease exists in this district, with the exception of some cases of tuberculosis and actinomycosis.

Attached you will find a detailed of statement of the animals received into quarantine, also cattle that were imported for breeding purposes, that did not require to be placed in quarantine during this period.

I have the honour to be, sir,

Your obedient servant,

ARTHUR BROWN, *V.S.*,
Inspector.

The Honourable,
The Minister of Agriculture,
Ottawa.

STATEMENT of cattle received into the Ontario Cattle Quarantine at Point Edward, from November 1, 1898, until October 31, 1899, also cattle that were imported for breeding purposes having the necessary tuberculin test and health certificates, also cattle forming part of settlers' effects.

Date of Entry.	Durhams.		Holsteins.		Galloways.		Herefords.		Jerseys.		Common Bred.		Valuation.	Removal.	Consignee and Address.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
1898.													$ cts.	1898.	
Nov. 15												1	30 00	Nov. 18	George Durey, Watford, Ont.
" 30		2											400 00	" 30	Richard Gibson, Delaware, Ont.
1899.														1899.	
Mar. 9			1										100 00	Mar. 9	G. R. Mayberry, Ingersoll, Ont.
" 9			1										100 00	" 9	A. & G. Rice, Woodstock, Ont.
" 28					12								1,000 00	" 28	D. McCrae, Guelph, Ont.
Apr. 2												2	60 00	Apr. 2	D. McDonald, Manitoba.
" 17												1	30 00	" 17	W. Shaw, Alberta.
" 21							1						400 00	" 28	M. H. O'Neil, Southgate, Ont.
May 1												2	70 00	May 1	N. Miltse, Ponoka, Alberta.
" 8												5	120 00	" 8	Wm. McLachlan, Red Deer, Alberta.
July 31												2	60 00	July 31	G. D. Gopsill, Guelph, Ont.
Sept. 8												1	30 00	Sept. 8	John Corbett, Trenton, Ont.
Oct. 12												1	35 00	Oct. 12	Colin Ferguson, Ailsa Craig, Ont.
" 12										1			50 00	" 18	James M. Durham, Grimsby, Ont.
" 16												1	35 00	" 16	Edwin Lovely, Sarnia, Ont.
Total		2	2		12		1			1		16	2,520 00		

Total number of cattle, 34.

ARTHUR BROWN, *V.S.*,
Inspector.

REPORT OF Swine received into the Ontario Cattle Quarantine at Point Edward from November 1, 1898, to October 31, 1899.

Date of Entry.	White Chester.	White Chester.	Poland China.	Poland China.	Berkshire.	Berkshire.	Date of Removal.	Value.	Consignee and Address.
1898.	M.	F.	M.	F.	M.	F.	1898.	$ cts.	
Nov. 23			1				Dec. 7	20 00	Meredith & Dunlop, Kent Bridge, Ont.
" 30				1			" 14	15 00	Harry Clapsaddle, Cainville, Ont.
Dec. 8		1					" 22	20 00	J. H Clark, Aylmer, Ont.
" 15					1		" 29	40 00	H. Bennett & Son, St. Williams, Ont.
							1899.		
" 22				2			Jan. 5	30 00	Meredith & Dunlop, Dresden, Ont.
" 22	1	1					" 5	60 00	Gideon Snyder, Jarvis, Ont.
" 29		1					" 12	25 00	Henry Herron, Putnam, Ont.
1899.									
Jan. 24					1	1	Feb. 8	30 00	H. Bennett & Son, St. Williams, Ont.
Feb. 22	1						March 9	50 00	R. H. Harding, Thorndale, Ont.
March 1	1						" 16	20 00	Joe Kearns, Camlachie, Ont.
" 31					1		April 15	35 00	George Green, Stratford, Ont.
May 3			1				May 18	35 00	Meredith & Dunlop, Dresden, Ont.
" 25	1	1					June 9	30 00	James Henshaw, Crumlin, Ont.
" 25		1					" 9	15 00	Wm. Inch, Gravenhurst, Ont.
June 15	1						" 30	30 00	Simon Munger, Leamington, Ont.
" 26	1	1					July 11	35 00	J. H. Westcott, Milton, P.E.I.
Aug. 12	2						Aug. 28	100 00	H. George & Son, Putnam, Ont.
Sept. 7					1		Sept. 22	50 00	A. C. Hastie, Comber, Ont.
							Still in quarantine	40 00	J. C. Blake, Springfield, Ont.
Oct. 20	1	1					"	40 00	W. McCridy, Springfield, Ont.
" 20	1	1					"	35 00	Joseph Featherson, Clarkson, Ont.
" 28						2	"	755 00	
Total	10	8	2	3	4	3			

Total, 30.

ARTHUR BROWN, V.S.

Inspector.

No. 27.

REPORT ON HOG CHOLERA OR SWINE PLAGUE IN SOUTH ESSEX, ONT.

(M. B. PERDUE, V.S.)

KINGSVILLE, Oct. 31, 1899.

SIR,—In compliance with instructions of the 5th inst., I beg to submit a report of work of inspection of infectious diseases among animals in South Essex, for the year ended October 31, 1899.

November 5, 1898.—On receipt of telegram from Dr. Armstrong, Tilbury Centre, I visited the farm of Mr. Henry Rawson, and found twenty-four hogs affected with swine plague, and eleven in contact, a number having died previous to my visit. This was some twelve miles east of any outbreaks previously reported, but although an isolated case, it was impossible to trace its origin. No other outbreak occurred in that vicinity.

November 21, 1898.—On receipt of a message by telephone from Mr. Geo. Sunderland, of Anderdon township, I visited his farm, finding thirteen hogs diseased and nine in contact, nine having died previous to my visit.

December 8, 1898.—On receipt of telegram from Mr. Wilfred Meloche, of Anderdon township, I visited his premises and found twenty-seven hogs diseased and four in contact, twelve having died previously. I also placed ten under quarantine, on suspicion, which were on the back part of the farm.

December 15, 1898.—On receipt of a message from Mr. Bernard Burns, of Anderdon township, I visited his farm, finding eight hogs diseased and fourteen in contact. Twelve of the contact ones were marketable and were sold as pork. A number had died previous to my visit.

January 7, 1899.—By request of Mr. Wm. Fox, of Gosfield South township, I visited his premises and found a Jersey bull affected with actinomycosis. I ordered the animal to be isolated and placed it under quarantine.

January 9, 1899.—On receipt of a telegram from Mr. Patrick Paquette, of Anderdon township, I visited his farm and found nine diseased hogs and twelve in contact, seven having died previous to my visit.

January 14, 1899.—By request of Mr. R. W. Kenedy, of Gosfield South township, I visited his premises, finding a cow badly affected with actinomycosis. I ordered him to isolate the animal, and placed her under quarantine.

February 2, 1899.—I inspected the farm of Mr. Henry Rawson, Tilbury West township, finding the cleansing and disinfecting directions thoroughly carried out; also inspected a number of farms in the vicinity of Wheatley.

February 6, 1899.—Inspected and quarantined hogs on farms of Messrs. E. Wigfield and Chas. Brown, of Mersea township.

February 9, 1899.—On receipt of a telegram, I visited the farm of Mr. Thos. H. Brown, of Mersea township, finding nineteen diseased hogs and five in contact.

February 11, 1899.—On receipt of a telegram from Mr. I. R. Hodgson, of Mersea township, I visited his premises and found two hogs diseased and one hog belonging to Rev. Dewey in contact.

February 18, 1899.—On receipt of a message from Mr. Alex. Dingle, of Anderdon township, I visited his farm and quarantined his hogs on suspicion.

February 20, 1899.—On receipt of a letter reporting swine plague on farm of Mr. E. Edgeworth, Anderdon township, I visited there at once, finding no suspicious symptoms of the disease.

March 9, 1899.—Inspected farms of Messrs. Chas. Brown, Thos. H. Brown and E. Wigfield.

March 16, 1899.—Inspected farm of Mr. Wm. Fox, of Gosfield South township, and released it from quarantine.

March 17, 1899.—By request of Mr. R. W. Kennedy, of Gosfield South township, I inspected the cow affected with actinomycosis. She was beyond recovery.

March 22, 1899.—Visited and released quarantine from farm of Mr. Wilfred Meloche, of Anderdon township.

April 3, 1899.—On receipt of a telegram from Mr. Hy. Jones, of Anderdon township, I visited his place and found eight hogs diseased and five in contact. There were eight hogs some distance from the infected lot, which I quarantined on suspicion. I was also requested by Mr. E. Edgeworth, of Anderdon township, to make an inspection of his hogs the same day, when I found fourteen hogs affected with the disease and two in contact. I left fifteen hogs under quarantine, but in a short time the disease developed and they also had to be slaughtered.

April 24, 1899.—By request of Mr. A. Augustine, of Gosfield South township, I visited his premises and found a cow affected with actinomycosis. I ordered her isolation and quarantined her. This is the third outbreak since January of 1898 on the same farm. I also released quarantine from stables of R. W. Kennedy, of Gosfield South township.

May 9, 1899.—On receipt of telegram from Mr. E. Edgeworth, of Anderdon township, I visited and found swine plague had developed among the hogs which had been left under quarantine from time of last outbreak. I had them all slaughtered at once.

May 12, 1899.—On receipt of telegram from Mr. Jos. Major, of Anderdon township, I visited there, finding four hogs diseased and five in contact. Nine had died before the case was reported to me.

May 26, 1899.—Visited and released farms of Messrs. Bernard Burns and Patrick Paquette, of Anderdon township.

May 30, 1899.—Inspected and released farms of Messrs. Thos. Brown, I. R. Hodgson, Chas. Brown and Ed. Wigfield, of township of Mersea.

June 13, 1899.—Visited and released quarantine from farm of Mr. Alex. Dingle, of Anderdon township.

June 22, 1899.—Inspected a number of farms in township of Anderdon, and finding suspicious symptoms of swine plague on the farm of Mr. Albert Fox, placed his hogs under quarantine.

June 28, 1899.—Upon making further inspection in Anderdon township I found swine plague existing on the farm of Mr. Frank Bastien, where I slaughtered twelve diseased hogs and nine in contact, placing six hogs that were some distance off under quarantine.

July 14, 1899.—Inspected farms of Messrs. Henry Jones, E. Edgeworth and Jos. Major, of Anderdon township, Mr. Jones being the only one who had finished the cleansing and disinfecting directions fully.

July 20, 1899.—Inspected hogs which were left under quarantine on farm of Mr. Frank Bastien, Anderdon township: the disease had developed in two hogs, four in contact.

August 9, 1899.—Inspected farms of Messrs. Albert Bastien, T. Vollins, Jos. Major, Frank Bastien and A. Fox, of Anderdon township. I found no contagious diseases.

August 17, 1899.—Inspected and released from quarantine the stables of Mr. A. Agustine, of Gosfield South township.

August 24, 1899.—Inspected the farm of Mr. Ed. Edgeworth, of Anderdon township, finding that he had not completed the cleansing and disinfection.

September 4, 1899.—On receipt of a message from Mr. Paschal Bastien, of Malden township, I visited his place finding swine plague affecting three hogs—seven in contact—three having died before the case was reported. Twelve other hogs were left under quarantine on another part of the farm.

September 16, 1899.—Inspected farms of Messrs. Jos. Major, F. Bastien, and E. Edgeworth, of Anderdon township, and found that they had not yet completed cleansing and disinfection.

September 19, 1899.—By request of Mr. Geo. Cady, of Gosfield South township, I inspected his hogs and found one sow sick, but no symptoms of swine plague. To be safe I quarantined his hogs on suspicion.

September 23, 1899.—By request of Mr. Walter Mottley, of the township of Gosfield North, I visited his farm and found nine hogs affected with swine plague and two hogs and one sow and pigs in contact. Seven had died previous to my visit.

October 7, 1899.—Inspected and quarantined a cow affected with actinomycosis on farm of Rev. Matthews, Gosfield South township.

October 18, 1899.—On receipt of a report of swine plague existing on farm of Mr. Jas. T. Pettypiece, of Anderdon township, I visited his place and quarantined his hogs on suspicion.

October 21, 1899.—By request of Mr. Richard McLane, of Colchester south township, I visited his farm and found swine plague existing there, I placed the hogs under quarantine till Monday, 23rd inst.

October 23, 1899.—Visited farm of Mr. Richard McLane, and had fifty-seven hogs slaughtered, finding forty-five diseased and twelve in contact. One hog belonging to Mr. Chas. Perry, of same lot, was also slaughtered as being in contact. Quarantined premises of Mrs. Levi Mitchell, on opposite side of road from Mr. McLane.

In the above cases, all diseased hogs and those in direct contact were slaughtered, some lots, not directly exposed, were quarantined, and kept under observation for about three months, instructions being left as to proper feeding, housing, and treatment. Of these some remained healthy while others developed the disease and were killed.

While the number of cases has been considerably less this year than last, they have covered a wider area, some having developed in the eastern portion of the district. After the strictest inquiry I was unable to trace the origin of these cases.

In the townsnip of Malden, where the disease was most prevalent last year, there was but one case, occurring in September.

Compared with last year, there was a larger proportion of contact hogs slaughtered, owing to the fact that the farmers reported the outbreaks earlier. Of the total number killed, which were covered by last annual report, ten per cent were contact hogs. During the past year, the percentage of such hogs was thirty-four.

The statement made in my last report, as to causes predisposing to swine plague, was confirmed by the past year's experience; almost invariably there were damp filthy yards and pens, exposure to winds, &c. More care is required in this district than in most to guard against this condition, on account of the unusually moist climate in the Essex peninsula.

As an instance of how the hog raisers are affected by this disease, I may state the case of Richard McLane. He has raised hogs extensively for over forty years, has good yards and houses, and cooks all their feed. Last year he sold eighty-one hogs between seven and eight months old for $700, this year his lot became infected with swine plague which existed in a mild form during the summer months.

His first sale of fifty hogs in September did not average within 100 lbs. of what they should have weighed, and brought him $295, whereas they should have brought over $500. With the onset of the cold season the disease became more virulent, and some forty-four hogs died. He then reported the case and the rest, fifty-seven in all, were slaughtered, some of the 7 months hogs, that should have weighed 150 lbs. only weighing 60 lbs.

I valued those slaughtered at $308 for which he will receive from the department about $143.

From January to October, he had fed $400 worth of grain. Now, valuing the forty-four hogs that died at the same rate as those slaughtered, they would be worth $237.75, so that for one hundred and fifty-one hogs, $400 worth of grain, and the expense of caring for them, he receives $295 and the department grant, altogether about $438, whereas they should have yielded him over $1,000, and this does not fairly represent his loss, as there were a number of valuable hogs for breeding purposes.

I have distributed among hog breeders a number of pamphlets supplied by the department,—Bulletin No. 2, by Prof McEachran, and 'Production of Pork,' by Prof.

Robertson, which should be of great benefit in spreading correct ideas as to the raising, feeding, and housing of swine.

I have the honour to be, sir,

Your obedient servant,

M. B. PERDUE, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 28.

REPORT ON HOG CHOLERA OR SWINE PLAGUE IN THE COUNTY OF KENT, ONT.

(Jos. KIME, Jr., V.S.)

CHATHAM, October 31, 1899.

SIR,—I beg to submit my annual report in connection with contageous disease in animals in the vicinity of the city of Chatham, county of Kent.

November 1.—Visited farm and premises of Albert Fenster, township of Chatham, county of Kent, and inspected hogs; found twenty-four affected with swine plague, and twenty-six in contact. All were slaughtered and farm quarantined.

I also visited farm of Alex. Cummings, on suspicion of disease in hogs. All apparently were well.

November 2.—Visited farm and premises of A. J. Crow, township of Raleigh, county of Kent, to inspect hogs and found swine plague in nine hogs and ten in contact, all of which were slaughtered.

November 3.—Visited farms and premises of A. J. and Henry Thibodeau, as to the cleansing and disinfecting of their premises.

November 3.—Visited farm and premises of N. Laprise, township of Dover, inspected hogs, seventeen of which were affected with swine plague, and twenty-five in contact, all of which were slaughtered and the farm quarantined.

I also inspected the premises of Jos. Emery and A. Moore, as to the cleansing and disinfecting of their premises.

November 7.—Visited farm and premises of John Ritchie, township of Dover, county of Kent, inspected hogs and found thirteen affected with swine plague and nineteen in contact, all of which were slaughtered and farm quarantined.

November 8.—Visited and quarantined farm of O. H. Owen, township of Dover; found twenty-three hogs affected with swine plague and sixteen in contact, all of which were slaughtered.

November 9.—Visited and inspected a quarantined farm in Dover township.

November 10.—Visited and inspected quarantined farm as to cleansing and disinfecting.

November 11.—Released quarantined farms of Marcel and Elizie Bechard.

November 14.—Visited and slaughtered hogs for swine plague on farm of J. Campbell, township of Dover, twenty-three hogs being diseased and eighteen in contact.

I also visited a farm as to disinfecting and cleansing.

November 15.—Visited farms of J. Campbell, A. J. Thibodeau and Wm. Ouellette, as to cleansing and disinfecting.

November 17.—Visited farm of Prince Porters, and raised quarantine.

November 18.—Visited farms of A. Moore and D. Bechard, and raised quarantines.

November 19.—Visited and slaughtered hogs of A. Dalton, Chatham township, sixteen hogs affected with swine plague and twelve in contact.

November 21.—Visited and inspected the hogs of H. St. Pierre, Dover township, thirteen hogs affected with swine plague and ten in contact; all were slaughtered and farm quarantined.

November 22.—Visited and inspected farms of J. Couture, D. Besilie, F. Premeau, Peter Laplante and H. Benoit, as to the cleansing and disinfecting of their premises.

November 23.—Visited and inspected hogs of F. Soutar, Raleigh township, on suspicion, but found no contagious disease.

November 28.—Visited farm of J. Brown, Tilbury; disease not contagious.

November 29 and 30.—Visited and inspected and quarantined farms in Dover and Chatham townships to ascertain if disinfecting satisfactorily done.

December 2.—Visited farms and premises of P. L. Demarais, A. St. Pierre and F. Bordeau, for purpose of raising quarantine if premises were cleansed properly.

December 5.—Visited and released farm of R. Benion.

December 6.—Visited and inspected cleansing and disinfecting of farms of E. Perisoneault and C. Payne, Dover township.

December 8.—Visited and inspected premises of Wm. Paxton, Dover township, swine plague being reported, thirteen hogs on premises, but no contagious disease existing among them.

December 9.—Visited and inspected quarantined farms in the township of Dover.

December 12.—Visited and inspected farm and premises of Theo. Labute. Found eight hogs affected with swine plague and six in contact; all were slaughtered and farm quarantined.

December 13.—Visited and released the farm of E. Poissant from quarantine, and also visited quarantined farms in neighbourhood as to cleansing and disinfecting.

December 15.—Visited and released farms and premises of A. Dalton and A. Stewart of Chatham township.

December 16.—Visited farm and premises of J. Patterson, Chatham township. Slaughtered six hogs affected with swine plague and four in contact, and quarantined the farm and premises.

December 17.—Visited and slaughtered five hogs affected with swine plague and six in contact for W. Perrin, and quarantined farm and premises.

December 20.—Visited and slaughtered nineteen hogs affected with swine plague and four hogs in contact for John H. Clements, Dover township, and quarantined farm and premises.

December 21.—Visited and inspected quarantined farms in the township of Dover as to cleansing and disinfecting.

December 22.—Visited and released farm and premises of Albert Fenster, township of Chatham.

December 23.—Visited farms and premises of J. Campbell, N. Laprese, Fred. T. Campbell, Dover township.

December 27.—Visited J. A. Smith, of Raleigh township, and inspected hogs which were affected with swine plague, twenty-five being diseased and one in contact, all being slaughtered.

December 28.—Visited farms of J. A. Smith, J. R. Longmore, Raleigh township, and Wm. Fleming, Dover township.

January 4.—Visited J. Catton's farms, Chatham township, and slaughtered fifteen hogs affected with swine plague, and twenty-four in contact and quarantined the farm.

January 5.—Visited and inspected quarantined farms in Dover township, and released the farms of Theo. Labute and N. Pilotte from quarantine.

January 9.—Visited suspected farms of H. Agnar and M. Fooly, township of Romney, Kent county.

January 10.—Visited and released from quarantine the farms of John Bordeau and Mederic Carron, Dover township.

January 12.—Visited and inspected farms and premises of Chas. King and O. H. Owen, Dover Centre, township Dover.

January 13.—Visited farm of W. Guy, Raleigh township, slaughtered ten hogs affected with swine plague and eleven in contact, and quarantined the farm.

January 16.—Visited farms of F. H. Dolsen and A. J. Crow, township of Raleigh.

January 26.—Visited farms and premises of F. Ross, Dover township.

January 27.—Visited farms and premises of A. Bump, James Ever, and Watson Guy, Raleigh township.

January 31.—Visited the quarantined farms of John Paterson and Wm. Perrin, of Chatham township.

February 2.—Visited and inspected hogs on the farms of Robert Dooling and S. Arnold, Chatham township, they having reported trouble in their hogs. Found disease not contagious.

February 14.—Visited and inspected hogs on farm and premises of D. Askel, Raleigh township, and slaughtered nine hogs affected with swine plague and four in contact. Farm quarantined.

February 15.—Visited Romney and inspected hogs of Jeremiah Vipond.

February 20.—Visited and quarantined farm and premises of J. W. Thasel, Chatham township, on suspicion.

February 21.—Visited and slaughtered six hogs affected with swine plague and seven in contact on the farm of J. W. Brown, Chatham township.

February 27.—Visited and released the farms of J. H. Clements and J. A. Smith from quarantine.

March 11.—Visited and inspected hogs on the farm of Alfred Ross, Dover township, and slaughtered nineteen hogs affected with swine plague and twenty-seven in contact. Quarantined farm.

March 13.—Visited the farm of William Ward, Tilbury East, and inspected hogs. Twenty-eight affected with swine plague and fifty-four in contact, all of which slaughtered, and farm quarantined.

March 23.—Visited Romney township and slaughtered hogs on the farms of Jas. Duddy, Jas. Franklin and Jeremiah Vipond, and quarantined their farms.

March 30.—Visit to farm of John and Wm. Lee, Raliegh township, and slaughtered seventeen hogs affected with swine plague and twenty-one in contact. Farm quarantined.

April 10.—Visit to farm of L. T. Pardo, Ouvry P.O., Raleigh township, and slaughtered ten hogs affected with swine plague and ten in contact; farm quarantined.

May 2.—Visit to farm of Alfred Ross, Dover township, and inspected as to cleansing and disinfecting and the raising of the quarantine.

May 11.—Visit to three quarantined farms in the township of Raleigh and released the farms of W. Grey, D. Arkel and L. T. Pardo.

May 16.—Visited and inspected the quarantined farm of J. Lee, Raleigh township, and released it.

May 22.—Visited and inspected the quarantined farms of J. Catton and J. W. Brown.

May 26.—Visited quarantined farms in Tilbury East and Romney township.

May 30—Visited and released the quarantined farm of J. Batchelor, Dover township.

June 24.—Visited and notified the reeves of the quarantined townships as to the release of Raleigh, Dover and Chatham townships from quarantine.

June 26.—Visited the farms of Theo. Faubert, Theo. Béchard and Elie Bélanger to inspect their premises.

June 27.—Visited and released from quarantine the farm of Geo. Giddis, Raleigh township.

June 29.—Visited and inspected the farms of J. Owen, Elam Hinds and A. Ross as to the raising of quarantines.

August 3.—Visited and inspected hogs on farm of S. Backus, Raleigh township, on suspicion of disease.

August 14.—Visited and inspected hogs of H. Purcell, lot 6, Gore of Aldborough, County of Elgin, as to trouble in hogs.

Aug. 15.—Visited farm of J. Bishop, Dover township, and inspected hogs.

Aug. 22.—Visited and slaughtered thirty hogs affected with swine plague and seventeen in contact, for R. Roseburgh, township of Dover, Kent County.

September 25.—Visited and inspected hogs on farm and premises of W. J. Wilcox, lot 19, concession 4, township of Chatham, and slaughtered twenty-seven hogs affected with swine plague, and twenty-nine in contact. Quarantined the farm. Also inspected farm of George F. Green, lot 19, concession 5, township of Chatham on suspicion, but found no disease.

September 26.—Visited farm of W. J. Wilcox to inspect dead carcasses.

September 29.—Visited and inspected the premises of R. Roseburgh as to cleansing and disinfecting farm.

October 3.—Inspected and slaughtered nine hogs affected with swine plague and seven in contact, for R. R. Pherril, of lot 4, concession 8, township of Chatham. Quarantined the farm.

October 9.—Visited and quarantined the farm of Wm. Johnson, township of Chatham, on suspicion of contagious disease in swine.

October 19.—Visited premises of S. Timmerman, lot 2, concession 8, township of Chatham, to inspect hogs and slaughtered seventeen affected with swine plague and six in contact. Quarantined the farm.

October 23.—Visited Joseph Simmon's farm and with Dr. Rowe, V.S., of Blenheim, inspected hogs, but found disease not contagious.

The above shows that the disease in swine is under the present system being stamped out. In Dover township, the main seat of disease last year, there have been so far this year only two cases reported.

Several cases of actinomycosis and tuberculosis have been reported for treatment, some of which being in the advanced stages were slaughtered and burned, the others were treated in the usual way.

Enzootic ophthalmia, which was prevalent in this district last summer in cattle and sheep, has entirely disappeared.

A few cases of anthrax, (black quarter,) in cattle have come under my notice, a farmer in the township of Harwich losing three young cattle on October 23, 24 and 25. I vaccinated the remainder of his herd and the disease has not showed itself in any more of them.

Influenza exists in this district in connection with horses, but not of an alarming character.

I am, sir,

Your obedient servant,

JOSEPH KIME, Jr., V.S.

The Honourable
The Minister of Agriculture,

No. 29.

REPORT ON HOG CHOLERA OR SWINE PLAGUE IN THE COUNTY OF BOTHWELL, ONT.

(J. R. THORNE, V.S.)

WALLACEBURG, Ont., October 31, 1899.

SIR,—I beg to submit my annual report of work done for the Department of Agriculture for the year ending October 31, 1899.

I have the honour to be, sir,

Your obedient servant,

JAS. R. THORNE,

Inspector for West Bothwell.

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

November 7.—Visited and inspected farm of Mr. Jas. Rankin, township of Dover. Recommended raising of quarantine.

November 16.—Visited and inspected two farms belonging to Mr. Chas. Dunlop, township of Dover; quarantine raised from one farm.

November 21.—Visited and inspected the farm of Mr. Thos. Stoker, township of Dover; quarantine raised.

November 28.—Visited and inspected farm of Mr. John R. McDonald in Gore of the township of Chatham; quarantine removed.

November 29.—Visited and made inspection with Mr. Clapp, V.S., of Dresden, on the farm of Mr. Samuel Eagleson, Eberts, township of Chatham; found hog cholera and had hogs slaughtered, twenty-two in all; appraised value $137.00.

November 29.—Visited and inspected farm of Mr. Hugh Cameron, township of Chatham; farm released from quarantine.

November 30.—Visited and made inspection with Mr. Clapp, V.S., on the farm of Mr. Daniel Soloman, township of Chatham; quarantined for hog cholera, and had one hog slaughtered.

November 30.—Visited and inspected farm of Mr. Samuel Eagleson, Chatham township. Found all hogs slaughtered.

December 12.—Visited and inspected farm of Mr. Isaac Watson, Chatham township. Found hog cholera, quarantined farm, and ordered slaughter of hogs, ten in all; appraised value, $76.

December 13.—Visited farm of Mr. Isaac Watson and had hogs slaughtered.

December 14.—In company with Mr. Clapp, V.S., of Dresden, visited and made inspection for hog cholera on the farm of Mr. Chas. Latimer, Chatham township. Found no disease.

December 15.—Visited and inspected farm of Mr Duncan Cameron, Chatham township; quarantine raised.

December 16.—Visited and inspected farm of Mr. David Burke, Dover township; quarantine removed.

December 28.—Visited and inspected farm of Mr. Aaron Highgate, in Dover township; quarantine removed.

January 23.—Visited and inspected farm of Mr. John Dunlop, Dover township; quarantine raised..

January 27.—Visited and inspected farm of Mr. Chas. Dunlop, Dover township; quarantine raised.

February 14.—Visited and inspected quarantined farm of Mr. Isaac Watson. Found I could not recommend raising quarantine until further cleaning up done.

February 28.—Visited and inspected farm of Mr. Isaac Watson, Chatham township. Found it satisfactory and recommended raising of quarantine.

April 1.—Visited and quarantined for reported hog cholera the farm af Mr. F. Crowe, Chatham township.

April 19.—Visited and inspected farm of Mr. Chas. Latimer for hog cholera and found no disease; quarantine raised.

April 19.—Visited farm and inspected hogs of Mr. Harry Adkins, Chatham township, and found no disease; quarantine raised.

April 28.—Visited and made inspection on farm of Mr. F. Crowe, Chatham township; found no disease.

April 29.—Visited and inspected for hog cholera the premises of Mr. Thos. Fury, of Wallaceburg, found two hogs on premises affected and had them slaughtered, appraised value $12; quarantined premises.

May 19.—Visited and inspected premises of Mr. G. Thompson in the town of Wallaceburg; hog cholera reported, found no disease.

May 27.—Visited and inspected farm of Mr. F. Crowe, Chatham township, found no disease in hogs. Farm released from quarantine.

June 13.—Visited Walpole Island with Mr. McKelvey, Indian Agent, hog cholera having been reported. Inspected hogs where disease was supposed to exist but did not find hog cholera.

June 15.—Made inspection with Mr. Clapp, V.S., of Dresden, on farms of Mr. Samuel Eagleson and Francis Davis, Chatham township. Farm of Francis Davis released from quarantine.

June 29.—Visited Walpole Island and inspected hogs for hog cholera; found no disease.

July 11.—Visited Florence and in company with Mr. McTavish, V.S., made inspection on the farm of Mr. Thos. Gammon, in the township of Dawn, where contagious disease was supposed to exist in cattle. Found four head on the farm and pronounced one cow tuberculous. Owner requested that the animal be slaughtered and a post mortem examination be made, which was done; tuberculosis apparent. I quarantined and advised that tuberculin test be applied to the remainder of the herd.

July 15.—I inspected premises of Mr. Thos. Fury, in township of Wallaceburg. Recommended that quarantine be raised.

August 14.—Visited and tested with tuberculin three head of cattle on the farm of Mr. Thos. Gammon in Dawn township. Pronounced them healthy and recommended release from quarantine.

August 15.—Tested with tuberculin, twelve head of cattle on the farm of Mr. John McCallum in township of Dawn, pronounced one cow, two yearlings and two calves tuberculous; isolated diseased cattle and quarantined.

August 17.—Tested with tuberculin ten head of cattle on the farm of Mr. Frank Daniels in township of Zone, found one cow tuberculous and one suspicious; isolated and quarantined.

August 28.—Made inspection in company with Mr. Clapp, V.S., on the farm of Mr. Samuel Eagleson in township of Chatham; recommended that quarantine be raised.

October 26.—Visited and made inspection on farm of Mr. John McKay, township of Dover, hog cholera having been reported, found disease, and of forty hogs on farm had thirty-five slaughtered of the appraised value of $142; five of the appraised value of $40, left to be slaughtered for pork. These were isolated and the farm quarantined.

No. 30.

REPORT OF VETERINARY INSPECTOR FOR NORTH ESSEX, ONT.

(GEO. W. ORCHARD, V.S.)

WINDSOR, October 31, 1899.

SIR,—I beg leave to submit my report of work done for the Department of Agriculture, from November 1, 1898, to October 31, 1899.

November 4, 1898.—Visited and quarantined for hog cholera the farm of Noah Bizarre, township of Sandwich West, found eight hogs affected and thirteen in contact, slaughtered all; appraised value, $71.

November 7, 1898.—Visited and inspected the farms of John McLean and Frank Chevalier, in township of Maidstone, quarantined for hog cholera; found them cleansed and disinfected.

November 9, 1898.—Visited and inspected the farm of Henry Marentette, township of Sandwich West, quarantined for hog cholera, and found it cleansed and disinfected.

November 28, 1898.—Visited and inspected the farm of John Moose, jr., township of Sandwich West, quarantined for hog cholera; found it cleansed and disinfected.

November 29, 1898.—Visited and quarantined for hog cholera the farm of Henry Parent, Sandwich West Township, seven hogs affected, slaughtered all of them. Appraised value, $8.00.

December 6.—Visited and quarantined for hog cholera the farm of Oscar Rhodes, Sandwich West township, found six hogs, four affected and two in contact, slaughtered all; appraised value $29.16.

December 28, 1898.—Visited and inspected the farm of Fred. Peck, Sandwich West township, quarantined for hog cholera. Found it clean and disinfected.

January 3, 1899.—Placed in quarantine two small hogs imported by Adam Campbell, Gesto, Ontario.

January 4, 1899.—Visited and quarantined for hog cholera the premises of John Selden, Windsor. Nine hogs affected. Slaughtered all of them. Appraised value, $10.

January 13, 1899.—Visited and quarantined farm of Patrick Janisse, Sandwich West township. Found three-year-old steer affected with actinomycosis.

January 14, 1899.—Visited and quarantined for hog cholera the farm of Albert Fields, Sandwich West township. Found seventeen hogs on farm, five affected, twelve in contact. Slaughtered all of them. Appraised value, $51.

January 16, 1899.—Visited and quarantined for hog cholera the farm of James Cahill, Sandwich West township. Found seven affected and thirty-seven, large and small, in contact. Slaughtered them all. Appraised value, $124.50.

January 19, 1899—Released hogs placed in quarantine January 3, to Adam Campbell, Gesto, Ont.

January 23, 1899—Gave certificate of health for one hundred and twenty-four lambs for export to W. C. Yawkey, Sandwich, Ont.

January 25, 1899.—Gave certificate of health for one cow eight years old for export to Isaiah Kersey, Windsor.

January 30, 1899.—Visited and inspected the farms of Noah Bizarre and George Margerm in Sandwich West township, quarantined for hog cholera. Found them clean and disinfected.

February 16, 1899.—Visited and inspected the farms of Wm. Terry and Patrick Janisse, both quarantined. Found them clean and disinfected.

March 2, 1899.—Visited and quarantined for hog cholera the farm occupied by John Jacques and Thomas Tansley in Sandwich West township. Three hogs affected, twelve in contact; all slaughtered. Appraised value, $46.66.

March 4, 1899.—Visited and quarantined for hog cholera the farm of Ignace Dumouchelle, Sandwich South township. Found five hogs affected and six in contact, all slaughtered. Appraised value $25.25.

March 6, 1899.—Visited and quarantined for hog cholera, the farm of Erzene Reaume, Sandwich West township. Found three hogs affected, one in contact, all slaughtered. Appraised value $6.00.

March 7, 1899.—Inspected and passed at M.C.Ry., one Jersey cow, 3 years old, forming part of 'settlers' effects' from Nashville, Mich., to Port Burwell, Ont.

March 15, 1899.—Inspected and passed at G. T. Railway, twenty-two cattle, one calf and twenty-three hogs, forming part of 'settlers' effects' of J. B. Forsythe, from Novi, Mich., to Harrow, Ont., and not accompanied by certificates of health.

April 4, 1899—Visited and inspected the premises of John Selden, Windsor, quarantined for hog cholera, and found them clean and disinfected.

April 4, 1899.—Visited and quarantined for hog cholera, the farm of Moses Moran, Sandwich South township, found five affected and eleven in contact; all slaughtered; appraised value $36.65.

April 7, 1899.—Visited and inspected the farms of Oscar Rhodes and Henry Parent, in Sandwich West township, quarantined for hog cholera, and found them cleansed and disinfected.

April 18, 1899.—Visited and inspected the farm of James Cahill, Sandwich West township, quarantined for hog cholera and found it cleansed and disinfected.

April 22, 1899.—Inspected at Windsor Ferry, one red cow, twelve years old, not accompanied by certificate of health, and forming part of 'settlers' effects' of Vincent Brown from Romeo, Michigan, to Windsor.

April 27, 1899.—Inspected at Windsor Ferry, one black cow, six years old, not accompanied by certificate of health, and forming part of 'settlers' effects' of Mike Rouske, from United States to Windsor.

May 2, 1899.—Gave to Albert Brown, Windsor, a 'certificate of health' for two cattle for export to United States.

May 10, 1899.—Inspected and passed at C.P.Ry., one brood sow, not accompanied by certificate of health, and forming part of 'settlers' effects' of D. N. Manly, from Mapsville, Ky., to Rainy River.

May 12, 1899.—Inspected and passed at C. P. Ry., one cow, three calves and one hog, not accompanied by certificates of health, forming part of 'settlers' effects' from Rushylvania, Ohio, to Rat Portage.

May 25, 1899.—Placed in quarantine two hogs imported from United States by U. S. Rollins, Windsor, Ont.

June 6, 1899.—Visited and inspected the farms of Erzene Reaume, Ignace Dumouchelle, John Jacques and Thomas Tansley, under quarantine for hog cholera, and found them cleansed and disinfected.

June 10, 1899—Released two hogs placed in quarantine May 25, to W. S. Rollins, Windsor, Ont.

June 28, 1899.—Gave to Herman Tobe, Windsor, Ont., a certificate of health for one cow and calf, for export to United States,

July 5, 1899.—Visited and inspected farm of Moses Moran, Sandwich South township, quarantined for hog cholera, and found it cleansed and disinfected.

August 13, 1899.—Gave to J. G. Leninger, Windsor, a certificate of health for thirty-five cattle for export to United States.

August 27, 1899.—Inspected at G. T. Railway, and refused admission into Canada, four razor-back hogs from the Indian Territory, accompanying a wire fence exhibit.

August 30, 1899.—Gave to W. Conly, Windsor, a certificate of health for twenty-eight cattle for export to the United States.

September 26, 1899.—Tested with tuberculin a cow for the Scotten estate; no reaction; gave chart and health certificate for export to United States.

September 29, 1899.—Gave to J. S. Leninger certificate of health for two sheep for export to United States for breeding purposes.

October 6, 1899.—Gave to L. D. Butterfield, Windsor, a certificate of health for 124 calves for export to the United States.

October 10, 1899.—Examined at Windsor Ferry six horses of Joseph Young's settler party; two horses with nasal discharge; not contagious; allowed them to pass.

I have the honour to be, sir,
Your obedient servant,

GEO. W. ORCHARD, V.S.,
Inspector for North Essex.

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

No. 31.

SUMMARY OF WORK PERFORMED IN OTTAWA DISTRICT.

(A. E. JAMES, V.S.)

SIR,—I beg to submit a short summary of work done by me for the Department of Agriculture during the year ended October 31, 1899.

Eighteen cases of hog cholera were under my charge. Of these, two cases were in the township of Osgoode, county of Russell, Ont.; one case at Merrickville, Ont.; one at Wolford Centre, Ont.; and fourteen cases in the township of Gloucester, county of Russell, Ont.

There were slaughtered during the year eighteen hogs, actually diseased, of a total value of $132.50, and one hundred and thirty-seven hogs as being in contact, of a total value of $797.84.

Cleansing and disinfection were carried out to my satisfaction in all cases, with the exception of Austin Bros.' piggery, Montreal road, township of Gloucester, county of Russell. This place is still under quarantine.

The only outbreak since last year has been at the place of Toussaint Trudel, who moved some of the infected buildings to another farm.

I applied the tuberculin test to nineteen herds of cattle, comprising two hundred and seventy-five head. I found twelve head affected, eight of these being in one herd, that of Geo. Hurdman, Hurdman's Bridge P.O., Russell county, Ont. All places where disease was found were quarantined, and the diseased cattle isolated. Of the twelve head affected, six have been slaughtered and six on Hurdman's farm are still alive, but quarantined. I held post mortem examination on all that were slaughtered and found extensive lesions in five of them; the sixth, small tubercular deposits in the mediastinal glands. Disinfection was carried out to my satisfaction.

I applied the mallein test to three horses. Of these, two on one farm reacted. These cases were in province of Quebec, Ottawa County. Owing to some question as to the Animal Contagious Disease Act of Quebec, these horses were not killed, but are still in quarantine. Tumefaction or ulceration of Schmidverian membrane was not present, and one had only a slight discharge from one nostril, the other none.

I examined these horses on September 29, four months after test, and they appeared perfectly healthy and in a thriving condition.

Two cases of glanders were reported at Treadwell, forty miles from Ottawa, on the south shore of the Ottawa River. These were slaughtered. No history of any of these cases could be traced.

Nine deaths occurred amongst young cattle near Westport, County of Leeds, Ont., from black-quarter. None were affected at time of my visit, April 22, 1899, so did not have an opportunity of holding post mortem.

I have the honour to be, sir,

Your obedient servant,

A. E. JAMES, *V.S.*

The Honourable
the Minister of Agriculture,
Ottawa.

No. 32.

REPORT OF H. S. PERLEY, V.S.

OTTAWA, ONT., October 31, 1899.

SIR,—I beg to submit the following report of my work in connection with the Department of Agriculture from November 1, 1898, to October 31, 1899. As you are aware an outbreak of hog cholera was discovered in the vicinity of Ottawa in August, 1898. Working in conjunction with Dr. James, I visited and quarantined all suspected places and those on which the disease was actually found. At the end of October and during Dr. James' absence I made an inspection of the infected district. Finding that the outbreak had assumed such proportions and that the general unsanitary conditions were so glaring, after a consultation with the Minister of Agriculture, it was deemed advisable to telegraph Professor D. McEachran, Chief Government Veterinary Inspector, who arrived in Ottawa, October 29, and accompanied me throughout the infected district. Acting under his instructions a district comprising about six square miles was placed under quarantine and all movement of hogs stopped. All animals showing symptoms of the disease were at once slaughtered and those appearing healthy were inspected when slaughtered for food, and, if found diseased, the carcases were condemned. Owing to the filthy condition of the piggeries, the nature of the food supplied them, and the ignorance of the owners, it was found very difficult to stamp out the disease, or to procure proper disinfection. The outbreak was practically stamped out by January, 1899, but owing to poor disinfection and to the fact that new animals were brought on contrary to directions, the disease has again shown itself, and at the present time Dr. James has the matter in charge. During January and February, 1899, I made several tests for tuberculosis, some being retests and some the first tests made. I have failed to find any diseased animals in either case, with one exception, namely, at Government House. In this case a cow had been introduced into the herd without being tested. She re-acted to the test and upon slaughtering her she was found to be diseased.

I have the honour to be, sir,

Your obedient servant,

HERBERT S. PERLEY.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 33.

REPORT ON INSPECTION WORK IN PRINCE EDWARD ISLAND.

(W. H. PETHICK, V.S.)

CENTRAL BEDEQUE, October 31, 1889.

SIR,—I have the honour to submit my report for the year ending October 31, 1899.

It is my pleasant duty to inform you that so far as live stock is concerned the past has been one of the healthiest years in the history of this very healthy province. The sudden death of some cattle on the farms of Mr. John McCardle, of Middleton, and Felix Curley, of Freetown Station, and said by local authorities to be due to anthrax, proved, upon post mortem examination, to be due to causes other than of a contagious character.

In my report of 1898 I stated that a fatal disease of calves was prevalent in some districts, and which, in my opinion, was a form of indigestion due probably to injudicious feeding and management, and have prescribed, when consulted, carmination and tonics, obtaining in nearly every instance favourable results.

Regarding actinomycosis, I regret to say that the number of cattle suffering from this disease seems to be increasing. Such as come under my notice are at once isolated, after which they are dealt with by the local authorities.

My time during the past year has been chiefly occupied in dealing with tuberculosis, and I am glad to inform you that the stockmen of this province manifest increasing interest in this important matter. You will have noticed that the requisitions for the tuberculin test have been nearly double that of the previous year; and in order to be available to the stockmen of the different portions of the province, I located for some time at Montague Bridge, in King's, and at Hunter River, in Queen's county, and while at these centres my time was occupied in addressing farmers' meetings and in applying the tuberculin test. I beg to refer you to the subjoined tabulated statement which I trust will give the required information. I wish to say to the credit of the owners of diseased cattle that they were in every instance willing to at once destroy such animals as reacted and have the premises thoroughly disinfected; this has been done in every instance. Our local legislature, at last session, passed an Act providing for the quarantine and testing of all incoming cattle that are not accompanied by a certificate signed by an official veterinarian showing that they have been submitted to the tuberculin test and found free from tuberculosis. Such animals as have entered since the coming into force of this preventive measure have proved free from disease. During the summer months I arranged my work so as to be as much as possible in Prince county in order that I might be available to the shippers of live stock from the port of Summerside, and I am glad to be able to report that all animals examined by me previous to shipment to foreign ports were in excellent health and condition.

I have the honour to be, sir,

Your obedient servant,

W. H. PETHICK, *V.S.*,

Government Inspector, P.E.I.

To the Honourable
The Minister of Agriculture,
Ottawa.

SESSIONAL PAPER No. 8

INSPECTION for Tuberculosis, by W. H. Pethick, V.S., Government Inspector, Prince Edward Island.

Owner.	Residence.	Number of Cattle Tested.	Diseased.
R. McMurdo	Wilmot Valley	13	None.
M. Laird	"	11	"
D. Walker	"	9	"
A. Callbeck	Centreville	2	"
W. A. Wright	Searletown	13	"
W. S. Hogg	Kensington	8	"
Wm. Hogg	"	5	"
C. Reeves	Freetown	15	One.
N. Wright	Middleton	1	"
Wm. Sharpe	Kensington	6	None.
Dr. McKay	"	1	"
W. S. Newsome	Bedeque	1	"
Montague Dairying Co	Montague	1	"
John Robertson	"	7	"
B. Aitken	Aitkin's Ferry	2	"
John Annear	Town Montague	9	"
J. C. Clark	Bay View	10	"
E. Hooper	Bedeque	1	"
Edward Wright	Indian River,	10	"
Richard Woolner	Stanley Bridge	8	"
George Easter	Clark's Mills	3	"
John D. Bell	Montague Bridge	1	"
Wm. Campbell	Aitkin's Ferry	8	"
Wallace Campbell	Montague	7	"
Alex. Campbell	"	10	"
Geo. D. Campbell	"	8	"
Geo. Wright	Aitkin's Ferry	8	"
D. G. Cameron	Montague	2	"
Isidor Martin	"	1	"
Dr. Robertson	"	7	"
Edgar Wight	"	5	"
Sylvanus Gallant	Abram's Village	13	"
W. Fowler	Ross Corner	3	"
Artimas Clark	North Bedeque	9	Two.
John McMurdo	Wilmot Valley	9	None.
Lewis Holland	Centreville	11	"
Thos. Robin	Central Bedeque	11	"
John C. Clark	Bay View	2	"
Dr. Douglas	Hunter River	1	"
J. McLeod	"	1	"
A. T. McLellan	Grand River	6	"
James H. Easton	Royalty	4	"
A. Hooper	Bedeque	1	"
Jesse Schuman	"	8	"
Geo. McGuigan	Hunter River	1	"
Geo. McLeod	"	1	"
M. Stavish	Town Freetown	8	One.
Frank Kelly	Ross Corner	8	None.
C. Reeves	Freetown	1	Suspicious
D. G. Cameron	Montague Bridge	1	"

No. 34.

REPORT ON CHARLOTTETOWN, P.E.I., CATTLE QUARANTINE STATION.

(ANDREW A. LECKIE, M.R.C.V.S.)

CHARLOTTETOWN, P.E.I., October 31, 1899.

SIR,—I beg to report that there have been inspected and passed between November 1, 1898 and October 31, 1899, the following horses, cattle, sheep and swine at Charlottetown, P.E.I. :—

1898.	Horses.	Cattle.	Sheep.	Swine.
November	33	107	1,394	53
December	15	110	1,656	9
1899.				
May	27	318	230	54
June	10	208	392	20
July	4	67	240	.....
August	5	58	269	9
September	1	93	466	11
October	.....	114	1,765	15
Total	95	1,075	6,412	171

The following are the importations of cattle :—

December 22, 1898, per *Gaspasia* from Liverpool, for E. R. Brow, 3 Guernsey cows ; Archibald, 2 Ayrshire calves, quarantined for 90 days.

March 20, 1899, per steamer from Boston, U.S., for E. R. Brow, 2 Guernsey heifers.

This completes the report.

I have the honour to be, sir,

Your obedient servant,

ANDREW A. LECKIE, M.R.C.V.S.,

Veterinary Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 35.

REPORT ON CATTLE QUARANTINE STATION AT EMERSON, MAN.

(P. A. Robinson, V.S.)

Emerson, Man., October 31, 1899.

Sir,—In response to your request, I beg to submit my annual report of animals, other than horses, imported into Manitoba by way of Emerson during the year ended October 31, 1899. There is nothing worthy of special mention, except it be the return to the United States of the bull imported by Fraser & Sons, which, upon being subjected to the tuberculin test, was found to be tuberculous and was therefore returned.

As to settlers' stock, no evidence of contagious disease was observed in any case, consequently none were detained in quarantine.

I have the honour to be, sir,

Your obedient servant,

P. A. ROBINSON, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

STATEMENT showing Importations at the Emerson Quarantine Station for the Year ended October 31, 1899.

Date.	Importer.	Where from.	Where to.	Cattle.	Hogs.	Sheep.	Mules.	Remarks.
1898.								
Nov. 28..	Louis Bibeau	Pembina, N.D.	St. Agathe	3	11			
Dec. 28..	Kenneth McLeod		Dougall, Man.		1			Imported for breeding purposes. Quarantined 15 days.
1899.								
Feb. 21..	Bunch-Keys Theatrical Co.				1			
" 26..	Frank Bloom	Pembina Co., N.D.	Emerson	1				
Mar. 25..	W. R. Milburn	Iowa		1	3			
April 3..	F. H. Lambert	St. Louis, Miss	Morris				2	Inspected at the request of custom officials. These animals showed nasal discharges.
" 6..	Robert Lawery	Pembina, N.D.	Cranbrook, B.C.	5				
" 12..	Joseph Lafontaine	"	St. Malo, Man.	9	3			
" 18..	Robert Ross	Polanse, Wash.	Oakville, Man.	3				
" 23..	McKenzie, K.	Sedelia, Miss.	Portage la Prairie		1			Imported for breeding purposes. Quarantined 15 days.
" 25..	McFadden Flat Theatrical Co				1			
" 29..	Thos. Clark	Pembina, N.D.	Emerson		1			
May 7..	Arch. Stark	New York Mills, Min.	Yorkton	8		3		
" 7..	Jno. Person	" "	"	4				
" 7..	McKinley, David	" "	"	7				
" 19..	Carl Grimson	Pembina, N.D.	Selkirk	8				
June 1..	D. Fraser & Sons	Northcote, Minn.	Emerson	1				This was a bull, imported for breeding purposes, which on being subjected to tuberculin test was found to be tuberculous and therefore was returned to United States.
" 18..	David Crawford	Drayton, N.D.	"	2	8			
" 20..	Joseph Lafontaine	Pembina, N.D.	St. Malo, Man.	1	2			
" 28..	Hebert, Jno.	Moorhead, Minn.	Elie, Man		10			
" 29..	Alex. Anderson	Grafton, N.D.	Morris, Man	2	3			
.. ..	No inspections in July							
Aug. 28..	Olafson, A. B.	Pembina, N.D.	Gimli, Man.	3				
Sept. 8..	H. C. Arnold	Bailie, Iowa	Portage la Prairie	1				
" 9..	Jacob Stakl	Yorkton, S.D.	Emerson			25		
" 21..	Bird, F. C.	Byron, Minn	Russell	1				
Oct. 9..	T. Hazahuerson	Grafton, N.D.	Winnipegosis	2				
" 12..	A. T. Griffith	Moorhead, Minn.	Yorkton, N.W.T.	20				
" 30..	John Goodmanson	Grafton, N.D.	Winnipegosis	3	2			
" 31..	Paul Tschetter	Hamilton, N.D.	Emerson, Man	1	4			
				86	51	28	2	

No. 36.

REPORT OF VETERINARY INSPECTOR AT NELSON, B.C.

(J. A. ARMSTRONG, V.S.)

NELSON, B.C., October 31, 1899.

SIR,—I have the honour to submit to you this my report for the year ended October 31, 1899 :—

During the year there entered for slaughter 8,356 sheep.

During the month of November, 1898, one horse.

During the month of December, three horses.

During the month of January, one horse.

During the month of February, one horse and thirty-five head of swine.

During the month of March, two horses.

During the month of April, one horse.

During the month of May, two horses, 13 head of cattle, and 105 swine.

During the month of June, fourteen head of horses, nine head of cattle, and fifty-four head of swine.

During the month of July, one horse.

During the month of August, seven horses, fifteen head of cattle.

During the month of September, none.

During the month of October, eight head of cattle and three head of horses. One cow in this herd reacted to the tuberculin test. I had her destroyed.

I am very pleased to report that the stock in this district is very free from disease, only one animal reacting to the test during the year.

There has been a number of reports of outbreaks of glanders, but on investigation I found it to be strangles in every case.

I have the honour to be, sir,

Your obedient servant,

J. A. ARMSTRONG.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 37.

REPORT OF THE NORTH-WEST MOUNTED POLICE COMMISSIONER.

(L. W. HERCHMER.)

SIR,—I have the honour to submit my annual report on the work performed by the North-west Mounted Police for your department during the last year, together with reports from the veterinary surgeons of the North-west Mounted Police, who are employed as veterinary inspectors.

During the year the work entrusted to us has been done in a very systematic manner, so that the whole Territories have been well looked after, and the books and papers in connection with your work have been so kept that everything of any interest is not only recorded, but full particulars can be found without delay.

As you are aware, sir, there has been a great deal of correspondence with your department and comment in the newspapers on the existence of mange among cattle in the Territories and the measures taken to suppress it.

A species of mange has existed for some years on the western ranges, and particularly in the Little Bow Country, which, while it showed up plainly on animals in poor condition during the cold weather, disappeared with green grass and sunshine; this was undoubtedly the ordinary skin disease called buffalo itch which existed among the buffalo in the old days, and is not dangerous unless animals are in extremely low condition. During last winter and early this spring our attention was called to several supposed cases of this disease which, while similar in appearance, appeared more virulent than usual. After several attempts to diagnose these cases, the parasite was discovered, and it was proved beyond doubt that these cattle were victims to true mange. The affected cattle were principally on the Little Bow, Medicine Hat and Maple Creek ranges, and it was decided to quarantine these districts and endeavour to stamp out the disease.

A dip was built at Rocky Coulee in July, and all the cattle found in Southern Alberta showing symptoms of mange were held there and dipped; unfortunately, in July, only animals in the worst stage of the disease show it, as the parasites do not burrow in hot weather, but live on the excretions in the hair, and many cattle were not collected and cleaned that would have been discovered if gathered earlier in the year. Later on a number of cattle were treated near Gleichen.

Dips were erected at Medicine Hat and Maple Creek, but have so far not been used owing to the lateness of the season.

In compliance with my interpretation of an Order in Council, dated July 12, instructions were given that the veterinary inspectors were, as far as possible, to examine all cattle for shipment on their ranges, so that no cattle that had been running with mangy animals should be brought in for shipment, and orders were given that if cattle inspected for shipment had any mangy animals among them when inspected at the shipping points they should not be allowed to go forward. The shippers complained of this to you, sir, and you instructed me to allow all cattle to be shipped that were not actually mangy themselves, and this ruling has been in effect for some time. The ranchers and shippers are not, in my opinion, alive to the situation, and as long as they can ship everything except those actually diseased they will fail to realize the great danger they run of having enormous losses of cattle from mange if a severe winter occurs, when mange will get in its deadly work to the best advantage. Many cattle men still assert that this species of mange is only buffalo itch, and is really not dangerous, but the cattle brought to the Rocky Coulee dip, and treated at other places in July and August, showed plainly that they had true mange and, if not cleansed, they would

have gone into winter so poor, if they lived until then, that they could not possibly have survived. Although veterinary surgeons accompanied many of the round-ups in July, very few mangy animals were found at that time, but immediately afterwards it was found that nearly all the bulls in Medicine Hat and Maple Creek districts that had been close herded by themselves during the spring and summer were very badly affected, and instructions were at once issued to quarantine them and have them thoroughly cleaned before they were allowed to be turned loose on the ranges. Strong protests were made by some, as this action would involve a late calf crop next spring, but the order was carried out and all the bulls carefully inspected before being released, otherwise the disease would have had an enormous chance of spreading all over the country.

The country indicated above is still quarantined, and all cattle leaving the districts concerned, must be examined at point of shipment and a certificate of health given by a veterinary inspector, or the cattle cannot be loaded on the Canadian Pacific Railway, who have given us every assistance in the matter.

It is too late now to dip, but it is proposed in the spring as soon as the weather gets warm enough, that all animals showing any symptoms shall be dipped at once, and this practice being continued, the disease will no doubt disappear.

There is a good deal of true mange among cattle south of the line, and immediately it was brought to the notice of the Montana Stock Association that we had quarantined Southern Alberta, the Chief Veterinary Inspector, Mr. Knowles, asked for an appointment to discuss the question. We met at Lethbridge in August, and at once visited the dip at Rocky Coulee near Kipp. He expressed himself as very much pleased with the arrangements and after going thoroughly into mange with our veterinary surgeons he left, promising to round up all American cattle within thirty miles of the line within forty days, which was done, and dip all cattle in Montana requiring it; all Canadian cattle found in Montana to be dipped, and all American cattle found after their round-up in Canada, to be dipped by us, expenses in both cases to be against the cattle until paid. The Americans were very much afraid that we would quarantine Montana for mange, as, if we had done so, all the intervening states would have stopped Montana cattle going to Chicago this fall.

Now that the Montana Stock Association have taken hold of the matter they will very soon clean up that territory, as, if ranchers will not do it, the association will, and charge up expenses.

TUBERCULOSIS.

The cattle at the Experimental Farm at Indian Head were tested for this disease, and one animal that reacted was destroyed as per your instructions.

Several animals reacted at the File Hills Indian Reserve, and were destroyed.

Tuberculosis was also found among some thoroughbred Shorthorns at the C. L. & R. Ranche, near Maple Creek, and four having reacted were destroyed, and a case occurred near Yorkton, and one or two at other points, but there has been very little of this dread disease in the Territories, although it has been reported lately that cattle near Dunvegan on Peace River are affected. This is very probably the case, as the cattle originally came from a herd near Edmonton that had tuberculosis among them. A competent veterinary inspector will, with your permission, examine the cattle at Dunvegan at an early date and take the necessary action.

BLACK LEG OR ANTHRAX.

A number of cattle and sheep died from this disease near the Elbow of the Saskatchewan, from local causes, and on the removal of the cattle to higher land and better water the disease at once disappeared.

It was also very prevalent for a time south of the boundary near North Portal, Assa., but owing to the vigorous measures taken by the police it did not cross the line.

Anthrax also appeared among the cattle in the vicinity of Duck Lake in March last and some cattle died, but not one-tenth the number reported in the newspapers, and there were a few cases in the vicinity of Calgary and in the Edmonton district.

The Department of Indian Affairs have decided to inoculate all their young cattle at the File Hills Reserve with single vaccine made in Columbia, Miss., and the police have offered to do the work. Much interest is attached to this experiment, as, if it is successful in warding off black-leg, it will be of enormous advantage to the country.

ACTINOMYCOSIS OR LUMPY JAW.

This disease is still frequently found, and a number of cattle all over the Territories have been destroyed, and a few in the earlier stages have been successfully treated. All intelligent ranchers kill animals affected on the range and burn the carcasses, but it is difficult to get some of the smaller owners to destroy their cattle, until they have tried treatment, generally ineffectual, but we have been very firm, and settlers are gradually realizing the advisability of destroying their diseased animals.

EYE DISEASE.

A curious disease affecting the eyes of cattle was reported near Maple Creek, and near Calgary, caused by continually feeding in swampy places. While the animals affected recovered, many of them lost the sight of one eye.

HOGS.

Only one outbreak of hog cholera occurred, in May, near Macleod, where a lot of hogs fed on town swill contracted the disease; these were destroyed, and some belonging to neighbours were closely quarantined until October, when they were released, and the outbreak entirely disappeared.

HORSES.

There have been a great many cases of glanders in Assiniboia, specially near Moosejaw, Qu'Appelle and Indian Head, and a large number of horses have been destroyed in consequence. One man at Moosejaw had ten out of twelve working horses react to the mallein test, and they were destroyed. Several parties were tried and punished for breaking quarantine, with a good result. Several valuable stallions had to be killed, but the disease has not been nearly so prevalent lately, and it is hoped that the drastic measures taken have almost stamped it out.

An Ordinance of the North-west Government calling upon liverymen to keep their stables clean and providing for police inspection, is now being rigidly enforced, and I expect that this measure will assist us greatly, as there is no doubt that a great deal of disease has been spread through these stables.

There were a few cases of glanders near Macleod, and a considerable number near Calgary, one poor man having all his horses destroyed; this case was fully reported to you, sir, and several cases occurred in both the Edmonton and Prince Albert Districts, but not nearly so many as in former years.

Several cases of death from splenic fever also occurred in the Edmonton District, caused by bad water and constant feeding on low ground, but as soon as the horses were removed to more favourable feeding grounds, the disease stopped at once. Owing to the extremely wet season, considerable foot rot appeared among horses on low ranges, but it was not contagious, and on removal the disease at once stopped.

On a previous occasion I ventured to report on the enormous numbers of illbred and wretched horses imported into this country from the United States, many of which are purchased from $5 to $10 each, the consequence being that the new settlers are starting to breed horses out of the very lowest type of mares, many of them having been inbred three or four times over, as, owing to the low price of horses for some years in Montana, no care has been taken in breeding. Twenty years careful breeding will fail

to eradicate this evil, which could, I think, be guarded against in future by prohibiting such common horses entering the country, and raising the valuation of horses when entered for customs. In addition to this I think these low inbred brutes are much more liable to glanders and other diseases, as they have no constitutions.

I would also respectfully submit that the importation of these wretched horses greatly depreciates the value of the good horses raised in this country, as it curtails the market. The large foreign immigration being generally satisfied to buy at first, the very cheapest horse procurable. Not that these horses are really sold cheaply, as a horse that is entered at $15.00, on which value duty is paid, is invariably offered for sale at $40.00 to $60.00, while a good class of horse can be bought locally at from $75.00 to $100.00.

A few horses on the Blood Reserve were found to be mangy; these were running with a lot of mangy cattle near Gleichen, and only one other case occurred, at Batoche, but veterinary surgeons state that horses cannot catch mange from cattle, as a different parasite affects them.

SHEEP.

Scab was found to exist during the year, at Buffalo Lake near Red Deer, Alberta, and on the Rose Bud Creek, north of Gleichen. This outbreak was traced to a small bunch of sheep that arrived from Manitoba last year. All were closely quarantined, and have now been released as clean, except two very small lots, one of which is the remains of the original flock that spread the disease; these are past cure, owing in a great measure to their owners failing to comply with our directions, and I have requested your authority to kill and burn them, as their existence is a menace to the community.

A small flock of sheep belonging to Mansell Bros., butchers, of Macleod, were found to have scab, and were closely quarantined. Later on the worst were destroyed and burned, and the rest killed and the pelts burned, and the yards, &c., where they had been kept, disinfected.

It is not generally known that all sheep are quarantined on entering Montana, where they have 20,000,000, and are not released till they have been dipped; and sheep are not allowed to be driven from one county into another until they are inspected.

GENERAL REMARKS.

On the whole, the season has been most favourable to stock interests, high prices, and a big demand for all sorts of stock, and a very few losses indeed, so far; but wolves are reported getting very numerous and destructive, and are killing cattle, and unless some steps are taken, the loss is likely to be heavy this winter from this cause.

Complaints from time to time appear in the papers *re* the delay in investigating alleged contagious diseases, and we have been on several occasions reported to you, sir. But, with the enormous territory to be gone over, I feel certain we have done our best, and that the complaints made against your department are not based on good grounds; in the whole state of Montana with its enormous stock interest, there being 20,000,000 sheep and some 500,000 cattle alone, there are only five Government veterinarians employed, for only two of whom is any provision made by the state for travelling expenses, so that the other three can only act in close proximity to their homes; while in these Territories, with less than one-tenth part of the stock, your department has twelve veterinary surgeons in their employ, all of whom can be moved at Government expense to any part of the country requiring them.

I may here draw your attention to the large number of stock associations in the Territories, few of whom assist one another as compared with the Montana arrangements, where all stock raisers belong to one association, who, through their central committee run the whole stock interests of Montana, ordering round-ups for diseased cattle, &c., &c., and even buying bulls for ranchers who will not provide enough, and making them pay for them.

American cattle are still very numerous in some parts of the southern territories, and as these are generally large steers their presence is a great damage to Canadian breeders, as they drive off the smaller bulls and hurt the heifers.

If the stock associations here could ship and sell all United States steers found in their districts, fit for market, as is done by the Montana Association with Canadian cattle, under similar conditions, fewer Montana steers would range here; cattle sell for much less here than in Montana, and the collection of duty would so much further reduce the prices coming to American owners, that they would take care to keep their saleable steers at any rate, out of Canada.

In conclusion I would respectfully suggest that all cattle, sheep, horses and hogs, coming into the territories from other parts of Canada, should be carefully inspected on arrival, for which at present there is no provision; this would assist us in endeavouring to trace cases of infection.

I have the honour to be, sir,

Your obedient servant,

L. W. HERCHMER.

Commissioner, North-west Mounted Police.

The Honourable
The Minister of Agriculture,
Ottawa.

STATEMENT OF ANIMALS QUARANTINED, TREATED OR DESTROYED DURING THE PAST YEAR, IN THE NORTH-WEST TERRITORIES UNDER THE ANIMAL CONTAGIOUS DISEASES ACT.

Mange.

Total number of cattle quarantined and treated for mange... 2,018

Glanders.

Total number of horses destroyed by police for glanders..... 118

Anthrax.

Total number of cattle died from anthrax..... 69
Sheep..... 90

In addition some more cattle died but were not reported by owners.

Actinomycosis.

Total number destroyed by police..... 98
" " successfully treated by police..... 83

A number of lumpy jaw cattle were destroyed on round-ups and were not reported.

Sheep Scab.

Total number of sheep quarantined and successfully treated.. 4,782
Still quarantined awaiting instructions to destroy or otherwise 32

Tuberculosis.

A number of cattle were tested for this disease. Reacted and destroyed 12

Hog Cholera.

Number of swine destroyed for this disease 25

Mange in Horses.

Three cases treated.

Typhoid Fever.

Thirty-three cattle died from this disease.
Twenty-one horses " "
Total number of cattle and horses inspected prior to shipment in quarantined district (west of Morse, C.P.R., to the mountains, and from township 28 to the line) for which certificates of health were given. Many more are yet to be shipped.

Cattle	17,974
Horses	1,600

Cattle inspected in Territories at railway points, other than in quarantined districts:

Cattle	20,000
Horses	4,376
Swine	756
Sheep	159

MACLEOD, October 31, 1899.

The Officer Commanding
Macleod District.

SIR,—I have the honour to request that you will forward to the Commissioner this, my report of quarantine operations for the past year ended October 31, 1899.

During the month of November, 1898, no disease was reported of any kind and animals appeared to be in the very best of health. Later on, in December, on receipt of a telegram from the Commissioner, I proceeded to Maple Creek to inquire into a disease said to be prevalent in that section of the country. The disease resembled very much that of mange. I was much disappointed at the paucity of information to be gathered. Supt. Moffat, who was in command of the North-west Mounted Police at that place, had had no intimation of any disease existing at that time. The only actually diseased animal I saw was one belonging to Mr. Greely. I carefully examined the animal for signs of true mange, but was unable to detect the parasite and attributed the disease to a form of 'Alopecia,' the so-called 'Buffalo Mange' or Texas Itch. This is a non-contagious disease and is not due to either animal or vegetable parasites, but to some cause or causes at present imperfectly known but usually said to be due to derangement of the vascular structures of the skin, accompanied by atrophy of the hair bulbs. This form of disease has been more or less prevalent since the buffalo days and was said to affect that animal, hence the name 'Buffalo Itch.' Another peculiarity of this disease is that it disappears with the advent of green grass.

On making a microscopical examination of specimens taken from Mr. Greely's animal I was unable to find the parasite of the mange, and attributed the disease, as I said before, to the affection mentioned above. With the light of more recent experience I am of the opinion that I was mistaken.

On February 1, I received a communication that the mange was said to be prevalent at Little Bow. This was the first intimation I had that the disease existed in Alberta. I left the same day to investigate. The weather, however, was intensely cold, and it was impossible to tell anything definitely about the disease, the animals being so covered with ice and snow. I made several attempts and even found some specimens, but could not detect anything upon which to form an opinion.

On Friday, February 24, which fortunately turned out to be an excellent day, when examining some affected animals at Little Bow, belonging to Circle Ranche, I was enabled to detect and isolate the 'mange mite,' which, under microscopical examination, I found to be the 'sarcoptes dermatodectes,' this proving beyond a doubt the existence of these parasitic mange. I immediately reported through my commanding officer. Later on I procured further specimens in which I found the parasite; these I forwarded to Montreal and received the following report of portions of skin from different cattle sent from Fort MacLeod, N.W.T.:

'The specimens were received in fairly fresh condition and when examined immediately in two of them (those labelled "obtained by scout on reserve," and "white steer from Kipp") numerous examples of the acarus were observed. On the other specimens we were unable to come across the insects though the appearance was identical.

'I may here say that the difficulty to observe them microscopically has been noticed by several previous observers. Sections made through skin showed no evidence of the parasites but demonstrated an extensive destructive inflammation of the skin proper. The study of the parasite sent by Dr. Wroughton, as again of those isolated by us, show that we have to deal with an acarus, one of the sarcoptes.

'This form of mange would appear to be rare among cattle. I am inclined, however, to recognize that we are dealing with the sarcoptes dermatodectes, which has been found and distinguished as affecting cattle.'

The stock association was informed of the above and warned that this disease was of such a nature that effective and immediate steps would have to be taken to eradicate it. Cattlemen at that time were loth to believe the existence of it, and as this affection becomes more or less dormant during the summer months, it is apt to and does give rise to a misapprehension as to the actual seriousness of it.

The country north of the Canadian Pacific Railway to the boundary line and between the eastern boundary of Alberta and the Rocky Mountains was declared an infected area and quarantined. All cattle shipped from this area have to be inspected and a permit given by a duly qualified veterinary surgeon.

In June it was decided to build a dipping tank to which all affected animals collected during the round-up were to be taken and treated. The material for the dip was supplied by the government, the other expenses being a charge against the owners of the cattle.

It was first decided to have the special quarantine station erected at a spot known as 'Long Bottom' on the Belly River, but owing to representations being made that this would entail a hardship upon settlers in the immediate neighbourhood, it was decided to apply for and obtain a government section at 'Rocky Coulee' on the Old Man's River. Here the tank was eventually erected together with corrals and chutes.

On August 2 and 3 the cattle were all put through. Where the scales were hard and crusted they were broken down when passing through the chute and the animals were completely submerged in the preparation. Six hundred and eighty-six head were put through all told. On August 12 the animals were all again put through a fresh mixture made a little stronger than the first.

On the 15th the station was visited by Commissioner Herchmer, Mr. Knowles, the Montana State Veterinarian, Inspector Burnett, and myself. The cattle were looking much improved and mange could only be detected on a comparatively few.

On the 21st the cattle were again put through. When about two-thirds had gone through the rain prevented doing any more, and as it was impossible to hold the cattle separate I decided to put them all through again. This we were unable to do until the 24th when every animal was again dipped. Great care was taken when putting them through the last time, and all that showed any roughness were stopped in the chute and examined. In some there still remained a decided scab, these were scraped and dressed with a concentrated solution of the dip before being put through the tank to insure destruction of the parasite. The dip also was made nearly double the strength of that first used.

I could not detect any signs of living scab on any of the animals when they were allowed to go. The expense of holding them and erecting the dip was very large, amounting to three dollars a head. This tax was a heavy one, especially as it is well known that all mangy animals were not gathered at the time of the round-up, due to the fact that some of the round-ups had started and were nearly over before it was decided by the stockmen to build a tank, also to the difficulty of detecting the disease during the summer months.

It is an undoubted fact that the disease with a few exceptions does not appear to be very active during the summer. Perhaps this is due to the fact that the excreting functions of the skin are stimulated, and thus furnish pabulum for the maintenance of the parasite, whereas in winter the insects bite to set up an irritation, and thus cause an exudation of serum upon which they feed, the eggs all being deposited under the scabs.

Since the quarantine has been established, I have inspected for mange, and allowed to be shipped out of the quarantined area, 2,984 head. June 16, fifty head for W. F. Godsall, for Stair, N.W.T.; Aug. 30, 182 head for Gordon & Ironside, for export; Aug. 30, thirty-six head for P. Burns, for British Columbia; Sept. 5, 359 head for P. Burns, Dawson, Yukon; Sept. 28, 476 head for A. McLean, for export; Oct. 6, 516 head for Gordon & Ironside, for export; Oct. 7, nineteen head for, P. Burns, for Cranbrook, B.C.; Oct. 20, 230 head for Geo. Lane, for export; Oct. 23, 242 head for A. McLean, for export; Oct. 23, 200 head for Geo. Lane, for British Columbia; Oct. 24, 239 head for Geo. Lane, for export; Oct. 28, 435 head for Gordon & Ironside, for export.

Besides these, I have inspected small bunches before being moved from one locality to another within the area.

I also expect that a large number will be shipped during the next three weeks.

Constable Donovan, of the North-west Mounted Police, who has recently returned from the fall round-up, being sent there for the purpose of reporting upon the general prevalence of mange, states as follows: 'I had an opportunity of seeing nearly every beast on the Willow Creek range this time, and on several occasions saw herds of 2,000 and 3,000 head of cattle gathered together. I found the conditions on these ranges wonderfully improved to what they were a month ago. Then there were traces of mange all over, now there are none to be seen. A few remain here and there where the skin is still broken and sore, but the percentage of these is exceedingly small indeed. Earlier in the summer these animals must have been badly affected.

I questioned several of the stockmen for their opinion as to the reoccurrence of mange which seems just now to have almost entirely disappeared, and while they are hopeful as to its not showing up again, still there is a great dread that when the weather breaks and snow begins to freeze and thaw on the animals' hides the parasites now dormant will again become active.

I am very much afraid that this will be the case. Many of those which now look clean will break out before long. It has been the history of the disease in this country.

Now that cattlemen have grasped the real seriousness of the disease, I have no doubt that steps will be taken earlier in the season next year to combat this affection.

I also am of the opinion that certain modifications and practical suggestions as to the method of treatment will be forthcoming, the results of the lessons learned during the past year.

I am sorry to report that an outbreak of 'hog cholera' occurred here on the premises of Adam James McGuire. It was my first experience of the disease in the North-west Territories. My diagnosis was confirmed by the bacteriologist's report upon the specimens forwarded by me.

Three other farms where pigs were kept were quarantined, not on account of actual disease, but it was thought a certain amount of communication had existed between these pigs and those of McGuire's.

On May 27 I had every pig on McGuire's ranch slaughtered, twenty-four all told. The appraised value of these amounted to $197.50, of this the owner was entitled to receive $97.68 as compensation. No fresh cases have occurred on any of the farms quarantined, and in consequence the quarantine has been raised by order of the Honourable the Minister of Agriculture.

Sheep scab was found to exist in a small flock of sheep owned by Maunsell Bros., butchers. These sheep were confined on the premises of the owners, and were all treated, except the very badly affected, which were killed and burnt. I then allowed them to be slaughtered on the premises and the mutton sold; the pelts, &c., were all burnt. Every animal has now been slaughtered, and Maunsell Bros. do not intend to renew the flock. There are no other sheep in the district.

I have had to destroy two horses for glanders during the year. One belonging to Wallace Nicholls, at the Mountain Mill, near Pincher Creek, was destroyed by me and burnt on June 9. I also tested another horse which was running at large with the diseased animal. It did not react, however, and was allowed to go.

On June 8 Mr. Thompson, the Homestead Inspector, came down from Calgary and reported his team as coughing. He also stated that some two weeks before, in Calgary, one of his horses had to be destroyed for glanders.

I decided to test the team, although they did not show any clinical signs of the disease. Upon the test being applied one animal was found to be diseased and was in consequence destroyed.

In January two thoroughbred bulls were destroyed at the Oxley Ranch, suffering from 'actinomycosis,' and one was destroyed at the dipping station, the property of Mr. Midge, of Macleod.

I also had an animal belonging to Mr. W. F. Godsall destroyed, by his authority, suffering from 'tuberculosis.' A few cases of 'black leg' have occurred recently, but there has been comparatively little of it this year. I have advised the use of 'black leg vaccine,' which has been used in one or two instances. The prevalence of the disease has not been sufficient to warrant its use to any great extent at present.

Besides the inspections mentioned before, the following horses and cattle coming into the country were inspected by me:—

On May 5, eight horses, two cows and two yearlings were inspected for Theodore Brandley; nine horses for Alfred Hirsch; two horses for Joe Hirsch; ten horses for J. C. Christensen; eight horses for Hans Marquedsen. These were all found free from disease, and admitted into the country.

On June 1 I inspected for J. A. Alexander and C. A. Chilcote one bull, seven cows, fourteen heifers, ten steers, four calves, four mares and two geldings. These animals were admitted being found free from disease.

I hereby attach the reports of Staff-Sgt. Fraser and Staff-Sgt. Farr. These reports speak for themselves of work performed.

I have the honour to be, sir,

Your obedient servant,

T. A. WROUGHTON, D. V. S.,

Inspector and Veterinary Surgeon.

SUMMARY of Quarantine Work done by Inspector Burnett, V.S., since November 1, 1898.

Name.	Residence.	Date.	Section.	Township.	Range.	No. of Animals destroyed. Horses.	Cattle.	Disease.	Remarks.
		1899.							
A. McDonald	Regina	Mar. 13				1 stallion		Glanders	This animal was destroyed and burned.
W. R. Motherwell	Abernethy	" 21	14	20	11	1 ch. mare		"	This animal showed rather peculiar symptoms, so I applied test; sufficient reaction to destroy, body was burned.
Nelson Allcock	Moosejaw	" 29-30				3 horses		"	There were 15 horses inspected at this man's place, 3 showed well marked symptoms and were destroyed and bodies burned. 12 were tested, 10 reacting to the test and were ordered to be destroyed.
Thomas Theobald	NE. of Indian Hd	April 13	13	20	10	2 "		"	These animals were destroyed and bodies burned.
W. R. Motherwell	Abernethy	" 13	14	20	11				Inspected this man's horses. Could not apply the test as they were suffering from influenza.
W. Rothwell	Regina								I applied tuberculin test to a cow for Mr. Rothwell. No reaction.
A. Haggie	Wascana Siding	June 10				1 horse		Glanders	This horse was destroyed and body burned.
Lee Cook	Glasgow, Mont.	" 12							Inspected 65 head of horses and found them free from disease.
T. & J. Bonneau	Willow Bunch	" 15				1 horse		Glanders	Inspected band of horses and found 1 affected with glanders, which I destroyed and had body burned.
M. Roffenbusch	Qu'Appelle	" 16	6	20	16				Examined 9 head of horses. No disease.
Franz Mang	"	" 16	12	20	17				" 5 " "
C. Gorlenschowskys	"	" 16	14	20	17				" 9 " "
C. Frombachs	"	" 16							" 4 " "
F. Gentner	"	" 16				1 horse		Glanders	" 7 " 1 I found affected with glanders and destroyed it and had body burned.
J. Harrups	Indian Head	" 19							Inspected 1 horse, temperature too high to test, horse ordered to be kept isolated.
Jno. Tees	Chickney	" 20				1 horse		Glanders	Inspected 7 horses, 1 I found affected with glanders and ordered destroyed, body to be burned.
W. R. Motherwell	Abernethy	" 20	14	20	11				Examined horses and found them free from disease.
W. Carey	Blackwood P.O.								Inspected herd of cattle owned by different farmers. I quarantined 1 steer and 1 heifer suffering from foot disease, these two animals were owned by Jno. Boden, Sec. 21, Tp. 18, Range 12.
Jno. Fleming	Maple Creek	July 3							Quarantined 1 steer suffering from mange.
Medicine Hat & Maple Creek Bull Herd	"	" 3-10							Quarantined this herd of bulls on account of mange.
W. Murray	Montana	" 2							Inspected band of horses and found same free from disease.
Henry Jench	Culvertson, Mont.	" 19							Inspected 83 head of horses and found same free from disease.

Thos. Wylie	Saltcoats							1 cow	Actinomycosis	This animal was destroyed.
Briggs & Sally	Wood Mountain	Aug.	7							Inspected band of horses, some of which were affected with strangles. I placed these horses in quarantine.
Paul Wagner	Balgonie	"	10	7	15	16				Inspected this man's horses, 2 I ordered isolated.
Medicine Hat & Maple Creek District.		"	12-19							From August 12 to 19, I was inspecting cattle for mange in the Maple Creek and Medicine Hat districts. I quarantined all that part of the West Riding of Assiniboia, bounded on the north by the District of Saskatchewan, on the west by the District of Alberta, on the south by the International boundary, and on the east by an imaginary line running north and south from Morse Station on C.P.Ry.
D. Garrison	Saso, Mont	"	26							Inspected 41 head of horses and found them free from contagious disease.
Stewart Meers	NE. of Sintaluta	Sept.	2	4	10	19	1 horse		Glanders	Examined brown gelding and found it suffering from glanders, had it destroyed and body burned.
Mr. Hanson	Qu'Appelle V'ly	"	2							Inspected 14 horses, some of these showing suspicious symptoms, these to be tested.
John Thompson	"	"	2	25	20	10				Inspected 2 horses and found them free from disease.
W. J. Harrup	Indian Head	"	3							Inspected 1 horse and found him free from disease.
Gordon & Ironside	Qu'Appelle	Oct.	10							Inspected 244 head of cattle. I found 6 cases of actinomycosis ; 4 were sent back to the agent, J. Aymott in the File Hills and 2 held in Qu'Appelle, until Gordon & Ironside could be communicated with.
Jno. Shatters	McLean	"	25							1 horse reported suspicious. I found the horse dead on my arrival, evidently from glanders. I had the body burned.
"	"									Inspected 9 horses and colts. No disease.
W. Carey	Blackwood	Oct.	25							Inspected band of 10 horses. No disease.
Mr. Hanson	Q'Appelle Vall'y	"	26				1 horse		Glanders	Examined 1 mare and found her affected with glanders, this animal had not been in contact with any other horses ; she was destroyed and body burned.
Jno. Thompson	Wolseley	Oct.	27	34	28	9	1 "		"	Examined 1 horse and found it suffering from glanders, had it destroyed and body burned.
Jno. Armstrong	Grenfell	"	28	18	15	7				Examined 6 horses and found them free from disease.
Jno. Brown		"	28	32	15	7				Examined band of horses and found them free from disease.
Joe Glen	Kenlis	"	29							Examined 3 colts and found them free from disease.
Wm. Cathcart	"	"	30	32	18	11				Examined 16 horses. 3 I found affected with glanders and ordered them to be destroyed and bodies burned.
Paul Wagner	Balgonie	"	31	7	15	16				Examined band of horses. No disease.
Chas. Wilson	Regina									Examined 43 horses brought in from United States. No disease.

CALGARY, October 31, 1899.

The Officer Commanding 'E' Division,
N.W.M. Police, Calgary.

SIR,—I have the honor to submit this my report of veterinary done by me while at Maple Creek, July 14 to October 4, 1899, for the Department of Agriculture :—

The number of cattle shipped from this district during the above period was :

Cattle shipped east	1,143 head.
" west	672 "

These were inspected at the point of shipment. Besides these 6,429 head were inspected on the ranges.

I have had to deal with the following diseases among cattle :—

Tuberculosis, six cases.

In the vicinity of Maple Creek, two cases of this disease came under my notice, both of which were in an advanced stage, and were destroyed. At Crane Lake, I tested eleven head of cattle for the C. L. & R. Company, of which four reacted to the tuberculin test, &c. ; suspicious. I recommended that the herd to which these cattle belonged be also tested.

Actinomycosis, 7 cases.

Very few cases of this disease came under my notice, from the fact that the ranches keep all lumpy jaw cattle killed off.

Mange, 233 cases.

212 cattle were in quarantine for this disease when I arrived at this district, and after being properly treated were released by me.

Twenty-one cases were afterwards found on the ranches at Ten Mile and Graburn, and were quarantined. They had not been released at the date of my departure.

Ophthalmia, 21 cases.

This disease, which appears to be caused by a small gray fly, appeared among the cattle at Ft. Walsh.

Glanders. Three horses were presented for my inspection supposed to be affected with glanders. In no case was this disease present.

I find the remainder of the stock in this district to be in good health and free from contagious disease.

I have the honour to be, sir,

Your obedient servant,

ANGUS W. TRACY, *D.V.S.*

CALGARY, ALTA., October 31, 1899.

The Officer Commanding 'E' Division,
North-west Mounted Police, Calgary, Alta.

SIR,—I have the honour to submit this, my report of work performed by me for the Department of Agriculture while in 'E' Division, Calgary, Oct. 1 to 31, 1899.

During the time I have been in this division, I have inspected the following stock for shipment :—

Cattle	1,095 head.
Horses	25 "

I have also inspected the following stock in quarantine :—

Horses	Nil.
Cattle, actinomycosis	1 destroyed.
" mange	1 under treatment.
Sheep, scab	4,782 head.

These sheep were in the Knee Hill and Rosebud Creek district, and were all released from quarantine, with the exception of thirty-two head, which I recommended to be destroyed on account of the fact of their being incurable.

I have the honour to be, sir,

Your obedient servant,

ANGUS W. TRACY, *D. V. S.*

BATTLEFORD, Oct. 31, 1899.

The Officer Commanding 'C' Division.

SIR,—I have the honour to submit herewith my annual report *re* the health of stock in this district during the past year.

Owing to the large number of animals shipped into this district to be wintered, from Manitoba, the percentage of animals destroyed for actinomycosis looks large, most of those affected being from there. Some were isolated and treated when in the early stages of the disease, and where the treatment was strictly carried out the animals recovered. The number destroyed was eight; the carcasses were burnt.

I am happy to state that glanders has almost completely disappeared from this district, only two cases of a chronic nature coming under my notice. These animals were shot; carcasses burnt under my supervision.

There were a number of cases of contagious abortion last spring. Sufficient attention is not paid to cows in calf in the spring, and it is almost impossible to convince some of our stockmen of the highly contagious and infectious nature of this disease.

There were a number of cases of typho-pneumonia during the year, and isolation was requested. A number of deaths occurred from this disease.

Anthrax was reported prevalent in the Prince Albert district, in April, among cattle and sheep, on a ranch near the elbow of the Saskatchewan, owing to the fact of the veterinary inspector for that district being unable to cross the ice with horses, I went from here, found thirty-five head of cattle and ninety head of sheep had died. Found, on a close post mortem, that these animals had died from the above disease. The stables and all the carcasses were burnt, according to my instructions, and I ordered removal of herd to higher pasture and running water. There was only one death after their removal.

I am pleased to state that there has been no cases of this disease in this district during the year.

Have examined the cattle frequently during the year, also animals passing through for shipment at Saskatoon, and have much pleasure in being able to report favourably on the health and splendid condition of the stock in this district.

I have the honour to be, sir,

Your obedient servant,

J. PRINGLE,

Veterinary Staff Sergeant.

NORTH-WEST MOUNTED POLICE,
COUTTS, October 31, 1899.

The Officer Commanding
North-west Mounted Police,
Lethbridge.

SIR,—I have the honour to report that during the past year, I did the following work for the Department of Agriculture :—

March 18.—Inspected eighteen horses shipped to Qu'Appelle by Canadian Pacific Railway, owned by J. Furman of Mountain View.

March 30.—Inspected nineteen horses belonging to settlers from Utah, U.S.

April 5.—Inspected sixty horses imported by Wilson of Montana, U.S., shipped to Regina.

April 13.—Inspected fourteen horses that arrived from Utah, U.S., this p.m.; passed on to Cardston.

April 17.—Inspected four horses shipped to Omaha, U.S., by Mr. Collis.

April 21.—Inspected eight head of horses from Utah, U.S., and passed them on to Cardston.

April 26.—Inspected ten head of horses from Utah, U.S., going to Cardston.

April 28.—Inspected thirteen horses, three cows, one calf and seven sheep belonging to settlers from Utah, U.S., going to Cardston.

April 29.—Inspected twenty-nine horses shipped to Winnipeg belonging to Morrichlin.

May 1.—Inspected sixteen horses belonging to settlers from Utah, U.S., en route to Cardston.

June 19.—Inspected at 'D' Division, St. Marys, 146 cattle belonging to Ockley. Eight horses belonging to W. Lunn and J. Ockley. Eight horses belonging to S. Foley, sr., and S. Foley, jr.

June 20.—Inspected at St. Mary's 220 head of Canadian Cattle brought back from Montana :—

Brown Ranch Company	56 head.
McIntyre "	108 "
Morman Church and R. Pillings	56 "
	220

July 4.—Inspected at Coutts for A. Hinds, six horses and one calf. Twenty horses, ten cows and two pigs belonging to L. Larsen, E. Robinson, G. Shields, E. Parrish and H. McFarland, from Utah, U.S., going to Sterling.

July 7.—Inspected three horses for Joe Roke from Montana to Lethbridge.

July 8.—Inspected thirty-six head of horses belonging to J. M. and S. M. Wolf, of Cardston; shipped by Canadian Pacific Railway to Winnipeg.

July 11.—Inspected 800 head of cattle at Grassy Lake sold by C Y to Gordon & Ironside to be driven to Red Dear. Found two lumpy jaws which I ordered to be separated from herd.

July 18.—Inspected eighteen horses belonging to C. Creger, bought near Lethbridge, shipped by Canadian Pacific Railway to Prince Albert.

July 20.—Inspected thirty-six horses shipped by J. Remon to Winnipeg, brought in from Montana, U.S., last year, branded O on right shoulder.

July 31.—Inspected 890 head of cattle shipped by Gordon & Ironside to Montreal.

August 2.—Inspected sixty-one horses shipped by Peter Batter to Saskatoon, bought from E. Hasson.

August 5.—Inspected eighteen horses shipped by J. W. Wolfe to Cartage Co., Winnipeg.

August 7.—Inspected twenty-four horses shipped by J. Walton to Winnipeg; purchased from E. Hasson.

August 25.—Inspected at Coutts six horses for W. Huckvale, brought in from Montana, U.S.; four horses for Dan. Wilford, two horses for Joe Wilford, two horses for E. D. Stimson, from South Dakota, going to Lacombe, N.W.T.

August 28th.—Inspected five horses for Alde. Paiement from Montana, U.S., going to Lost River, N.W.T.

August 29.—Inspected at Coutts one cow, two calves and one pig for W. Low, from Salt Lake to Stirling, N.W.T.

September 8.—Inspected at Coutts eight horses for Mrs. Harriet Wright, from Montana, U.S., going to Medicine Hat.

September 14.—Inspected at Coutts 101 horses for H. Mills, going to Little Bow, Alta, from Montana, U.S.

September 18.—Inspected at Coutts one horse for F. C. Tabor, brought from Montana, U.S.; two horses for W. Dickinson, brought from Montana, U.S.

October 7.—Inspected at Coutts four horses for Jas. Rooney, from Montana, U.S., going to High River.

October 9.—Inspected at Coutts one horse for Thos. Lawson, from Montana, U.S., going to Medicine Hat.

I collected fees for inspection amounting to $65.75, which I forwarded to the Officer Commanding North-west Mounted Police, Lethbridge.

I have the honour to be, sir,

Your obedient servant,

G. FRASER,

Veterinary Staff Sergeant.

NORTH-WEST MOUNTED POLICE,
LETHBRIDGE, October 31, 1899.

SIR,—I have the honour to forward this my annual report of work done by me for the Department of Agriculture for the year ending October 31, 1899.

February 6.—I inspected twenty-two head of horses for Mr. Waters, at St. Mary's Detachment, and considered them free from contagious disease.

February 28.—I examined Mr. Furman's band of horses and tested one for glanders and *got no reaction; I considered him free from disease.*

May 5.—I left St. Mary's and arrived at Coutts on May 7, for quarantine duty.

May 13.—I inspected twenty head of horses for T. C. Allen from Montana, and I considered them free from disease.

May 31.—I inspected sixteen head of horses for Messrs. Fletcher, Peterson, Hardy and Richards from Utah and considered them free from any contagious disease.

June 2.—I inspected twenty head of horses, six cows and two calves for Messrs. Hardy, Faddis, Hilton and Jacobs from the States and considered them free from any contagious disease.

June 3.—Inspected twelve head of horses for D.H.S. Co., passed through to gather American cattle in Canada, considering them free from any contagious disease.

June 5.—Inspected twenty head of horses for Messrs. Seely, Frandsen and Wambolt and considered them free from disease.

June 5.—I inspected seven head of horses and three head of cattle for Messrs, Ogdon and Grant, from Utah, and considered them free from any contagious disease.

June 12.—I inspected ten head of horses and one colt for Messrs. Gibb. Tillic and Sikes and Hanson, from Utah, and considered them free from any contagious disease.

June 15.—Inspected eighty-three head of horses and eleven colts for T. C. Allen, from Montana, and considered them free from any contagious disease.

June 16.—Inspected six head of horses and four head of cattle for S. Fawcett, from Utah, and considered them free from any contagious disease.

June 21.—Inspected seventy-five head of horses and two colts for Messrs. Anderson and Wentworth from Montana and considered them free from any contagious disease. I inspected two hundred and four head of young cattle for Mr. Harris, of Lethbridge; one had mange, I ordered it to be treated; the remainder showed no symptoms of disease.

June 23.—I inspected seventy-five head of horses and twenty-one head of colts for Mr. Lawrence, from Montana, and considered them free from any contagious disease.

I inspected seven horses, two cows and two calves for Mr. Wooley, from Utah, and considered them free from any contagious disease.

June 27.—I inspected fifteen head of horses, two colts, eight cows and three calves for Messrs. Davis, Silk, Baker and Shafer, from Utah, and considered them free from any contagious disease.

I inspected fourteen cows and two horses for Chas. Farrel, from Montana, and considered them free from any contagious disease.

July 4.—I inspected sixty-one head of cattle for Messrs. Taylor, Edwards, Plummel and Taylor at St. Mary's, from Utah, and considered them free from disease.

July 11.—I inspected thirteen horses for Allen T. Spencer, from Montana, and considered them free from any contagious disease.

July 13.—I inspected fourteen head of horses for Messrs. Reynolds & Gates, from Nebraska, U.S.A., and considered them free from any contagious disease.

July 14.—I inspected seven horses and three cows for Messrs. Davis, Richards, James and Castleton, from Utah, and considered them free from any contagious disease.

July 15.—I inspected five horses and four cows for Mr. Spencer from Utah, and considered them free from any contagious disease.

I inspected one horse for G. Alexander, from Great Falls, Montana, and considered him free from any contagious disease.

July 17.—I inspected nineteen horses and three cows for Sickler Bros., from Montana, and considered them free from any contagious disease.

July 18.—I inspected five horses and one cow for Peter Larson, from Utah, and considered them free from any contagious disease.

July 19.—I inspected one horse for John Ross, from Montana, and considered him free from any contagious disease.

July 20.—I inspected three horses for Carney, fifteen for Raymond, seven for McLaughland, four for McLaughland, jr., and six for Raymond, from Dakota, and considered them free from any contagious disease.

I inspected seven horses for A. McKinnon, from Montana, and considered them free from any contagious disease.

I inspected seven horses for A. Russell, from Utah, and considered them free from any contagious disease.

July 30.—I inspected two horses for James Fletcher, from Montana, and considered them free from any contagious disease.

August 6.—I inspected 220 head of horses for D.H.S. Co. round-up passed through to gather American cattle in Canada, and considered them free from disease.

August 16.—I inspected four horses for J. A. Rusk, from Montana, and considered them free from any contagious disease.

August 18.—I inspected thirty-six horses for John Gingras, from Montana, and considered them free from any contagious disease.

August 19.—I inspected six horses for Mr. Larson, sr.; two for Mr. Larson, jr., from Utah, and considered them free from any contagious disease.

August 21.—I inspected 164 horses for F. Co. round-up, passing through to gather American cattle in Canada, and considered them free from any contagious disease.

August 22.—I inspected one horse for McLaughlan, from Montana, and considered him free from any contagious disease.

August 23.—I inspected one horse for Mr. P. Hagan, from Montana, and considered him free from any contagious disease.

August 24.—I inspected six horses, one cow and thirty-five sheep for Mr. Steele; eleven horses, seventeen head of cattle, four hogs, and sixty-eight sheep for Mr.

Rine; sixty-one sheep and one horse for Mr. Terry, from Utah, and considered them free from any contagious disease.

August 26.—I inspected one horse belonging to party unknown; found him suffering from glanders, destroyed him and burned the carcass. This horse was found parading the prairie by himself.

August 27.—I inspected 256 head of cattle for Mr. Lane, shipped from Lethbridge to Montreal, and considered them free from any contagious disease.

August 31.—I inspected 499 head of beef cattle, shipped from Lethbridge for Old Country market; I found one diseased with mange. I ordered it to be taken to the dipping chute and treated. The remainder showed no symptoms of disease.

September 6.—I inspected eighteen head of horses, shipped by Mr. Wolf from Lethbridge to Winnipeg, and considered them free from any contagious disease.

September 8.—I inspected two hundred sheep shipped by Mr. Taylor from Lethbridge to Winnipeg, and considered them free from disease.

September 13.—I inspected 284 head of cattle, shipped by Gordon & Ironside from Lethbridge to Old Country, and considered them from any contagious disease.

September 29.—I inspected nineteen head of horses, shipped by Mr. Vaughan from Lethbridge to Fleming, Assin., and considered them free from any contagious disease.

October 5.—I inspected 382 head of cattle shipped by Gordon & Ironside from Lethbridge for Old Country market, and considered them free from any contagious disease.

October 14.—I inspected 284 head of cattle, shipped by Gordon & Ironside from Lethbridge for Old Country market, and considered them free from any contagious disease.

October 20.—I inspected 239 head of cattle at Pincher Creek, shipped by Mr. McLean for Old Country market, and considered them free from any contagious disease.

I collected the sum of $149.70, inspection fees, for the Department of Agriculture during the year and remitted same to Officer Commanding 'K' Division, Lethbridge.

I have the honour to be, sir,

Your obedient servant,

To the Officer Commanding
K Division, Lethbridge, N.W.T.

J. W. FARR, S.S.,
Veterinary Surgeon.

NORTH PORTAL, October 31, 1899.

The Officer Commanding
Depot Division.

SIR,—I have the honour to forward the following quarantine report for this district for the year ended October 31, 1899:—

As a result of a transfer from Maple Creek, I assumed charge of the quarantine duties of this place about the middle of July, since which, with the exception of three horses that developed glandery symptoms, in the vicinity of Alameda and Dalesboro respectively, during the month of September, and which in each instance were forthwith destroyed and their carcasses disposed of in accordance with regulations, no disease of a contagious character affecting either horses or cattle has been brought before my notice. Further, in this connection it might be mentioned that a reference to the records reveals the fact that in this same locality during the preceeding months of November and December respectively, other two horses found similarly affected were likewise destroyed. Subjoined is full particulars as to ownership, &c., of animals thus destroyed:—

Horses destroyed in the Estevan Sub-District, year ending October 31, 1899.

Owner.	Address.	Number Destroyed.		Disease.	Date.	Remarks.
		Horses.	Cattle.			
R. G. Willock	Carlisle	1		Glanders	Nov. 1898	S.S. Tracy, Inspector.
A. G. Paul	Alameda	1		"	Dec. 1898	" "
Jab. Stevenson	Dalesboro	1		"	Sept. 1899	S.S. Mitchell, "
Samuel Deyelle	Alameda	1		"	"	" "
D. A. McEwan	"	1		"	"	" "

As compared with the previous year, a considerable increase in the number of animals brought into Canada at this place—and chiefly by incoming settlers—has to be recorded. All told, inclusive of horses brought in for sale, of which, as already stated, the number was limited, a total of 1,316 passed in with settlers. Of cattle, including about 200 head imported for breeding purposes, a total of 646; while of swine, exclusive of 661 that entered in bond, and five thoroughbred animals imported for breeding purposes and duly quarantined, a total of ninety. Nor does it appear from the records that, of this considerable quantity of stock converged at this point on the Canadian frontier from various parts of the country to the south, a single animal was rejected owing to disease or infirmity of any kind, thus testifying to the healthfulness and vigour of the stock that accompanies these people.

But, as an offset to this good showing in the increased number of cattle brought in by settlers during the year at this place, a large exodus of stockers from Manitoba and adjacent parts of the Territories appears also to have taken place thereat, for the records show that no less a number than 4,365 head of this class of stock passed out of Canada during the month of April *en route* to the Dakota ranges.

I have the honour to be, sir,

Your obedient servant,

W. MITCHELL, V.S,

Vet. Staff Sergt.

North Portal, October 31, 1899.

The Officer Commanding
Depot Division, Regina.

Sir,—I have the honour to forward the following Quarantine Report, giving a brief statement of work performed by me in connection with the Department of Agriculture at 'A' Division during the interval between the middle of November, 1898, and the early part of July following:—

Obviously taking over the quarantine duties of this division at so advanced a season of the year, presupposes the fact that the bulk of the work, both in connection with the inspection of outgoing beef cattle, as well as prairie work generally, was practically over before my arrival; nevertheless several car loads of—for the most part—culled stock collected from points as far north as the Red Deer country, and south well nigh to the international boundary line, were shipped from the Maple Creek stock yards subsequent to my arrival, all of which were duly inspected by me, and found in a healthy condition.

Towards the end of December, acting under instructions from the officer commanding the division, I visited the Medicine Lodge district relative to the reported death of several calves in that vicinity from some mysterious cause. A short interview with their owner, however, convinced me that not only had the mortality been greatly exaggerated, but that the few animals that had died had succumbed to well known causes, and not to diseases of a contagious character.

About the same time a lumpy-jawed steer, whose ownership could not be established, was destroyed on the prairie a couple of miles from the barracks; and this, with the exception of inspecting an occasional horse brought in during the winter, concluded the season's operations till the spring.

As spring advanced, however, several considerable bands of horses—the largest of which numbered about 150—were brought into the country from the south, and which, in every instance, were inspected by me and found healthy. Also, during the same interval, I inspected several cases of lumpy jaw in the vicinity of Medicine Hat and Medicine Lodge detachments, respectively, and, as a result, affected animals were either destroyed, with their owners' consent, or isolated.

The Maple Creek round-up party to which I was attached and with whom I constantly journeyed till the completion of their work occupied the greater portion of the month of June and that part of July preceding my transfer from that division afforded me an excellent opportunity for noting the condition of the stock in that vicinity, their freedom from disease, &c. These and other particulars relating thereto were embodied in a report and forwarded by me to the officer commanding that Division, at the completion of these duties.

I have the honour to be, sir,

Your obedient servant,

W. MITCHELL, V.S.,

Vet. Staff Sergt.

NORTH PORTAL, October 31, 1899.

The Officer Commanding,
Depot Division, Regina.

SIR,—I have the honour to request that eight hundred and eighty-two horses (882) the number of animals entered at this port during the interval between the date of my annual quarantine report for this district and October 31, be added to the total of horses therein contained, which will represent the grand total for the year.

I have the honour to be, sir,

Your obedient servant,

W. MITCHELL, V.S.,

Vet'y Staff Sergt.

PRINCE ALBERT, October 31, 1899.

SIR,—I have the honour to forward this my annual report of the work done for the Department of Agriculture, for the year ended October 31, 1899.

Thirteen cases of glanders in horses came to my notice. All of the above horses were shot, the carcasses burned and the stables disinfected, and two suspected cases were shot and burned before I had an opportunity of seeing them.

One black cow belonging to the Indian Department, which was tested and found to be suffering from tubercolosis, was shot and burned.

One N. W. M. Police horse which was suffering from mange was treated successfully and released.

Three outbreaks of symptomatic anthrax happened in this section of the country; the dead animals were burned and exposed ones isolated.

Fifty-two cases of actinomycosis came to my notice. Twenty-five of these were shot and burned; the remainder were treated successfully and released.

Quite a number of horses have died from typhoid fever this past summer, caused from drinking at sluice near the stables and poor attention.

The other stock is in good health and condition, and over two thousand head of fat cattle will be shipped out of here this season.

I have the honour to be, sir,

Your obedient servant,

J. J. MOUNTFORD, V.S.,

Vet. Staff Sergt.

The Officer Commanding,
'F' Division, Prince Albert.

SERVICE performed for the Department of Agriculture since November 1, 1898.

Date.	Place.	Owner.	Cattle.	Horses.	Disease.	Remarks.
1898.						
Nov. 2.	Duck Lake.....	Mr. H. Mitchell....	2 dead.	.....	Symptom. anthrax.	Quarantined.
" 11	Prince Albert...	John Snell.....	1	.....	Actinomycosis	Shot.
" 15-16	"	Mr. McLeod.....	.....	1.....	Glanders	Tested and shot.
Dec. 3	"	James Mildure	.....	1.....	" ...	Shot.
" 10	Shelbrook	Mr. Sanderson.....	1.....	.....	Actinomycosis	Released from quarantine.
" 12	Batoche	N.W.M. Police.....	....	1 ...	Eczema.....	Suspected mange.
" 14	Willoughby. ...	Mr. A. Cameron...	1 ...	.....	Pneumonia....	" tuberculosis.
" 19	Hague.....	Messrs. Rumple & Tresbrake.	.....	3.....	Strangles.....	" glanders.
" 20	Rosthern.. ...	Mr. Burgess.....	.....	1.....	" ...	Glanders.
1899.						
Jan. 17	Collison	George Read.....	4.....	.....	Actinomycosis	Shot.
" 20	Prince Albert...	James Mildure.....	.....	1.....	Glanders.....	Shot before I arrived.
Feb. 6	Saskatoon	John Evans	.....	2 ..	Strangles. ...	Suspected glanders.
" 11	Prince Albert...	Massey, Harris Co..	.....	1.....	Glanders.....	Shot.
" 18	North of Prince Albert.	William Hutchison..	.....	6...	Strangles. ...	Suspected glanders.
" 24	Batoche	N. W. M. Police....	.....	1.....	Mange	Isolated.
" 26	Prince Albert...	Hilton Keith.....	.....	1 ...	Glanders....	Shot.
" 27	On Arrow Reserve.	Indian Dept.....	4 dead.	.....	Debility and neglect.	Suspected anthrax.
" 28	Duck Lake.....	Mr. Mitchell.....	.....	.....	Quarantine....	Cattle released.
Mar. 1	Prince Albert...	Hilton Keith.....	.....	1	Glanders.....	Shot.
" 4-6	Lumber Camp.	"	.....	14 ...	Nil	Suspected glanders.
" 7	Prince Albert...	Mr. Mildure.....	.....	1... .	Influenza....	"
" 14	"	Laplante & Tunvill .	.....	6...	Nil.....	"
" 14	"	George Craig	.....	2.....	Influenza....	"
" 23	Duck Lake.....	Indian Department..	2 dead.	.....	Symptom. anthrax.	Quarantined reserve.
" 30	Prince Albert...	John Sayer.....	.....	1	Strangles.....	Suspected glanders.
" 31	Batoche...	Mr. Langley.....	1.....	.....	Tympanitis...	" anthrax.
Apl. 12	Prince Albert...	E. W. Foster.....	2	4.	Nil	From Iowa.
" 24	Rosthern.	Mr. Jeolla	1 ...	.....	Actinomycosis	Dead and burned.
" 30	Prince Albert...	N. W. M. Police...	.....	1	Isolated for mange.	Released.
May 1	"	Mr. Ireland	.....	2.....	Influenza.....	Suspected glanders.
" 8	Willoughby.....	A. Cameron	30.....	... .	Debility and neglect.	Out of feed.
" 16	Shell River...	Mr. Potter	.....	1	Sus. glanders	Dead and burned.
" 16-19	Snake Plains....	Indian Department..	.....	.....	Nil.	Debility and neglect.
" 27	Rosthern.. ...	Frank Seaman	.....	1.....	Strangles.....	Suspected glanders.
" 29	Batoche... . .	Chas. Thomas	.....	1.....	Influenza...	"
" 30	Crooked Lake...	Mr. Venn	.....	.....	Nil	Reported anthrax,
" 31	Fishing Lake...	E. Charvet.....	5 dead.	.....	Tympanitis...	"
June 1	Carrot River....	Mr. Rosko.....	.....	1.....	Typhoid fever.	Reported glanders.
" 2	"	J. Robertson	11 dead.	.....	Debility and neglect.	Out of feed in April.
" 2	"	Mr. Burney.....	2 " .	.....	"	"
" 3	Birch Hills....	Gordon & Ironside..	1 ...	.....	Actinomycosis	Shot.
" 9-10	Prince Albert...	Mr. Cowan	.....	1 . .	Nil	Tested with mallein; no reaction.
" 12	"	"	.....	1	Glanders.....	Showed reaction and quarantined.
" 12	"	R. Miller	1.....	.....	Actinomycosis	Shot.
" 13	South Branch...	Mr. Ramsay	1 ..	.....	Abscess.....	Spear grass.
" 13	" .	George Halcrow ...	.....	1.....	Influenza.....	Reported glanders.
July 1	Duck Lake.....	Indian Department.	4 dead.	.....	Inflammation of bowels.	Caused by change of food.
" 2	Snake Plain ..	McDreaver & Johnson.	2.....	.....	Actinomycosis	Treated satisfactorily.
" 2	Sandy Lake	Indian Department.	2.....	.....	"	"

SERVICES performed for the Department of Agriculture, &c.—*Continued.*

Date.	Place.	Owner.	Cattle.	Horses.	Disease.	Remarks.
1899.						
July 3	Muskeg Lake ..	Laroque & Longneck	2	.....	Actinomycosis	Treated satisfactorily.
" 3	" ...	Mr. Lushey.....	.....	1	Strangles.. .	Suspected glanders.
" 4	Carlton.....	Mr. Sisson.....	.....	1	Diseased tooth	"
" 6	Prince Albert...	R. Stanley...	.....	1	Sus. glanders.	Dead and burned before I arrived.
" 8	"	George Nelson.....	2	.....	Actinomycosis	Treated satisfactorily.
" 10	Collison	Mr. Shirwood.....	1.	.....	Wound.....	From barbed wire.
" 12	Duck Lake....	Indian Department.	1. . .	.....	Tuberculosis..	Isolated.
" 13	Fish Creek.....	Fiddler & Ross	6 dead.	....	Symptoms anthrax.	Quarantined.
" 14-15	Duck Lake.....	Indian Department.	1	.....	Testing cow...	Yielded and shot.
" 17	"	Mr. McKay	..... .	1.....	Debility and neglect.	Reported glanders.
" 18	"	Lushea & Bird.....	.. ..	2	Influenza.....	"
" 19	Prince Albert...	Sam Donaldson.....	.....	1	"	"
" 20	Red Deer Hill..	Mr. Montgomery...	1.....	.....	Actinomycosis	Shot.
" 22	Dundurn... ...	Different owners....	16.....	.... .	"	5 shot, 11 released.
" 23	"	Mr. Wilson.....	3.....	.....	"	Shot.
" 23	Saskatoon.....	Sinclair & Tucker...	2... .	.....	"	Shot.
" 26-27	Prince Albert...	Mr. Cowan	.....	1... ...	Glanders.....	Second test, shot.
" 26	Collison.....	George Read.....	.....	1.....	Strangles. . .	Reported glanders.
Aug. 5	Duck Lake. ...	George Bussell.....	35	.....	Nil	All in good health.
" 6-7	Prince Albert...	Mr. Cowan	.....	10 tested	3 glandered...	7 released after second test.
" 10	South Branch...	Mr. Olett.....	6 dead.	.....	Tympanitis...	Reported anthrax.
" 13	Duck Lake.....	Mr. Campbell	.....	1.....	Influenza.....	" glanders.
" 14	"	Mr. Sinclair.....	6.....	.....	Actinomycosis	Treated satisfactorily.
" 15	Batoche.....	"	1.....	.....	"	"
" 18	Lillie Plain... .	Mr. Mackie	... .	1....	Influenza.....	Reported glandered.
" 18	Prince Albert...	— Whittiman.... ..	.....	1.....	"	"
" 24	Sturgeon Lake..	Indian Department.	.....	1.....	Nil	Reported mange.
" 31	Steep Creek.....	Mr. Kush	.... ..	3.....	Strangles.....	" glanders.
Sept. 6..	Rosthern	Dyck & Frieson....	.....	2.....	Glanders.....	Shot.
Oct. 4	Osler.....	Mr. Grant	2.....	.....	Ringworm...	Reported mange.
" 5	Duck Lake.....	"	.....	1.....	Influenza.....	" glanders.
" 6	Batoche.....	Mr. Thomo.....	1... ..	.....	Nil.....	" lump jaw.
" 6	McKenzie's Crossing.	Mr. Swain.....	.....	2.....	Wound and neglect.	" glanders.
" 12	Stoney Creek...	Mr. Cameron..	1	.....	Actinomycosis	Dead when I arrived.
" 13	Goose Hunting Creek.	Mr. Kays.....	.....	1 ..	Typhoid fever	Suspected glanders.
" 14	Flet Springs....	John Flett.....	.....	1.....	Diseased tooth	"
" 18	Saskatoon	Capt. Andrews.....	1	.....	Nil.....	Reported diseased meat.
" 18	"	Kush, Ray & Evans.	.....	11 dead.	Typhoid fever	Cause neglect.
" 21	John Smith's Reserve.	Indian Department.	.....	1.....	Eczema.... ..	Reported mange.
" 25	Prince Albert...	Mr. Cowan	.....	16.....	Nil	Imported from Ontario
" 26-30	"	Gordon & Ironside...	11.....	.....	Actinomycosis	5 shot, 6 released.

I have the honour to be, sir,

Your obedient servant,

J. J. MOUNTFORD, V.S.,

Vet. Staff Sergt.

The Officer Commanding 'F' Division,
Prince Albert.

Officer Commanding,
'A' Div., N. W. M. P.,
Maple Creek.

MAPLE CREEK, October 31, 1899.

SIR,—I have the honour to make the following report of my work while in the employ of N. W. M. P. as Veterinary Inspector for year ended October 31, 1899.

August 28, 1899, went to Moosejaw and inspected a bay mare reported by constable Hendren as diseased and running at large. Found a four year old bay mare dead on the prairie which constable Hendren recognized as the animal he reported. Found no indications of animal having died of contagious disease. Reported on my return to Regina. August 30, in company with Inspector Burnett, went to Sintaluta, thence drove to S. Meers, north of Sintaluta. Found a brown gelding glandered which was ordered destroyed by Inspector Burnett, also an aged black mare accompanied by sucking colt suspicious cases; to be tested. From there we proceeded to Hansen's ranch, thirty-five miles north and inspected a bunch of horses, fourteen in number. Found five suspicious cases, to be tested. Returned to Indian Head evening of 31st and September 1 inspected an aged roan gelding belonging to Mr. Harrup, north-east of town. From general appearances, animal appeared to be suffering from tubercolosis. Returned to Regina evening of September 1.

September 2 inspected thirteen head of horses at the barracks, Regina, the property of Isaac C. Ireland, of Latah County, Idaho, *en route* to Brandon, Man. Found them free from disease and reported same. September 9 went to Moosejaw *en route* to Chaplin. September 10 proceeded to Chaplin and morning of 11th drove to Hitchcock and Ferguson's ranch 25 miles north and the same day inspected cattle on Joseph E. Bellehumeur's ranch. Found them all in good health. Drove to Richardson and Gile's ranch and inspected cattle there. Found them all healthy except one red cow affected with lump jaw. Also inspected cattle on A. Funnis' ranch and found four cases of lump jaw, balance healthy. Same day inspected cattle on Hitchcock and Ferguson's ranch. Found them in good health. In the above mentioned cases of lump jaw I had animals isolated with instructions to treat and cure them, or failing in that, destroy them and report when instructions were carried out.

September 12 issued permit to Hitchcock and Ferguson to ship 150 head of cattle from Moosejaw to Winnipeg. Returned to Regina September 13.

September 14 went to George and Joseph McNerce's farm, Tregarva P.O., fourteen miles north of Regina, and found a chestnut stallion previously reported as being diseased, by constable Hardy, to be suffering from glanders. Had animal destroyed and body burned. Placed balance of horses, 10 in number, in quarantine. September 18 proceeded to Wolseley, and in company with Constable McIlmoyle, drove to J. Thompson's, fifteen miles north, and inspected a black gelding belonging to Thompson, which had been quarantined under suspicion of glanders some time before by S. S. Mathew. Found animal in very good condition, but still showing suspicious symptoms. Temperature was too high to make a test, so instructed the owner to still keep him in quarantine until such time as he could be looked after. Proceeded from there to Hansen's, ten miles west, and found he had corral built and had that day sent for his horses according to Inspector Burnett's instructions. Called at S. Meer's and found mare and colt previously reported in about the same condition. Returned to Regina on the 18th and reported.

September 20.—Inspected cow belonging to Mr. Tennent, caretaker of Government buildings, and found her suffering from lump jaw. Gave usual instructions and reported.

September 21.—Left for Tregarva to test horses previously placed in quarantine by myself for glanders. Tested all the adult horses, seven in number. No reaction and accordingly raised quarantine.

September 21.—Inspected R. Cooper's horses. September 22.—Inspected C. F. Colten's and Dennison's. September 23.—Inspected R. Doig's. Found them all healthy. Returned to Regina September 24, and reported.

September 26.—Went to the farm of Keys Bros., six miles north of Pense, and inspected their horses, quarantined some time before for glanders by S. S. Mathew. Found no indication of disease and raised quarantine. Returned 27th, and reported.

September 29.—Left Regina for Maple Creek, arriving morning of 30th.

October 2.—Accompanied by Special Constable McKay, drove to George Adams' at Fish Creek and inspected cattle on his ranch; found one steer I suspected of actinomycosis; balance in good health; eighty-five in all. Next went to P. Williams' and inspected cattle on his ranch, 110 in number: all healthy. From there to Warnock's; inspected cattle on his ranch; all healthy, 103 in number.

October 3.—Inspected McGarry and Cheeseman's cattle, 220 head; found two cases of lump jaw belonging to Cheeseman; balance healthy. Also inspected 115 head belonging to Wm. Pollock; found two cases of lump jaw; balance in good health. Same day inspected 105 head belonging to S. Lawrence; all in good health.

October 3.—Inspected twenty head of cattle at Maple Creek, the property of Benallack & LaFrance for shipment to Winnipeg; gave permit.

October 3.—Inspected thirty head for shipment from Maple Creek to Winnipeg by H. W. Husband; gave permit for twenty-nine head; one cow cut out for lump jaw.

October 3.—Inspected 146 head of cattle at Maple Creek belonging to Mullins and Wilson, for shipment to Winnipeg; gave permit.

October 4.—Inspected seventy head of cattle at Walsh, belonging to Thomas and Wm. Stothers and R. Armstrong, for shipment to Winnipeg; gave permit.

October 4.—At Maple Creek inspected 105 head, belonging to J. Lawrence, for shipment to Winnipeg; gave permit.

October 5.—At Maple Creek inspected 229 head belonging to A. J. McLean, for shipment to Montreal; gave permit.

October 7.—At Rush Lake inspected sixty head of cattle belonging to R. Cruikshank, for shipment to Maple Creek; gave permit.

October 9.—At Maple Creek inspected 206 head belonging to Gordon & Ironside, for shipment to Winnipeg; gave permit.

October 10.—Inspected thirty-five head belonging to Jno. Houston at Gull Lake. Gave permit to ship to Montreal.

October 11.—Inspected thirty six head at Maple Creek belonging to Gordon & Ironside, for shipment to Montreal. Gave permit.

October 12.—At Rush Lake inspected eighty head of cattle belonging to R. Cruikshank, for shipment to Maple Creek. Gave permit.

October 12.—Inspected 213 head at Rush Lake belonging to C. L. & R. CO. for shipment to Montreal. Gave permit.

October 12.—Inspected nineteen head at Rush Lake belonging to R. Cruikshank for shipment to Montreal. Gave permit.

October 13.—Inspected for Gordon & Ironside at Maple Creek sixty-six head for shipment to Montreal. Gave permit.

October 15.—Inspected for A. J. McLean at Maple Creek 114 head for shipment to Montreal. Gave permit.

October 18.—Inspected for Colter & McKenacher at Walsh 158 head of cattle for shipment to Montreal. Gave permit.

Also thirty-four head at Maple Creek for shipment to Montreal. Gave permit.

October 19.—Inspected at Maple Creek sixty-three head of cattle owned by Benallack & La France, for shipment to Montreal. Gave permit.

October 19.—Inspected seventy head at Maple Creek belonging to Colter & McKenacher, for shipment to Montreal. Gave permit.

October 25.—Inspected a yearling heifer at Maple Creek belonging to Mr. Lithgow, quarantined by S. S. Tracy for lump-jaw. Found animal nearly cured and still under treatment.

October 26.—Inspected 330 head of cattle owned by Kobold & Co. at Maple Creek for shipment to Winnipeg. Gave permit for 328 head, two steers cut out for lump-jaw.

October 27.—Inspected nineteen head belonging to Benallack & La France at Maple Creek, for shipment to Winnipeg. Gave permit to ship eighteen head, one steer mangy.

October 27.—Inspected 102 head at Maple Creek owned by Colter & McKenacher, for shipment to Winnipeg. Gave permit.

October 28.—Inspected eighteen head of cattle at Swift Current owned by James Smart, of Saskatchewan Landing, for shipment to Winnipeg. Gave permit for seventeen head. One steer mangy.

October 28.—Inspected 131 head of cattle at Maple Creek owned by D. J. McLean, for shipment to Winnipeg. Gave permit for 130 head. One steer mangy.

October 29—Inspected 158 head of cattle and eleven head of horses for H. A. Greely at Maple Creek, for shipment to Cayley, Alta. Gave permit.

October 29.—Inspected twenty-one head of cattle at Maple Creek, for J. Fenwick, for shipment to Moose Jaw. Gave permit.

October 29.—Inspected black mare, eleven years old, owned by D. Kearns, of Maple Creek. Suspicions of glanders. Quarantined animal pending testing and reported same to officer commanding.

In all cases of contagious disease mentioned in this report I have given instructions to owners to isolate the animals, and treat and cure them, or, failing in that, to destroy them, and report what has been done.

I have the honour to be, sir,

Your obedient servant,

D. CORISTINE, *Vety. S.S.*

'A' Division N.W.M.P., Maple Creek.

SUMMARY of Work done by R. G. Matthew, D.V.S., since November 1, 1898.

Owner's Name.	Place of Residence.	Date.	Number of Animals Affected.		Disease.	Remarks.
			Horses.	Cattle.		
		1898.				
D. McEwen	Grenfell	Nov. 1				Examined carcass of beef supposed to be affected with tuberculosis and found it not affected and fit for food.
T. C. Hockins	Moosejaw	" 5				Examined one horse, no disease.
Thos. Morrison	File Hills	" 22		4	Anthrax	Four animals had died and no new cases for about fourteen days and he had moved herd to new feeding ground; ordered carcasses burned.
Robt. Miller	Lumsden	" 30				Tested three oxen for tuberculosis; no disease.
Experimental Farm	Indian Head	Dec. 15		1	Tuberculosis	Tested fourteen steers, one reacted; ordered destroyed and stables disinfected.
		1899.				
Alphonse Oskysi	File Hills	Jan. 10		2	Tuberculosis	Tested, destroyed and buried.
Buffalo Bow	"	" 10		1	"	" "
Tommy Fisher	"	" 10				1 animal tested, no reaction.
John Mullen	Old Crossing	Feb. 7				Examined one carcass, no disease.
Wm. Smith	Lumsden	" 16	1		Glanders	Tested, destroyed and burned, stables also burned.
Robt. Rayburn	Rose Plain	Mar. 7				1 animal examined, blood poisoning cause of death.
Chas. Martin	Regina	" 10		1	Actinomycosis	Destroyed and buried.
Hugh Armor	Kennel	" 17	2		Glanders	Tested eight, two reacted, destroyed bodies, burned, stables, etc., disinfected.
John Wilkinson	Buffalo Lake	" 21	1		"	Destroyed and burned, remainder of herd quarantined.
Wm. Riddell	"	" 21	2		"	" (in same herd as above).
H. Foster	Kutawa	April 1				4 horses examined, 1 suffering from influenza.
Thos. Murray	McDonald Hills	" 2	1		Glanders	Destroyed and burned, stables disinfected.
W. R. Harvey	Qu'Appelle	" 3		1	Actinomycosis	Quarantined for treatment.
Owner unknown	Jumping Creek	" 4	2		Glanders	Destroyed and bodies burned, had been run in herd of about 35 horses; herd quarantined.
Edgar Thomas	Edenwold	" 5				Suspected case of glanders, temperature too high to test; quarantined for re-examination.
Rev. C. Andicotte	Moosejaw	" 10				1 horse tested, no reaction.
Keys Bros.	Cottonwood	" 10	1		Glanders	Tested, destroyed and buried; stables disinfected.
Rev. G. Elmitt	Moosejaw	" 10				1 horse tested, no reaction.
Stewart Bros.	Kennell	" 16				Examined 6 horses, no disease.
John Pierce	Rose Plain	" 17				" 4 "
N. W. M. Police	Regina	" 24				Horse, Neg. No. 1,954, tested for glanders, no reaction.

H. Hanson	File Hills	May	1	3		Glanders	Destroyed and bodies burned, remainder of herd quarantined for re-examination.
J. Brown	"	"	1	1		"	Destroyed and burned in same herd as above.
Owner unknown	"	"	1	1		"	" "
Edgar Thomas	Edenwold	"	8	1			Tested, destroyed and burned, orders given *re* disinfecting stables, harness, etc.
H. Mackintosh	"	"	9	2		Glanders	Tested, destroyed and burned; stables also burned.
Wm. Leader	Fort Qu'Appelle	"	11	1		"	Tested, destroyed and burned, orders given *re* disinfecting harness, etc.
John Scott	"	"	12				Suspicious case (colt unbroken.) Quarantined.
F. Fromback	Hendesford	"	18	1		Glanders	Examined and destroyed, body burned.
Jos. Bushby	Meriton	"	25				No disease; 6 horses examined.
A. McRae	Pense	"	26				" 1 horse "
David White	Regina	"	28				80 head of horses examined, entering from United States; no disease.
Robt. Jones	Moosejaw	"	30		1	Actinomycosis	Destroyed and buried.
Thos. Getty	Pioneer	"	31	6		Glanders	10 tested, 6 reacted, were destroyed and burned; stables, harness, etc., disinfected.
V. Parker	Moosejaw	June	1				15 head of horses examined, entering from United States; no disease.
John Edwards	"	"	1				7 " " " "
B. Smith	Pioneer	"	2	7		Glanders	16 tested, 7 reacted; destroyed bodies, burned, stables, harness, etc., disinfected.
M. Latham	"	"	2				7 horses examined, no disease.
Geo. Paisley	"	"	3				6 " "
H. Green	"	"	3				9 " "
John Bonnell	Moosejaw	"	4		1	Actinomycosis	Destroyed and buried.
H. Brubaker	"	"	5				1 horse examined and tested, no disease.
F. Johnston	"	"	9	1		Glanders	Destroyed, burned body, harness, etc., disinfected.
Wm. Riddell	Buffalo Lake	"	9	3		"	Re-examined bunch examined on March 28, no more cases. Also examined another bunch south of Qu'Appelle Valley and found 3 affected, destroyed and burned; quarantined remainder of bunch.
D. McArthur	Lumsden	"	10	2		"	Destroyed, burned bodies, harness, etc., disinfected.
Jas. Glenn	Coventry	"	15	5		"	7 tested, 5 reacted, destroyed, bodies burned; also stables, harness, etc., disinfected.
Wm. Craft	Regina	"	19				97 horses examined, no disease.
Henderson Bros.	"	"	19				33 head of horses examined; no disease.
R. Paul	"	"	19				67 " " "
Chas. Wilson	"	"	19				48 " " "
W. H. Sinclair	Moosejaw	"	23				182 " " " Entering from U.S.A.
A. Wilkie	Buffalo Lake	"	23				Quarantined 1 unbroken colt.
Chas. Colanut	Parkbeg	"	24		1	Actinomycosis	Destroyed and buried body.
Wm. Broadshaw	"	"	24		2	"	" "
B. Hallevan	Moosejaw	"	26				62 horses examined; no disease. Entering from U.S.A.
John Briggs	"	"	27				40 " " " "
Bonneau Bros.	Qu'Appelle	"	30				80 " 6 tested; no disease.
Chas. Parish	Edgley	July	3	3		Glanders	Tested, destroyed and bodies burned, stables, etc., disinfected.
J. G. Beasley	Moosejaw	"	10	1		"	Destroyed body, burned, stables, etc., disinfected.
F. McDurmont	"	"	11	3		"	4 tested, 3 reacted, destroyed and burned, also stables.
H. Hanson	File Hills	"	15	1		"	Re-examined bunch quarantined on May 1. 1 more destroyed and burnt; bunch still in quarantine.
R. C. Mission	Fort Qu'Appelle	"	19	2		"	Tested, destroyed and burned, stables disinfected.
John Scott	"	"	19	1		"	Destroyed and burned, premises disinfected.
C. M. Annable	Moosejaw	"	20				148 horses examined; no disease.
Wm. Walsh	Woody River	"	21				204 " "
Keys Bros	Cottonwood	Aug.	7	1		Glanders	Destroyed, body burned, also stables.
A. Montock	Ellisboro	"	11				4 horses examined; no disease.
John Thompson	"	"	12	4		Glanders	7 tested, 4 re-acted, destroyed and burned bodies; stables, etc., disinfected.

SUMMARY of Work done by R. G. Matthew, D.V.S., since November 1, 1898—*Continued.*

Owner's Name.	Place of Residence.	Date.	Number of Animals Affected. Horses.	Number of Animals Affected. Cattle.	Disease.	Remarks.
		1899.				
Owner unknown....	Katepewe	Aug. 15..	....	....	....	3 horses examined; no disease.
James Fleming.....	Summerberry	" 26..	.....	...	.....	1 horse " "
B. S. Sergeant. ...	"	" 26..	.....	..	... .	4 horses " "
L. Mitchel	" ...	" 26..	.....	....	....	5 " 1 mule examined; no disease.

Total number of horses destroyed for glanders 60
" cattle " tuberculosis .. 4
" " " actinomycosis. 7
" " dying from anthrax.. ... 4

R. G. MATTHEW, D.V.S.,
Vet. Staff Sergeant.

A.—Return of Cattle Shipped from Medicine Hat and Vicinity for the Season of 1899.

Date.	Buyer's Name.	No.	Where from.	Where to.	Disease (if any).	Remarks.
1899.						
Aug. 28.	Jas. Mitchell	85	Medicine Hat	Montreal	Nil	For export.
Sept. 10.	J. Twohey for P. Burns	60	"	Calgary	"	For home consumption.
" 16.	McCarracher & Coulter	20	Stair	Montreal	"	For export.
" 16.	" "	201	Medicine Hat	"	"	"
" 20.	Geo. Lain	135	"	Calgary	"	For home consumption.
" 21.	McCarracher & Coulter	108	"	Montreal	"	For export.
Oct. 6.	Robt. Linton	247	"	Winnipeg	"	"
" 8.	Spencer Bros.	289	"	"	"	"
" 8.	W. B. Marshal	50	"	"	"	"
" 12.	John Ellis	39	Stair	"	"	"
" 16.	Robt. Linton	213	Medicine Hat	"	1 case mange	"
" 20.	"	246	Walsh	"	3 "	"
" 21.	J. Twohey for P. Burns	148	Medicine Hat	Calgary	Nil	For home consumption.
" 24.	" "	468	Walsh	"	1 case actinomycosis	" "
" 26.	" "	252	Medicine Hat	"	1 case mange	" "
" 29.	" "	107	Stair	"	Nil	" "
" 29.	McCarracher & Coulter	76	"	Montreal	"	For export.
" 29.	" "	119	Medicine Hat	"	"	"
	Total beef shipped	2,863				

R. G. MATTHEW, D.V.S.,
Vet. Staff-Sergt.

B.—Return of Cattle Inspected for the Year Ended November 1, 1899.

Date.	Owner's Name.	Residence.	Number of animals examined.	Number affected.	Disease.	Brands.	Remarks.
1899.							
Aug. 30	N. G. Peterson	Seven Persons Station	53	Nil.	Nil	C M, left thigh	
" 30	C. Kraft	Seventeen Mile Tank	60	"	"	C K " shoulder	
" 30	J. Meyers	" "	60	"	"	W M " ribs	
" 30	Mrs. S. Hays	Medicine Hat	30	"	"	D S " hip	
" 31	Thos. Settleford	"	90	1 cow.	Mange	T L, right shoulder	Had her isolated and under treament.
Sept. 1	John Webb	Dunmore	60	Nil.	Nil	A M, left ribs	Later, cured.
" 1	John Middleton	"	175	"	"	Variety	Enclosed ranch herds for other people per month.
" 2	Jas. Harper	Ross Creek	55	"	"	4—E, right ribs	
" 2	Matthew Miller	"	43	"	"	9 H L "	
" 4	D. Nimen	Bull Head Creek	45	"	"	D N, left thigh	
" 5	J. Johnston	Plume Creek	80	"	"	X 4 1 " ribs	
" 5	J. W. Taylor	"	28	"	"	N T, right shoulder	
" 5	J. McDougal and Corbett	"	28	"	"	O C H, right ribs	Herded by J. W. Taylor.
" 5	H. Yuil	"	10	"	"	N I F "	" "
" 5	W. Shaw	"	15	"	"	H "	" "
" 5	John Divine	"	134	"	"	Ω, left hip	
" 5	Barnhill and Pulman	"	100	"	"	ZNZ, left ribs	Herded by John Divine.
" 6	Mrs. J. Welband	"	160	6	Mange	J[" hip	Have had a number of cases of mange; quite a few cured.
" 6	Peachey Bros	"	200	8	"	1 F " ribs	Have treated about 20 head
" 6	A. B. Carle	"	135	Nil.	Nil	U—1 " "	
" 9	Drowning Ford Ranch	Sandy Coulee	500	"	"	2VV, right "	
" 11	H. Jenkins	Ross Creek	200	1	Actinomycosis	O—T, left "	Destroyed.
" 12	Robert Mitchel	Medicine Hat	300	Nil.	Nil	Z—T " "	
" 15	Medicine Hat Ranch Co	Pagan Creek	1,200	"	"	M—R " "	
" 16	Tinney Ranch	Medicine Hat	500	"	"	IV, right hip	
" 19	R. E. Stark	Plume Creek	12	"	"	3 K, left "	
" 19	J. Niblock	"	9	"	"	* " ribs	In R. E. Stark's field.
" 19	E. Walton	Medicine Hat	19	"	"	E W " "	
" 21	Chas. Payton	Plume Creek	600	7	Mange	C P " thigh	Have treated a number of cases.
" 21	M. S. Miller	Seven Persons Creek	100	Nil.	Nil	V O, right ribs	
" 21	Jas. Wright	Pagan Creek	60	2	Actinomycosis	1 N K "	Quarantined.
" 21	Thos. Bassett	"	20	Nil.	Nil	T B, left shoulder	
" 22	John Pooling	"	350	5 cases.	Mange and 1 actinomycosis.	* " ribs	Notified to treat mangy ones and isolate actinomycosis.
" 25	T. E. Scott & Co	Plume Creek	310	2	Actinomycosis	= Ω " "	One destroyed, other quarantined.
" 26	Chas. Guernsey	Medicine Lodge	40	Nil.	Nil	* " "	

"	26	John Walker	"	110	"	"	1 D Y " "	
"	26	Geo. Murray	"	54	"	"	* right "	
"	26	L. Sexton	"	360	1	Actinomycosis	S E " "	Animal quarantined. Later, ordered destroyed.
"	26	John Reid	"	350	Nil.	Nil	* left shoulder	
"	26	Chas. Allan	"	200	"	"	E 1, right hip	
"	27	John Biddle	"	50	"	"	* left ribs	
"	27	Thos. Kajewski	"	50	"	"	* "	
"	27	J. Birosh	Josephburg	50	"	"	* "	
"	27	P. Kennard	"	40	"	"	* right thigh	
"	27	John Crookes	"	30	"	"	L—L, left ribs	
"	27	Josh Jenkinson	"	75	1	Mange	L T, right "	Animal had been isolated and under treatment for about 16 days; doing well.
"	27	Thos. Fawcett	"	525	8	"	* " "	Ordered isolated and treated.
"	27	John Cooper	"	400	6	"	N 1 B " "	" "
"	27	McLaughlin Bros	"	70	2	"	S I B " "	Have been treating both cases; doing well.
"	28	Jas. Robinson	"	80	Nil.	Nil	L—M, left "	
"	28	A. Mort	"	100	"	"	B y 1 " "	
"	28	John Bohnet	"	100	8	Mange	B I H " "	Ordered to treat and quarantine.
"	28	C. Droudson	"	60	3	"	K D " shoulder	Was not at home; left notice at post office to isolate and treat.
"	28	J. Finklestein	"	310	Nil.	Nil	J C " hip	
"	28	Alois Good	"	675	"	"	* right "	
"	28	Jas. Dunn	"	100	3	Mange	* left hip	Ordered to treat and isolate.
"	28	Walter Blackburn	"	135	Nil.	Nil	T T, left ribs	
"	28	Fred. Wiss	"	400	2	Mange	C 9 K, right ribs	Not at home; left orders with police at Med. Lodge.
"	28	Fred. Bohnet	"	10	1	Actinomycosis	9 N R "	Quarantined.
"	28	Robt. Elson	"	60	Nil.	Nil	E X, left shoulder	
"	29	J. R. and Geo. Maybury	Gros Ventres Creek	50	1	Mange	L 4 C " ribs	Ordered treated.
"	29	Jas. Maybury	" "	50	1	"	9 N U " "	"
"	29	John Huston	" "	90	3	"	B 6 U " "	Had been treating them; doing well.
"	29	John Wiss	" "	75	Nil.	Nil	U 3 X, right ribs	
"	29	C. Wiss	" "	40	1	Mange	P I F "	Ordered treated.
"	29	J. T. Bell	" "	250	2	Actinomycosis	4 B F "	One destroyed, other quarantined for treatment.
"	30	Porter Bros.	" "	400	6	Mange	R P "	Ordered treated.
"	30	Oliver Maybury	" "	90	Nil.	Nil	X Ω "	
"	30	Geo. Knight	" "	40	"	"	* left shoulder	
Oct.	3	S. Hooper	Many Berries Creek	350	"	"	* " ribs	
"	3	W. Huckval	" "	350	"	"	—N— left ribs	
"	4	Spencer Bros	Bad-Water Lake	2,200	"	"	* left ribs	
"	17	Barnhill and Pulman	Plume Creek	1	1	Mange	ZNZ "	Affected almost over the entire body; destroyed and buried.
"	17	Mrs. J. Welband	"	150	3	"	J ſ, left hip	Have been treating, but ordered that they get another dip.

Total number of cattle examined on the range 14,311
" " affected with mange 76
" " " actinomycosis 12

R. G. MATTHEW, D.V.S.,
Veterinary Staff Sergeant.

* These brands cannot be indicated with ordinary type.

NORTH-WEST MOUNTED POLICE, DISTRICT OFFICE,
CALGARY, October 31, 1899.

SIR,—I have the honour to make the following report *re* animals affected with contagious or infectious diseases from January 1 to October 15, 1899.

During this period the following diseases have been dealt with :—

Cattle—

Actinomycosis, destroyed 39, quarantined 18.
Anthrax, 10 died.
Tuberculosis, nil.
Mange, 1,025 quarantined.

Horses—

Glanders, 12 shot and burned.
Mange, 3 quarantined.
Influenza, nil.

Sheep scab—

About 2,200 quarantined.

Animals affected with curable diseases have been treated satisfactorily, and after a careful inspection and satisfying myself that the disease no longer existed, they were released from quarantine.

The following is a statement of animals that have been examined and shipped from this district :—

By whom Inspected.	Cattle.	Horses.
S. Sergt. G. T. Stevenson, D.V.S.	4,031	210
S. Sergt. A. W. Tracey, D.V.S	673	
R. Riddell, V.S.	78	20

The stock in this district is in excellent condition.

I have the honour to be, sir,

Your obedient servant,

GEO. T. STEVENSON, D.V.S.,
Veterinary Staff-Sergeant.

The Officer Commanding
'E' Division North-west Mounted Police,
Regina.

NORTH-WEST MOUNTED POLICE,
FORT SASKATCHEWAN, October 31, 1899.

SIR,—I have the honour to submit the following annual report *re* the health of live stock in this district.

The general health of all classes of stock has been good, and though I have had occasion to visit almost every locality quite frequently, no severe outbreak of disease has come under my notice.

Considering the large number of horses brought into the district and disposed of to the newly arriving settlers, very few cases of glanders have been reported, and these have been promptly dealt with.

An outbreak of scab occurred at Buffalo Lake among two small flocks of sheep, which were quarantined and treated successfully, after which disinfecting was thoroughly carried out and the disease is now quite stamped out.

At Ponoka a number of horses have died of typhoid fever. Many might possibly have recovered if proper care and treatment were available, but they require the constant attendance of a veterinary surgeon.

Symptomatic anthrax (black-leg) which prevailed to a considerable extent in several localities has not been so prevalent this year as last, but this may be due in part to the season and also to the adoption of preventive inoculation by some settlers, and which is no doubt wonderfully successful.

Actinomycosis (lumpy-jaw) is also much less prevalent, but this may also be due in part to the number of cases taken in the early stages of the disease and successfully treated.

A mild form of influenza has occurred in several localities, but without serious results.

There has come under my notice a form of hoof disease which is not of an infectious nature, but due to the excessive moisture, rendering the hoofs less resistant to pricks and abrasions which afford easy access to putrid matter and filth. Very little treatment is necessary except thoroughly cleansing and disinfecting the affected parts and removing all cattle to a dry and clean yard for a few days. It is much to be regretted that more care and consideration is not given to sanitary conditions, for though wonderfully supplied with nature's disinfectants, 'sunlight, pure air, sharp frosts and running water in many places,' the accumulations of manure and filth, month after month, and the close proximity of wells, water holes and lakes, as well as low, damp, ill-lighted and ventilated stables will certainly lead to disastrous results to many settlers.

Hog-raising is becoming a rapidly growing industry in this district. Hogs have much advanced in quality, and have been particularly free from disease.

A number of mares aborted in this immediate vicinity during the winter months, which was probably due to a mild form of influenza, as it was not confined to any particular farms. I would not consider it to have been contagious abortion.

I attach herewith table of cases examined.

I have the honour to be, sir,
Your obedient servant,
C. H. H. SWEETAPPLE,
Vet. Staff-Sgt.

To the Officer Commanding
N.W.M. Police,
Fort Saskatchewan.

Disease.	No. of Animals.	Remarks.
Glanders	6 horses	Destroyed and carcasses burned.
Actinomycosis, lumpy jaw	3 cattle	" "
"	2 "	Isolated and treated successfully.
Sheep scab	60 sheep	Quarantined and treated successfully.
Symptomatic anthrax, black-leg	10 cattle	Died ; carcasses burned.
Typhoid fever	10 horses	Died.
Nasal gleet	3 "	Suspected glanders by owner.
Influenza	30 "	Losses slight.
Hoof disease	50 cattle	No loss.

Estimate of number of animals inspected, 5,000.

C. H. H. SWEETAPPLE, *V.S.*,
Vet. S.-Sgt

No. 38.

REPORT ON PICTOU CATTLE DISEASE IN NOVA SCOTIA.

(GEO. TOWNSEND, V.S.)

OFFICE OF THE INSPECTOR OF STOCK,
NEW GLASGOW, N.S., October 31, 1899.

SIR,—I have the honour to submit, herewith, a statement showing number of cattle slaughtered for 'Pictou cattle disease,' and amount of compensation paid therefor, during the year ended October 31, 1899.

I have the honour to be, sir,

Your obedient servant,

GEORGE TOWNSEND, *V.S.*

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

STATEMENT of Cattle slaughtered and amounts paid, from November 1, 1898 to October 31, 1899.

Month.	Number Slaughtered.	Amount Paid.	Month.	Number Slaughtered.	Amount Paid.
		$ cts.			$ cts.
November, 1898	5	26 00	June, 1899	19	151 33
December, "	0		July, "	25	182 00
January, 1899	2	15 00	August, "	24	171 32
February, "	2	8 00	September, "	17	110 65
March, "	1	8 00	October, "	11	81 00
April, "	1	10 00			
May, "	5	37 33	Total	112	800 63

GEORGE TOWNSEND, *V.S.*

No. 39.

REPORT OF WORK DONE DURING THE YEAR BY THE INSPECTOR OF DISINFECTION IN CONNECTION WITH PICTOU CATTLE DISEASE.

(JOHN S. COPELAND.)

SIR,—During the month of December, 1898, I visited twenty-two farms, twenty of which I found satisfactorily disinfected; during the month of September, 1899, I visited eighteen farms, fifteen of which were satisfactorily disinfected; and during the month of October, 1899, I visited eight farms, all of which had been properly disinfected.

'Pictou cattle disease' throughout the county is on the decrease. In localities where it has been most prevalent there are few cases now, although it still breaks out in new sections. The disinfecting system is proving to be a great benefit and safeguard against the spread of the disease.

I have the honour to be, sir,

Your obedient servant,

JOHN S. COPELAND,

Inspector of Disinfection.

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

No. 40.

REPORT OF INSPECTOR OF STOCK CARS.

(M. AUGER.)

OTTAWA, October 31, 1899.

SIR,—I have the honour to submit to you my report for the year ended October 31, 1899. I have during the year visited stations on the border between Canada and the United States, such as Windsor, Sarnia, Niagara Falls, Victoria, Sutton, and Abercorn; the regulations as to cleaning and disinfecting of live stock cars have been well followed. At Windsor where loaded cars in transit for Buffalo and other places in the United States enter Canada, there has been some improvement, although there is room for more.

I have been and am still trying, in conformity to your orders, to impress on the different railroad companies, the necessity of having tight ten inch bottom boards for *hog* cars more especially and I am glad to say that I have seen lately several new cars on the C.P.R. so equipped.

I have travelled several thousand miles during the year inspectlng cattle yards, several of which, at my request, have been put in order. The live stock cars for local trade are generally pretty well cleaned, although in a few instances they might have been cleaner. The enormous freight trade has had the effect of some being overloaded.

I have the honour to be, sir,

Your obedient servant,

M. AUGER,
Dominion Inspector of live stock cars and yards.

The Honourable
The Minister of Agriculture,
Ottawa, Ont.

No. 41.

REPORT OF THE PROCEEDINGS OF THE CONGRESS ON TUBERCULOSIS HELD IN BERLIN, GERMANY, ON MAY 24, 25 AND 26, 1899.

To the Hon. SYDNEY FISHER,
Minister of Agriculture.

SIR,—In accordance with your instructions, I proceeded to Berlin, and attended the Congress on Tuberculosis, held in that city, in May.

The congress was attended by delegates from most of the countries of Europe, Germany being most largely represented by many of her most distinguished authorities in medical science. The United States, Persia and Japan also sent delegates. From the British Empire came the Right Hon. Sir Herbert Maxwell and Dr. Pye-Smith to represent the British Government. The National Society for the Prevention of Tuberculosis in Great Britain sent Prof. Sir Thomas Granger Stewart, of Edinburgh, Mr. Malcolm Morris and Dr. Hillier, of London. There were also delegations from Australia, New Zealand and Canada.

The gathering was considered one of national importance in Germany. The meetings were held in the Council Chamber of the Reichstag. Her Majesty the Empress graciously consented to open the first meeting. Among the many kind attentions to the delegates were brilliant social entertainments given by the Kaiser, the Chancellor of the Empire (Prince Hohenlohe), the Burgomaster of Berlin and others.

The whole subject was considered under four heads:

1st. Dissemination of tuberculosis.
2nd. Its causes.
3rd. Prevention.
4th. Treatment and sanatoria.

Dr. Kohleh, the Director of the Imperial Health Office in Berlin, introduced the first subject. He gave statistics of the prevalence of the disease and its mortality. His tables showed that England, Belgium, Sweden, Norway and Italy had the smallest mortality from consumption, and Russia and Austria the highest. Of the cities, London, Naples and Buenos Ayres gave the lowest mortality, and Vienna, Buda-Pesth, Moscow and St. Petersburg the highest. He also mentioned the greater prevalence of the disease in cities and large towns than in the country districts.

Dr. Krieger dealt with the subject of occupation as a cause of the spread of tuberculosis. He mentioned particularly those who have the care and nursing of consumptives; persons who lead sedentary lives, those whose occupation leads to the inhalation of irritating dust, creating points of local irritation and lessened resisting power in the bronchial tubes, as being particularly liable to take the disease.

Dr. Schjerning, Chief Medical Officer of the German War Office, presented statistics of tuberculosis in the German Army. His analysis showed that the disease rate from tuberculosis was higher among those soldiers recruited from the cities and large towns. In the garrisons also in large centres, especially among men employed indoors, the rate was higher.

Prof. Bollinger, of Munich, spoke of the relation between tuberculosis in domestic animals and in the human subject. The identity of the disease in cattle and hogs and human tuberculosis was shown. The tubercle bacillus was the cause in all instances. Animal tuberculosis was a great source of danger to man. The danger from meat was not great unless it was taken uncooked. Milk and its products from infected cattle were most to be dreaded. The frequency of tuberculosis in hogs, mostly due to feeding on infected milk, was cited as a proof of this danger. In children especially, infected milk was largely the cause of the so-called scrofulous affections.

In the discussion which followed the reading of these papers, Dr. Schmid, of Berne, Director of the Swiss Health Office, Dr. Brauer, of Heidelberg, Dr. Kuthy, Buda-Pesth, and Dr. George Meyer, Berlin, took part. The points to be particularly noted were the large mortality from tuberculosis among tobacco workers, due to crowded factories and dust-laden air, and the prevalence of the disease among the employees of the printing offices in Berlin.

Section II.—Etiology.

Under this head the papers were, to a great extent, scientific in character; and the names of Flügge, Fränkel, Pfeiffer, Loeffler, Lannelongue and Courmont were sufficient guarantee that the bacteriological elements of the subject were crystallized into an instructive form.

Professor Flügge, of Breslau, gave us a history of the study of the causes of tuberculosis, leading up to the now well known fact which will no longer admit of discussion, that *the tubercle bacillus is the direct cause of all varieties of consumption in the human subject and also of bovine tuberculosis.* Tubercle bacilli were parasites which flourished in living animal tissue, but quickly lost virulence outside the animal organism.

Professor Fränkel, of Halle, presented the same view as the previous speaker in regard to the tubercle bacillus being the only direct cause of the disease. From it came all the infection. In the pus of the tuberculous sore, in the sputum from the diseased lung; in meat and milk, if infected, it was the tubercle bacillus which conveyed the disease. Every human being infected with tuberculosis and every infected animal were centres from which the disease spread. In spite, however, of the number of sources of their origin and the immense production of tubercle bacilli, they are found principally in the surroundings of the consumptive patient, where the production is enormous; if the patient is removed, infection, to a great extent, ceases, for the bacilli have but little vitality outside the organism. Direct sunlight, putrefaction, and desiccation soon destroy them.

Professor Pfeiffer, of Berlin, gave an interesting account of the later stages of lung consumption, pointing out that the severe symptoms of the suppurative stage were due to pus-producing organisms, making a second infection in addition to the tuberculous sore. These cases of mixed infection were no longer cases of uncomplicated tuberculosis.

Professor Loeffler, of Greifswald, considered the question of heredity and immunity. We have yet no means of producing immunity. Hereditary tuberculosis is very rare; it may occur through infection from the genitals of the mother. A tuberculous father does not transmit the disease.

Dr. Max Wolff, of Berlin, described his experiments to determine the heredity of tuberculosis. The result of his experiments showed that but one out of sixty infected animals transmitted the disease to its offspring.

Section III.—The Prevention of Tuberculosis.

Dr. Roth, of Potsdam, read a paper on the general means to be taken for the prevention of consumption. He claimed that as the disease is infectious, public health boards should deal with it as such, and provide the means of prevention. The expectorated matter was the great danger. The sputum of the tuberculous patient must be destroyed. The people should be instructed in regard to this danger. We must also learn to recognize consumption in its early stages. He strongly advised the use of spittoons made of paper, which could be burnt every day.

SESSIONAL PAPER No. 8

Professor Heubner, of Berlin, spoke on the important subject of the prevention of tuberculosis in children. The disease was acquired in the young by breathing the germs. Care should be taken to keep children apart from members of the family or others suffering from consumption, as the children of tuberculous parents are more easily infected than others. Such parents should be taught, not only the importance of avoiding infection in their children, but that they should be fed well, live an out-door life and have all means taken to strengthen their tissues and make them resistant of the disease.

Professor Kirchner referred to the marriage of tuberculous persons. Infection of husband or wife and children was the result of such marriages. When such marriages took place, persons should be instructed as to the danger which existed. If the public understood the danger, such marriages would be, to a great extent, avoided.

Professor Rubner discussed the subject of the prevention of tuberculosis in factories and dwellings for the crowded poor. He spoke of house inspection, the necessity which exists for better sanitary arrangements in factories, so that overcrowding, imperfect ventilation and a dust-laden atmosphere would be avoided. Notices should be posted in all public conveyances cautioning travellers not to spit on the floor. Sleepings cars should be well ventilated and cleaned every day when in use.

Professor von Leube, of Würzburg, dealt with the subject of prevention in hospitals. The most strict cleanliness was necessary. Tuberculous patients should have a special receptacle for the sputum, and during the act of coughing should hold a pad of absorbent cotton over the mouth, which should be immediately burnt. Veils should be worn by those making the beds or dusting. When proper attention was given to preventive measures, tuberculous patients need not be isolated, but, whenever possible, it is better and safer to separate tuberculous from other patients in general hospitals. The importance of specially constructed hospitals or wards for "open air treatment" was dwelt on.

Professor Virchow spoke of the prevention of tuberculosis from articles of food. Cattle, by their meat and milk, hogs and, to some extent, poultry spread the disease. The tuberculosis test should be employed to discover its existence. He impressed us with the danger of tuberculous milk. Milk as it comes from the gland of the cow may be infected, but it certainly is when tuberculous sores exist on the udder of the cow. Milk must be sterilized. Hogs were more subject to tuberculosis than was generally believed, usually in the form of tuberculous glands in the neck.

The disease in poultry was not identical with human tuberculosis, but yet he considered it a source of danger.

Dr. Von Maar read a paper on stable-hygiene in relation to tuberculosis in cattle. He pointed out that the disease in animals was perpetuated by housing them in dark, dirty and ill-ventilated barns, and he urged the necessity of instructing farmers and animal breeders on the importance of having buildings for their cattle light, airy, well-ventilated and scrupulously clean. Strict cleanliness in handling milch-cows is an absolute necessity. This instruction should be given by public lectures or by literature on the subject furnished by the agricultural authorities.

Section IV.—The Treatment of the Disease.

In this section papers were read by Curschmann, of Leipzig, Kobert, of Rostock, Brieger, of Berlin, Sir Hermann Weber, of England and Dettweiler, of Falkenstein, one of the pioneers of the "open air" treatment. The reading of the papers in this section was followed by an interesting discussion. The principal facts brought out were the following:—Much better results of treatment are obtained now since disinfection and "open air" treatment are used. A cure is possible and a considerable prolongation of life likely to result if the modern system of treatment is properly carried out. Recovery can only be brought about *when the disease is attacked in its early stage.* In the later stages treatment with the hope of cure is useless. Climate is not considered so important as it formerly was in the treatment of tuberculosis. Change of air and scene and sea voyages are still considered effective in the early stages of the disease, if combined

with careful medical supervision, and good diet. The danger at the present time is in reliance on climate alone for the cure of consumption. Sir Hermann Weber, who is the great authority on the subject of climate in the treatment of tuberculosis, advised that those in whom the disease was extensive or progressive should not be sent far from home. In opening his paper he said:—"While he still held that climate is really important, it is insufficient unless there be careful medical supervision and hygienic and dietetic guidance." In summing up he spoke as follows:—

"In cases with limited disease at one or both apices of the lungs without, or with only a slight amount of fever, nearly all climates can be made use of, but especially high altitudes and sea voyages, if the constitution is a strong one.

"For the prevention of scrofula and tuberculosis all healthy climates can be used, as long as a good diet and plenty of time in the open air can be obtained; but high altitudes and marine climates have advantages—the former rather against pulmonary tuberculosis, the latter (including sea voyages) more against scrofula.

The cure of tuberculosis during the early stages is possible in all healthy climates; some climates, however, have advantages for various cases over the other climates; for instance, notably those of high altitude. But climate by itself without careful medical supervision is generally insufficient. The patient's blind reliance on the climate often leads to errors, to aggravation of the disease, and to death. For the majority of patients, therefore, treatment in sanatoria should be preferred, but for the treatment of the poor it is a necessity. The erection of numerous sanatoria for the people is therefore a national requirement for the cure, the prevention, and extermination of tuberculosis."

Professor Brieger, of Berlin, spoke favourably of Koch's tuberculin in both its first and latest form. It was, he said, a specific. If used in the early stage when the infection was purely tuberculous, he considered it of value as a means of treatment. On one point, however, there was no question, namely, the value of Koch's first tuberculin as a means of diagnosis in men and animals.

By other speakers the efficacy of open air, day and night, good food, (the diet should be full and suitable to the patient), disinfection, and the judicious use of alcohol, stimulating the skin by cold water affusion to the chest and body, with brisk rubbing, were recommended very strongly. The necessity of considering the body weight in estimating the results of treatment was also mentioned.

Section V.—Sanatoria.

Professor Von Leyden sketched the growth of the Sanatoria treatment of tuberculosis in Germany. In 1880 the subject was first considered and subsequently taken up by prominent medical authorities up to 1892, when the People's Sanatorium in Falkenstein was started. From this time the movement spread rapidly, the Imperial Insurance Company, the Berlin-Brandenburg Sanatoria Society, the Red Cross Societies, each established sanatoria; then more united action was brought about by the formation of the Central Committee for the establishment of sanatoria, with Prince Hohenlohe, the Imperial Chancellor, as president. There are now thirty-three sanatoria in Germany.

Landesrath Meyer discussed the question of the "ways and means" for the establishment of sanatoria for the people. He claimed that apart from the duties of governments and the efforts of charitable persons and societies, there was a special obligation upon those who were likely to be benefited by the creation of sanatoria for consumptives; for instance, it was in the interest of large employers of skilled labour that the health of their workmen should be preserved. Life insurance companies and workingmen's clubs were directly interested in the lives and health of the insured. The large death-rate from tuberculosis was a great drain upon these institutions.

Papers were also read on the situation and plans of construction of sanatoria. A sheltered neighbourhood in the country or so far from any town that there is freedom from smoke and dust, exposure to the sunshine, with good water supply and perfect drainage were insisted on in the selection of a site. In the construction of the build-

ing, the application of all the modern improvements, now so well kown, to procure perfect sanitation, and plentiful supply of pure air were required. Sanatoria for children should be at the sea-shore. Weakly children or those with a tendency to tuberculosis should have the benefit of sea air and salt bathing. These are the most valuable tonics for children.

The foregoing is but a brief synopsis of the work done at the congress. Many valuable papers presented were not read for want of time; but as can be easily seen, the whole subject was thoroughly considered in all its sanitary and medical aspects.

Having dealt briefly with the transactions of the Berlin congress, I may perhaps be allowed to set forth for the information of the Government and through them of the people of Canada what I deem to be the lessons of the congress.

The object of the meeting was not to develop any new idea nor to state any new fact to medical men who have been following the progress of our knowledge on the subject of tuberculosis in recent years. The patient, quiet labour of the bacteriologist and pathologist in the laboratory, the daily study of the doctor in the hospital ward and the work of the statistical bureau are commonly hid from the public eye. The results of their work are made known almost exclusively to the profession through the columns of medical journals. Such large public gatherings as these serve the purpose, then, of crystallizing into form our recent advances in medical science. They also attract public attention and become a source of enlightenment to the people on subjects intimately associated with public health.

The paramount importance of making known the recent acquisitions to our knowledge of the nature and causes of tuberculosis is now generally acknowledged; and it has become a necessity that the public should begin to grasp the main facts and to understand that thousands of valuable lives can be saved by basing our action upon the truths brought to light by recent discoveries.

That we may be impressed with the necessity of vigorous action, let me state that the disease is not limited, as people generally suppose, to cases of pulmonary consumption, common and fatal as these are, but embraces a large number of diseases, many fatal to life and others producing conditions of long-continued and almost hopless invalidism or rendering the sufferer incapable of a useful life. The following list of diseases which have their origin from the tubercle germ will convey some idea of the widespread nature of tuberculosis:—

(1.) Consumption of the lungs.
(2.) Almost all cases of running sores from chronic joint and bone affections, such as hip-joint disease.
(3.) Consumption of the bowels.
(4.) The so-called scrofulous affections.
(5.) Most of the cases of pleurisy.
(6.) Meningitis or the brain-fever of the infant.
(7.) Tuberculosis of the spine, producing curvature of the spine or "broken back
(8.) A large proportion of the cases of enlarged and diseased glands.
(9.) Lupus and other tubercular diseases of the skin.
(10.) Consumption of the bladder and other parts of the genito-urinary system.

It is only necessary to ponder upon the foregoing list and one is prepared for the statement that the death-rate from this disease must be large. The mortality is in fact enormous, being estimated by some authorities to be one-sixth of the deaths from all causes. In its ravages it is not limited to any one part of the world, but seems to follow population everywhere. It is destructive of life at all ages and in both sexes. Unfortunately, it occurs most commonly, and is most fatal in young adults, at a period when life is most precious to the individual, the family and the state, and even in cases where life is saved, the body is often so maimed and crippled, that a useful life, if not wholly lost, is greatly lessened. Bergy, in an article on bovine tuberculosis (*Medical News*, 23rd January, 1897), claims that "tuberculosis has produced more deaths than small-pox, diphtheria, scarlatina, typhus fever, typhoid fever, yellow fever, cerebro-spinal fever, Asiatic cholera, relapsing fever, leprosy, measles, and whooping cough, combined."

Dr. Kohleh made the statement at the congress, that in the four years 1894-1897, the yearly average number of deaths from pulmonary tuberculosis in Germany was

87,600; this represents 2·95 per 1,000 persons out of a total mortality of 9·1 per 1,000. Dr. Kuthy, of Buda-Pesth, stated also during the discussion, that consumption caused 60,000 deaths a year in Hungary, while the number suffering from the disease was 400,000.

It is difficult to estimate with accuracy the death rate from this cause in Canada, as we have not a complete system of vital statistics, but it is probably nearly as large as it is shown to be in those countries where an account is taken.

The disease is produced by the tubercle germ or bacillus. There is no longer any room to doubt this fact. This germ is the direct cause; the seed from which consumption springs. Since the discovery of the germ, twenty years ago, by Koch, every step in the progress of our knowledge has made this point certain.

Tubercle germs are living organisms though microscopic in size, with enormous powers of reproduction in a favourable soil. It is said that an advanced case of pulmonary consumption throws off millions of bacilli in an hour. They live and grow only in the animal organism but they have feeble powers of life outside of living animal tissue. They are easily destroyed. "Direct sun-light soon kills them, putrefaction destroys them in six or seven weeks and desiccation in six to ten months, they are only found in the immediate vicinity of consumptive patients, and when their producer is removed they disappear." This view was presented by Prof. Frankell of Halle, in one of the most forcible and learned addresses heard at the congress. This is the most favourable statement yet made in regard to the low vitality of the organism outside of living animal tissue; many having held that tubercle bacilli were almost ubiquitous in their infective condition. Later investigation and experiment have settled the fact that the infection is practically limited to the surroundings of a patient suffering from the disease. It follows also that they hold their poisoning power longer in dark, damp, ill-ventilated and sunless rooms and houses.

The tubercle germ is derived solely from the excreta of tuberculous sores, and as lung consumption is the most common form of disease, the most prolific source of the poison is the expectoration from a diseased lung. It is this—the sputum of a consumptive patient, which spreads disease and death through a family and in its neighbourhood. How this occurs is easily understood. It arises most commonly from the careless and uncleanly habit, so common, of spitting upon the floor, upon carpets or mats, into dark corners and behind beds and other articles in a room, particles of the expectorated matter often adhering to the bed covering, the furniture or hangings of a room. It also occurs in the store, warehouse, factory or workshop, in railway carriages, street cars, public halls, places of amusement, &c., these are being constantly contaminated by the sputum of the consumptives. It dries in a few hours, and the ordinary dusting or sweeping of the place stirs up the dust loaded with virulent germs, the dust is breathed by the susceptible, and thus consumption is spread to the extent we find it in the world to-day.

It can be stated without fear of contradiction that if, as a result of education, persuasion or legal enactment, all expectorated matter from tuberculous patients was thrown into a vessel containing a small quantity of five per cent solution of carbolic acid or any other effective germicide, the number of cases of consumption existing in this country could be reduced over one-half within five years.

The disease is not truly hereditary, that is, the tubercle germ does not descend from parent to child. It is true that the children of consumptive parents are more liable to "catch" the disease as they are born with systems which are weak, with tissues of low vitality and with less power of resistance. They present a favourable soil for the growth of the germ; this question of a favourable soil will be considered more fully further on. There is another source of tubercular infection which has attracted much attention of late years: the meat and milk of tuberculous cattle. It is now well known that the disease is very prevalent among cattle and pigs and to a limited extent among poultry. Tuberculosis in animals is identical with human tuberculosis. Cow's milk is the greatest source of danger. From fully cooked food there is very little danger of infection, therefore the meat of tuberculous cattle is not likely to be harmful as the prolonged heat required in cooking destroys germ life. The milk of a tuberculous cow is what we most fear. In a paper read at the congress, Virchow, who is not only one

of the most distinguished scientists of Germany, but is also a prominent member of the Reichstag, claimed that milk was one of the chief spreaders of this disease. It is yet perhaps unsettled whether the milk of tuberculous cows, as it comes from the milk gland is always infectious, but as tuberculous sores on the udder of the cow are a very common lesion of bovine tuberculosis, when a cow so affected is milked, the milk becomes infected by the sore on the cow's teat and can easily produce consumption. Though milk is a source of infection to which public attention should be given, still it is trifling as compared with the sputum of the consumptive patient.

It is now clear that we must deal with this disease as an infectious one, just as we now deal with smallpox or diphtheria. We may not need to isolate a case of consumption, in all its stages, as completely as we isolate these diseases, but now that we know the source of infection, since science has proved the sputum from the diseased lung to be almost exclusively the origin of the infective matter, stringent measures should be taken as soon as possible by governments, boards of health, and sanitary authorities to prevent the wholesale poisoning of the people which is constantly going on, more particularly in the vicinity of cases of tuberculosis.

To do this we must destroy the germ either by burning, boiling or by chemical disinfectants. All expectorated matter from a consumptive patient must be disinfected. This is now a simple and easy procedure, so easy that it will only be necessary to inaugurate a campaign of education, so that the families and friends of consumptives may see the great danger to which they are subject unless proper precautions are taken. To a large proportion of our intelligent population it will only be necessary to point out the fact that the source of tuberculous poisoning is the expectoration from the diseased lung and that this can be easily destroyed, in order to bring about such a change in our present habits of carelessness and uncleanliness in dealing with it as will very materially lessen the disease rate from tuberculosis in Canada in a very short time.

As it is the excretion of the diseased lung which contains the poison, the question will naturally be asked : Is the breath of the patient infectious? In the early stages of a case and in mild slowly progressing cases *it is not*, but in the later stages when the lung is breaking down and millions of germs are thrown off every hour, *the breath in such a case is infectious* and can convey the disease. The frequency of disease and the number of infective germs which are, in consequence, floating in the air will also lead to the inquiry : Why are we not all of us infected if this germ-life is spread about so freely? The answer is simple. In all contagious disease due to germ-life there is another factor required, that is the soil in which the germ will grow. The tissue of some persons presents a favourable soil, while in the tissue of others, the germ will not grow.

In the course of our study of disease-producing germs and their effects on the human system, the grand truth has been elucidated that our tissues in the process of vital action constantly going on in them have a strong resisting power against germ-life, that there is implanted in our nature not only the power of growth, development, and reproduction, but also a power of resistance against germs. This last named function is as natural to us as either of the others which are so well understood. Some persons and some systems have more power of resistance against this disease than others. All persons who inhale or ingest tubercle germs do not contract consumption as their tissues do not furnish a favourable soil. This resisting power against disease is increased or lessened by heredity, by our mode of life, our surroundings, habits as to eating and drinking, and by all the circumstances which tend to lower the vitality of our tissue on the one hand, or to improve it on the other. As a general rule it may be stated that the lower the vitality of tissue is, the greater is the liability to microbic disease. A person whose standard of health is low presents a favourable soil for the growth of disease-germs, while the tissue of a healthy well nourished individual is an unfavourable soil. This is especially true of the tubercle bacillus ; if the body be well nourished and in vigorous health it finds no soil for its growth and is harmless when inhaled or ingested. It must be borne in mind, however, that a person in the best of health and whose tissues are best equipped to resist tuberculosis, if exposed continuously and for a length of time to large quantities of the poison such as may occur when a wife, sister or friend nurses a patient in the last stages of consumption, often sleeping in the same

room, under these circumstances the best resisting power may be overcome and the healthiest and strongest may contract the disease. This, however, only occurs under such exceptional circumstances.

Unfortunately we often find, especially in cities and crowded localities, the same circumstances which preserve the virulence of the germ produce among the dwellers therein the favourable soil. The tubercle germ retains its power of infection for the longest time in the vicinity of the tenement house, in the close unventilated room where the sun's rays rarely enter, in dark damp places with noisome and unwholesome surroundings, and as a rule the persons who live in these localities are subject to many circumstances which lower their resisting power and make them an easy prey to the contagion. But not alone in the homes of the poor, but very often in the comfortable household of the farmer and in the richly furnished homes of the wealthy classes we find many conditions favourable to the growth of tubercle germs. How often one finds the rooms in such a home overheated in the winter months by steam or hot water coils, without an open fire place, windows caulked or pasted up, so that there is but little chance for the entrance of fresh air or the discharge of foul air. In such a room the consumptive patient lives, the expectoration is often carelessly disposed of, even though there may not be absolute uncleanliness; the room is darkened with shutters, blinds and curtains, through which hardly a ray of direct sunlight is allowed to penetrate. To this sick room the members of the family come and go freely, their tissues have probably a low resisting power on account of heredity and other causes. No precautions are taken to avoid infection; the weakly child is allowed to rest or play or may be to sleep there for many hours. Under such circumstances it can be easily seen how tuberculosis is spread even in the homes of the well-to-do classes.

In considering the means to be taken to stamp out tuberculosis let us start with this axiom: *No tubercle germ, no consumption. An unfavourable soil for the growth of the germ, no consumption.*

Next to the destruction of the bacillus the most necessary point to be learned by the public is the danger to which they are subject, if a good standard of health is not maintained.

It would be well for us to consider some of the causes which lead to the production of this lowered vitality of tissue and lessen its resisting power. Among these are, first, an inherited weak system: this is the cause of a very large death-rate from tuberculous disease in the first two years of life. Dyspepsia again always produces an ill-fed tissue and is at the present day one of the most common causes of a low resisting power against disease germs; the life of the debauchee, alcoholism, irregular living, business worry, residence in close, ill-ventilated and sunless rooms, lack of cleanliness, and a continuous in-door or sedentary life such as obtains in the business office and factory are among the principal causes. To prevent consumption, then, we must (1st) kill the germ, (2nd) have good health and nourish the body well with good food, sunlight and fresh air.

The point to be kept prominently before the public is that *tuberculosis is infectious. In most cases in which many members of a family are attacked and die of the disease, it is not on account of inheritance, it is due to an infected house and to contact.*

The congress dealt fully with the whole question of prevention and treatment. How shall we destroy the tubercle germ? To do this every means must be taken to prevent the sputum from consumptives from being spit about, where it will dry and float about as infective dust. Sanitary authorities must make such rules, which can only be carried out with the assistance of an enlightened public opinion, as will prevent spitting in public places, such as public buildings, halls or places of amusement, railway carriages, street cars, schools, factories or workshops. These should be provided with proper receptacles in sufficient number, and they should contain some cheap disinfecting fluid. Public notice should be given, cautioning families among whom consumption exists, or has existed, of the danger to which they are subject by the presence of the infective tubercle germ, and that this can be prevented by having their rooms disinfected as they would after a case of diphtheria or scarlet fever. The public should be instructed as to the value of sunlight and fresh air as natural disinfectants. Medical men should recommend, and boards of health should require, that

sick-rooms of the consumptive should be frequently disinfected. Again, all their underclothing, handkerchiefs, bed linen and the like should be boiled for half an hour before being washed, and dry dusting and sweeping should be abolished as a means of cleanliness. This last precaution is one which is much needed, for I believe the broom and the dust-brush are responsible for many deaths from tuberculosis. We are all familiar with the method by which the careful housewife cleans her rooms —usually once a week. The mistress and the girls, or the servants, as the case may be, cover their heads with cloths to keep the dust out of their hair, but leave the mouth and nose uncovered, so that it may have free access to their lungs, and they proceed to apply the broom and dust-brush vigorously to the floor and halls. The air of the room is soon filled with dust, so that one can hardly see through it. There can be no more certain means of producing tuberculosis than this. It is only necessary to suppose, as is often the case, that the carpet or floor contains the virulent germ, that the poor sweeper is susceptible and the consequences are easily foretold.

There is one other source of tuberculosis, though it is probably more often a cause of other infections, which is not considered by the authorities but which I will venture to mention here. I refer to the common habit of taking food during meals or at other times without washing the hands. It may be said that among refined people this does not occur, but even among these only a few are careful, and outside of this limited number of people no attention is paid to the point. Numbers of working people neglect this precaution, and even among the better educated many are careless; the bank clerk or the broker takes his lunch while he is counting dirty bank notes, which, passing as they do from hand to hand, are often loaded with disease germs; the merchant and the storekeeper leave their counting room and shop to take a hurried lunch after handling all sorts of things which may be infected, so that the neglect of this simple act of cleanliness may be often the means of conveying disease.

While we loudly proclaim, then, that we can prevent consumption, let it be a source of comfort to the people that it is also curable. It is true that the proportion of cures yet obtained is not large, but the sanatoria established for the purpose are reporting better results each year since they were started. We have not yet obtained any specific remedy, but in the laboratories of science, faithful effort is being made to discover an antitoxin, which may be used without danger, to overcome the disease and destroy the poison, as it was hoped the tuberculin of Koch would do when it was first made known to the world.

A short discussion of the subject of cure will not be out of place now, although this part of the subject is of more interest to medical men. The destruction of the tubercle germ will be the most important factor in lessening the severity and fatality of cases in the next few years. In the home of a consumptive family it is almost impossible to work a cure on account of the immense quantity of the poison which is being constantly breathed or swallowed. The invading army of germs is so strong that ordinary remedies or treatment of any kind is valueless. Even with improved methods we cannot for some time look for a large proportion of cures in private practice, that is, outside of sanatoria, but when these millions of microbes which are floating about the homes of consumptives are to a great extent destroyed, then we may expect that with careful treatment we shall save the lives of fifty per cent more than we do to-day.

It is only in the early stages that treatment of any kind promises a good result; when the disease has fully established itself and the lung tissue is breaking down, the case is hopeless. It is easy to sum up the treatment under four heads :

(1st.) Sunlight, open air, rest, dry soil for the home.

(2nd.) A good digestion and contentment.

(3rd.) An abundance of strong food, which should be taken to the limit of the digestive power.

(4th.) Medication of a constructive character such as iron, cod liver oil and the like with a moderate quantity of wine, beer or other stimulants.

Of direct sunlight both for prevention and cure, too much cannot be said. It is doubly effective, acting both as a natural tonic to the system and a destroyer of the tubercle germ. The advantages of fresh air and an out-door life are too well known to need much consideration, but though most intelligent people are theoretically in

favour of fresh air, still in practice, especially during our winter months, the necessity is forgotten, and to many an in-door life and over heated rooms with lack of ventilation is the rule. We are all familiar with the fact that persons whose occupations are indoors, such as school teachers, typesetters, dressmakers, book-keepers, tailors and factory operatives, are very prone to tuberculosis.

The importance of a dry soil for the home must not be lost sight of. In houses which are damp and especially if built upon wet soil, consumption is most common.

At the present day there is probably no more common cause of low vitality and weakened tissue than dyspepsia. It may be called the fruitful mother of disease. Its baneful effects are numerous, but one of the most serious is that of lessening the resisting power against the tubercle bacillus. The copious draughts of iced water, bad teeth, fast eating, excessive use of alcohol, with the mental excitement and worry of modern business life are constantly undermining the organs which safeguard the body and furnish strength to the system. If we wish to avoid consumption we should keep the lung tissue strong and this we must fail to do if we destroy the food-factory—the stomach. The dietetic treatment stands side by side with sunlight and fresh air, and next to the destruction of the germ in the sputum, in our endeavour to prevent and cure tuberculosis. Dettweiller, who was one of the pioneers of the sanatorium treatment recommended "a proper system of feeding adapted to the needs of each patient and when it could be safely done, in over-feeding to a certain extent, with a moderate quantity of alcohol." The body weight must show a gradual increase. This is the only safe test of the fighting power of the tissues. If the body weight will only show a slight gradual increase under treatment then the lung is becoming a more unfavourable soil for the growth of the germ.

While much was said at the congress about milk as a source of contagion, there did not seem to be sufficient attention given to the great value of milk as a food. Good pure milk properly taken and digested is one of the most valuable foods we have. It is one of the very few articles of diet which contains all the elements for the nutrition of tissue, and when pure and rich it is invaluable as a food both for the prevention and cure of consumption. A pint of good milk has more value as a nutrient and tissue builder than a bucket full of soup, beef-tea, bovril or meat extract of any kind. It is a food, *par excellence*, of the young. To have its full value it must be not only rich in cream but it must be pure. In case there is danger of infection in the milk, it should be pasteurized, that is, treated twice at least to a temperature of 160° F.

There are two ways in this country by which children are robbed of their milk supply. One is the habit of giving young children tea as a drink at their meals just as it is taken by the parents. The habit is injurious in two ways, the tea, as it is generally made, may be harmful and it prevents the child taking so much milk. Another habit among farmers, which may not be very common, but which occurs often enough to be noticeable, is to take the largest amount of cream possible from the milk to make butter for the market and to feed the children on skim-milk. By these means a great wrong is done to the child; its tissues are ill-nourished and it becomes an easy prey to the tubercle germ. Is it not possible that feeding skim-milk to calves has the same effect in the production of bovine tuberculosis?

The necessity for special sanatoria for treatment can no longer be looked upon as the view of a limited number of authorities; there is now a consensus of opinion among medical men that tuberculosis cannot be treated successfully in private houses. It is difficult to do so among those who are well housed and comfortably off, but it is almost impossible among the poorer classes, so that there are now being established, in all countries which have given attention to the subject, special sanatoria for this purpose.

The treatment demanded under our present plan: open air, sunlight, good food and proper feeding, sponge baths, with careful medication, and medical supervision, can only be carried out when a patient is surrounded by all requisite appliances.

It should now be made the rule that pulmonary tuberculosis can not be admitted to the wards of a general hospital. To do this is a double wrong, as it is an unfit place to carry out a plan of treatment which will give the consumptive even a fighting chance for his life (and at best this is all he has); and again it is unjust to the other

patients, as they are exposed to the contagion and are in danger of contracting a new and fatal disease, instead of being cured of that for which they entered the hospital.

When I was a house physician to the Charity Hospital, New York, some years ago, a circumstance occurred, the force of which can now be understood. It was deemed wise by the governing powers of the hospital to put all cases of consumption in one ward, and as no precautions were taken except ordinary cleanliness as to infection, this ward was soon reeking with tubercle bacilli, so that treatment was as futile as an endeavour to stem the rising tide. One day when I was on duty in the distribution office, where the patients were allotted to the various wards, a poor woman whom I had directed should be sent to the ward I mention, looked up at me with an appealing glance and said: "Oh, doctor, do not send me to that ward; I have heard that no one ever comes out of it alive." For the poor, then, especially, sanatoria must be provided either by governments or by private charity or both. How we are to get them must be left for further consideration.

During my stay in Berlin, I visited the sanatorium at Grabowsee, so that I might have a better idea of the practical management of such institutions, the requirements of which a description of this sanatorium will indicate. It is situated on a wooded hillside with a gentle incline, but only slightly above the level of the surrounding country. It has a southern aspect. The soil is dry and porous and the green sward is preserved as far as possible to avoid dust. It is also sheltered from severe winds. It is arranged on the pavilion plan, each pavilion containing eight beds. These are but sheds with large windows on each side. There were also open pavilions or covered verandahs for shelter in case of rain. An executive building contained offices, bath rooms, billiard room and weighing room. It was heated with hot water coils, and the patients' pavilions with an open fire. In two separate buildings were: in one the sterilizing room and laundry, and in the other the dining room and kitchen. The floors of the pavilions were covered with linoleum. Accommodation was provided for one hundred and sixty patients. As far as possible only those in the first stages of the disease were admitted. Every detail of treatment was carried out under medical supervision. The patients were obliged to live all the time in the open air, and about the lawns were scattered extension chairs in which the patients rested, being well wrapped up if the day was cold. A daily bath was given, in the beginning warm, but the temperature gradually lowered each day to a cold bath, as the patient improved. A very full diet was given with plenty of sterilized milk and a moderate quantity of wine or beer. There was more rest than exercise prescribed, but the amount of each was under the direction of the medical officer. *It was considered a serious offence to expectorate upon or about floor or grounds. A violation of the rule was severely punished.* Each patient was provided with a small wide-mouthed dark glass bottle with a tight screw cap which he carried in his pocket as a receptacle for the sputum; this was sterilized as often as necessary.

This report is already too long, but I found it difficult to deal with the subject in a shorter space. I will conclude with the hope that the Dominion Government, in concert with provincial and municipal authorities, will see the pressing need there is, both for humane and economic reasons, to begin such a campaign against tuberculosis as will stamp it out of Canada in a few years. In writing this report I have avoided using medical terms as far as possible so that the Government could, if it was thought well to do so, submit it to the sanitary authorities of districts in the country where public opinion has not been aroused on the subject.

I have to acknowledge much kindness at the hands of Lord Strathcona and Mount Royal, and also from Sir Francis Lascelles, the British Ambassador at Berlin.

All of which is respectfully submitted.

EDW. FARRELL, M.D.

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QUARANTINE.

CATTLE QUARANTINE.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, LL.D.
AGRICULTURIST	J. H. GRISDALE, B.AGR.
HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
ENTOMOLOGIST and BOTANIST	JAS. FLETCHER, LL.D
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, Nappan N.S.	R. ROBERTSON
HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, Brandon, Manitoba	S. A. BEDFORD
" " Indian Head, N.W.T.	ANGUS MACKAY
" " Agassiz, B.C.	THOS. A. SHARPE

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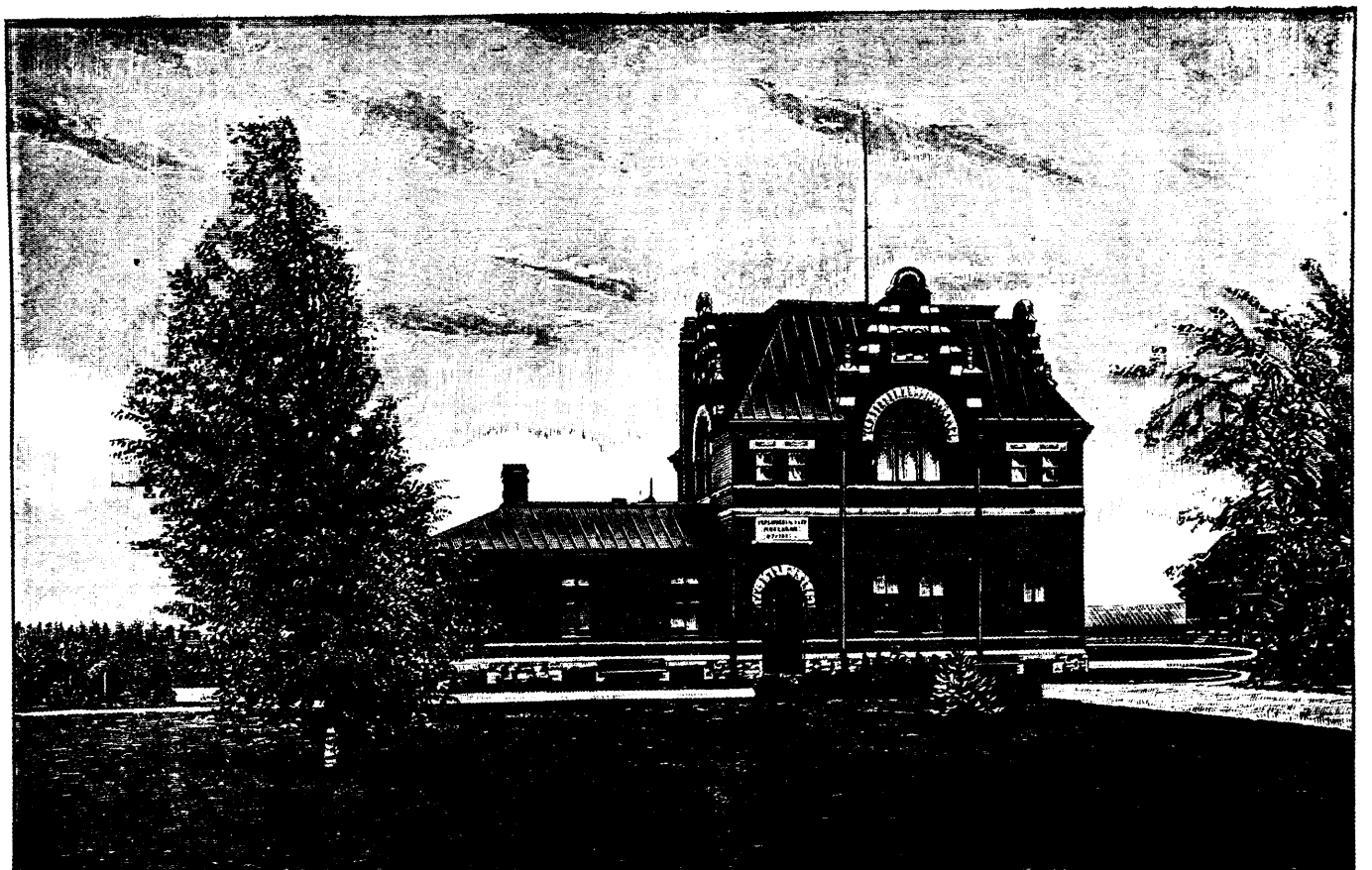

OFFICE BUILDING AND MUSEUM OF THE CENTRAL EXPERIMENTAL FARM.

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS.

——o——

OTTAWA, December 1, 1899.

SIR,—I take pleasure in submitting for your approval the thirteenth annual report of the work done, and in progress, at the several Experimental Farms.

In addition to my own report, you will find appended, reports from the following officers of the Central Experimental Farm : From the Agriculturist, Mr. J. H. Grisdale ; from the Horticulturist, Mr. W. T. Macoun ; from the Chemist, Mr. Frank T. Shutt, and from the Entomologist and Botanist, Dr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia ; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba, at Brandon ; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms ; also of scientific investigations in the chemical laboratory and the information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand made by the farmers throughout this country for the annual reports and other publications issued from the experimental farms, is a gratifying evidence of the desire for information among this class of the community, also of the high esteem in which these records of the work of the farms are held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit grower and that they may assist in advancing the interests of agriculture and horticulture in Canada.

I have the honour to be, sir,

Your obedient servant,

WM. SAUNDERS,

Director Experimental Farms.

To the Honourable

The Minister of Agriculture,

Ottawa.

ANNUAL REPORT

OF THE

EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR, WM. SAUNDERS, LL.D., F.R.S.C., F.L.S.

The particulars herewith submitted of the operations conducted at the five Dominion Experimental Farms during 1899 for the advancement of agriculture, horticulture and arboriculture will, it is hoped, include much which will be of interest and of value to Canadian farmers. During the thirteen years which have passed since these farms were established great changes for the better have taken place in farm life. The position of the farmer in the community has been improved and his work is now carried on with greater intelligence and with more financial success. In most instances the home has been made more attractive, the family surrounded with greater comforts and much of the drudgery formerly associated with the farmers' calling, has been lifted from his shoulders, by the introduction of methods of co-operation, by improvements in machinery and by the dissemination of valuable experience gained in reference to all branches of farm work in this country. He has thus received benefit from the work of others, has acquired a wider knowledge of the principles which underlie successful farming, and has thus been able to bring more skill to bear on the many sided work in which he has been engaged. The farmer now seldom sells coarse grains from his farm but converts these by feeding, into concentrated animal products and thus retains the elements of fertility which these crops have taken from the land and restores them to the soil in the manure. He thus supplies for future crops much plant food in a readily available form. The experience gained on the Experimental Farms widely disseminated in reports and bulletins has exercised an important influence in bringing about the changes and improvements referred to. In the planning and carrying out of the many experiments explained in the Annual Reports the special needs of farmers residing in the climates in which these farms are located have been carefully considered, and much efficient help has thus been rendered.

CROP RESULTS OF THE PAST SEASON.

The season of 1899 has been characterized by good crops over the greater part of the Dominion, and reference to the particulars of the crops harvested at the several experimental farms will show that the results obtained at these instititions are considerably above the average of the country. The success achieved has been due mainly to a more thorough preparation of the soil, greater care in the preserving and using of barnyard manure, the careful selection of well matured and plump seed of the most productive sorts and early sowing, all of which may easily be put in practice by the average farmer.

The results had in 1899 from the uniform trial plots of grain, fodder corn, roots and potatoes were published as heretofore early in the season in bulletin form, so that the particulars which might influence farmers in the choice of seed were in their hands for consideration in good season. The average results of a five years trial of all the more important sorts furnishes additional evidence in support of the view, that under uniform conditions some varieties are much more productive than others, and that this desirable tendency in some instances is so strong that it asserts itself under all the different climatic and soil conditions which obtain at the Central and Branch Experimental Farms. The relative earliness in ripening which under some conditions is almost as important as productiveness has been further investigated and the results reached confirm the views held by most careful students of this subject that as a rule any great increase in earliness in ripening of grain is accompanied by a decrease in yield.

EARLY, MEDIUM AND LATE SOWINGS.

The experiments which have now been continued for ten years to gain information as to the best time to sow, have furnished evidence so conclusive in favour of early sowing that it will probably not be thought necessary to continue these any longer.

VACANCY IN THE STAFF FILLED.

Early in the year the position of Agriculturist of the Central Experimental Farm which has remained vacant since the resignation of Prof. J. W. Robertson in 1896, was filled by the appointment of Mr. J. H. Grisdale. Mr. Grisdale takes charge of the stock, the dairy and the field crops. The experimental plots will remain under the charge of the Director.

NEW BUILDINGS.

An excellent new root house has been built during the year with substantial stone walls and a superstructure of wood two storeys high. The lower one has been arranged for the storage of the farm wagons, sleighs, &c., with a large room at one end for the distribution of samples of seed grain. The upper storey has been fitted for the storage of miscellaneous material and furnishes also a convenient place for preparing grain and other farm products for exhibition purposes. The size of this building, outside meauurement is 104 ft. by 34.

Two circular silos have also been built to take the place of the two square silos formerly used, which had become so much decayed as to be unfit for further service. The new silos are 16 ft. 10 in. by 30 feet and have capacity for the storage of about 125 tons of ensilage in each.

A suitable building has also been erected for the curing of tobacco, furnishing space sufficient for two or three acres of crop.

EXPERIMENTAL WORK

CONDUCTED AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, ONTARIO.

EXPERIMENTS WITH OATS.

The number of varieties of oats tested in the uniform trial plots during the season of 1899 was seventy-eight. These experiments have been conducted to gain information as to the relative yield, earliness and other characteristics of the several sorts. The soil was a heavy sandy loam mixed with clay, of good quality which received a dressing of barn-yard manure about 18 tons per acre in the spring of 1893. No fertilizer of any sort has been applied since. The previous crop was wheat. The land was gang-ploughed shallow in 1898 soon after harvest to start weed seeds and shed grain and ploughed again late in autumn about 8 inches deep. In the spring of 1899 it was disc-harrowed twice and harrowed twice with the smoothing harrow before sowing. The seed of all the varieties was sown on May 2, on plots of one-fortieth acre each, two bushels of seed were used per acre and the land was rolled after sowing, just before the grain came up. Among the varieties tested this year were the following 14 cross-bred sorts all of which have been produced on the Experimental Farms. Lawson, Olive, Oxford, Cromwell, Miller, Kendal, Medal, Milford, Russell, Master, Brandon, Holland, King and Pense.

OATS.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
1	Thousand Dollar	Aug. 4	94	40 to 47	Stiff	7 to 9½	Branching	74	4	33½	Considerably.
2	Lawson	" 11	101	48 to 54	"	9 to 11	Sided	68	28	31	Badly.
3	Golden Giant	" 11	101	46 to 50	"	8 to 10	"	68	8	30½	"
4	Holstein Prolific	" 7	97	44 to 48	"	7⅞ to 9½	Branching	67	22	33½	Slightly.
5	Poland	" 4	94	40 to 43	Medium	8 to 9½	"	67	2	33½	Badly.
6	New Zealand	" 15	105	46 to 50	Stiff	9 to 11	Sided	66	16	38	Slightly.
7	Danish Island	" 5	95	40 to 45	"	7½ to 9½	Branching	65	30	31½	"
8	Banner	" 7	97	46 to 50	"	8 to 10	"	65	30	30	"
9	American Triumph	" 7	97	40 to 44	"	6⅞ to 8	"	65	30	34½	"
10	American Beauty	" 7	97	44 to 47	Weak	8 to 10	"	64	24	27	Badly.
11	Columbus	" 5	95	42 to 47	"	7½ to 9	"	64	24	30	"
12	White Giant	" 7	97	42 to 46	Stiff	6½ to 8½	"	64	24	34	Slightly.
13	Prol. Blk. Tartarian	" 9	99	46 to 50	Weak	8 to 10	Sided	61	26	28⅝	Badly.
14	Mennonite	" 7	97	40 to 45	Medium	7½ to 9	Branching	61	6	33½	Slightly.
15	Mounted Police	" 7	97	44 to 48	Stiff	7½ to 9	"	61	6	30	Considerably.
16	Abyssinia	" 7	97	42 to 46	Medium	7 to 8½	Sided	60	..	35	"
17	Golden Tartarian	" 9	99	48 to 52	Stiff	8 to 10	Sided	60	..	30½	Badly.
18	Joanette	" 9	99	36 to 40	"	6 to 7⅞	Branching	59	14	34	Slightly.
19	Oderbruch	" 7	97	40 to 46	Medium	7½ to 9	Half-sided	59	14	31	Considerably.
20	Lincoln	" 7	97	40 to 46	Stiff	8½ to 10	Branching	58	28	28	"
21	Olive	" 8	98	45 to 49	Medium	7½ to 9	Half-sided	58	8	34	"

OATS.—TEST OF VARIETIES.—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre. Bush.	Yield per Acre. Lbs.	Weight per Bushel. Lbs.	Proportion Rusted.
				Inches.		Inches.					
22	Bavarian	Aug. 7	97	42 to 46	Stiff	7½ to 9	Branching	57	22	30	Slightly.
23	Winter Grey	" 3	93	45 to 48	Medium	7 to 9	"	57	2	39	Considerably.
24	Black Tartarian Imp	" 9	99	46 to 50	Weak	8 to 10	Sided	55	10	30	Badly.
25	Black Cluster	" 10	100	36 to 40	Stiff	6 to 7¾	Branching	54	24	31½	Slightly.
26	Wallis	" 4	94	38 to 42	"	8 to 9	"	54	..	29	Considerably.
27	Bayonet	" 7	97	43 to 47	Weak	8½ to 10	"	52	32	36½	"
28	Improved Ligowo Imp	" 6	96	46 to 49	Medium	8 to 9½	"	52	32	32¼	Badly.
29	Imp. Ligowo, C.E.F.	" 6	96	46 to 49	"	8 to 9½	"	52	12	33	"
30	Oxford	" 7	97	43 to 47	Stiff	7½ to 9	Half-sided	52	12	35½	Considerably.
31	Wide Awake	" 7	97	46 to 50	Medium	7½ to 9½	Branching	52	12	25	"
32	Early Maine	" 9	99	45 to 49	"	7½ to 9¾	"	51	26	31	"
33	Victoria Prize	" 4	94	38 to 42	Weak	6½ to 8	"	51	6	40	Slightly.
34	Early Archangel	" 4	94	40 to 46	Medium	8 to 10	"	51	6	35¼	"
35	Cromwell	" 8	98	44 to 50	Stiff	8 to 10	Half-sided	51	6	32	Considerably.
36	White Russian	" 7	97	46 to 49	Weak	8 to 10	Branching	50	20	30	"
37	Early Golden Prolific	" 7	97	44 to 48	Stiff	6 to 8¼	"	50	20	26½	"
38	Early Gothland	" 7	97	46 to 50	"	8 to 9½	Half-sided	50	20	33	"
39	Newmarket	" 7	97	46 to 50	"	7½ to 9	Branching	49	14	26	Slightly.
40	California Prol. Blk. Im	" 7	97	45 to 48	"	7 to 9	Sided	49	14	25½	Badly.
41	Improved American	" 7	97	48 to 52	"	8½ to 10	Branching	49	14	26¾	Slightly.
42	Salines Imp	" 8	98	46 to 50	"	7½ to 9½	"	48	8	27	Considerably.
43	Golden Beauty	" 6	96	48 to 52	Weak	8 to 10	"	48	8	26	"
44	Hazlett's Seizure	" 7	97	46 to 50	Stiff	8 to 10	"	48	8	29½	"
45	Liberty	" 8	98	45 to 50	"	8 to 10	"	48	8	28½	"
46	Buckbee's Illinois	" 10	100	46 to 50	"	8 to 10	"	47	22	29	"
47	Flying Scotchman	" 3	93	38 to 43	Weak	8 to 10½	"	47	22	29¾	"
48	Black Beauty	" 7	97	42 to 46	"	6½ to 8⅓	"	47	2	31½	"
49	Miller	" 7	97	42 to 46	Stiff	7½ to 9½	"	47	2	32½	"
50	Kendal	" 8	98	45 to 49	Weak	7 to 9	Hlf-br'nch	47	2	28½	"
51	Medal	" 8	98	50 to 54	Stiff	8½ to 10	Half-sided	47	2	29½	Considerably.
52	Siberian	" 8	98	44 to 50	"	8 to 10	Branching	47	2	28	"
53	California Prol. Blk.	" 7	97	43 to 48	Weak	6½ to 8½	Sided	45	30	26	"
54	Rosedale	" 5	95	46 to 50	"	7½ to 9	Half-sided	45	10	28¼	Badly.
55	White Schonen	" 8	98	45 to 50	Medium	7 to 9	Branching	45	10	29	Considerably.
56	Cream Egyptian	" 7	97	46 to 50	Weak	7½ to 9¼	Half-sided	45	10	30	Badly.
57	Milford	" 9	99	44 to 48	Stiff	7 to 9	"	44	24	29	Considerably.
58	White Wonder	" 2	92	40 to 43	Weak	7 to 9	Branching	44	4	39½	"
59	Russell	" 8	98	40 to 46	"	7½ to 9	Hlf-br'nch	43	18	31	"
60	Victoria	" 8	98	44 to 48	"	8½ to 9½	Branching	43	18	27	Badly.
61	Master	" 9	99	48 to 55	Stiff	9 to 11	Half-sided	43	18	31	"
62	Early Blossom	" 7	97	40 to 44	"	7½ to 9	"	41	26	34½	Slightly.
63	Abundance	" 7	97	46 to 50	Weak	8 to 9½	Branching	41	26	25	Considerably.
64	Scottish Chief	" 2	92	40 to 47	"	6 to 8½	"	41	26	29¼	"
65	Bonanza	" 3	93	40 to 44	"	7½ to 10	"	41	26	32	"
66	Rennie's Prize White	" 9	99	42 to 47	"	7 to 10	"	40	20	29½	"
67	Brandon	" 7	97	40 to 45	"	7½ to 9½	Half-sided	40	20	29	Badly.
68	Holland	" 9	99	42 to 48	Stiff	7 to 8½	Sided	40	..	27½	"
69	Early Dawson	" 3	93	39 to 42	Weak	8 to 10	Branching	39	14	37	Considerably.
70	King	" 7	97	45 to 50	Medium	8 to 9½	"	39	14	29½	"
71	Black Mesdag	" 3	93	38 to 42	Weak	8 to 10	"	38	28	27½	Badly.
72	Mortgage Lifter	" 4	94	40 to 45	Stiff	7½ to 9	"	38	28	32½	Considerably
73	Coulommiers	" 8	98	45 to 49	"	6¾ to 8	"	35	30	32½	"
74	Welcome	" 2	92	36 to 39	Weak	6 to 8	"	35	10	29	"
75	Pense	" 8	98	40 to 45	Medium	7 to 9	Half-sided	35	10	34½	Badly.
76	Imported Irish	" 2	92	40 to 44	Weak	7 to 9	Branching	34	24	38	Considerably.
77	Prize Cluster	" 4	94	36 to 40	"	6 to 8	"	31	26	32½	"
78	Doncaster Prize	" 9	99	44 to 48	Stiff	7½ to 9½	"	25	10	26¾	"

SESSIONAL PAPER No. 8a

EXPERIMENTS WITH BARLEY.

Fifty-six varieties of barley have been under trial in the uniform test plots during the past season. Twenty-four of these were two-rowed sorts and thirty-two were six-rowed. The land chosen for the barley plots was adjoining that used for the trial plots of oats. The soil was similar and the preparation and treatment of the land the same. The previous crop was wheat. The two-rowed varieties were all sown on May 1 at the rate of 2 bushels of seed per acre and the six-rowed sorts on May 2, using $1\frac{3}{4}$ bushels of seed per acre. The size of the plots was $\frac{1}{40}$th acre each. Among the varieties tested this year are included the following two-rowed and six-rowed sorts, all of which are hybrids which have been produced at the Experimental Farms. Two-rowed sorts, 17, as follows: Sidney, Beaver, Kirby, Fulton, Leslie, Monck, Nepean, Logan, Dunham, Clifford, Victor, Jarvis, Pacer, Gordon, Bolton, Rigid and Harvey. Six-rowed sorts, 17, namely, Claude, Pioneer, Royal, Nugent, Trooper, Summit, Yale, Vanguard, Stella, Argyle, Mansfield, Garfield, Brome, Phœnix, Empire, Albert and Surprise.

Two-rowed Barley—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				Inches.		Inches.	Bush. Lbs.	Lbs	
1	Sidney	Aug. 3	94	38 to 41	Medium	3 to 3½	50 ..	50	Slightly.
2	Beaver	" 3	94	33 to 36	Weak	3 to 4½	49 8	50½	"
3	French Chevalier	" 4	95	33 to 37	"	3 to 5	47 24	49	Considerably.
4	Kirby	July 31	91	34 to 38	"	2½ to 3	47 4	49	Slightly.
5	Danish Chevalier	Aug. 4	95	35 to 38	"	3½ to 5	47 4	49	Considerably.
6	Canadian Thorpe	" 2	93	37 to 41	Stiff	3 to 4	46 32	50	Slightly.
7	Fulton	July 29	89	36 to 39	"	3 to 3½	46 32	49½	"
8	Leslie	" 29	89	32 to 35	Weak	3 to 3½	45 40	50	"
9	Monck	Aug. 4	95	39 to 41	Stiff	3½ to 4½	45 20	48	"
10	Nepean	July 29	89	40 to 44	Weak	2½ to 3½	45 20	49¼	"
11	Logan	" 29	89	40 to 43	Stiff	2½ to 3½	45 20	49	"
12	Dunham	" 29	89	39 to 42	"	3 to 3½	45 ..	48	"
13	Clifford	" 29	89	40 to 44	"	3 to 4	44 28	51½	"
14	Victor	" 30	90	37 to 40	Medium	3 to 4	44 28	49½	"
15	Jarvis	" 29	89	40 to 45	Stiff	3 to 4½	44 8	51	"
16	Pacer	" 29	89	37 to 40	"	3 to 4	41 42	48½	"
17	Gordon	" 29	89	39 to 42	"	3 to 3½	40 40	49¾	"
18	Bolton	" 29	89	36 to 39	Medium	2½ to 4	38 16	49	"
19	Rigid	" 31	91	34 to 37	Stiff	3 to 4	36 42	49½	"
20	Kinver Chevalier	Aug. 7	98	34 to 38	Weak	3 to 4½	35 20	48	Considerably.
21	Improved Thanet	" 7	98	35 to 39	"	3½ to 5	33 16	50	Slightly.
22	Newton	" 7	98	32 to 36	Stiff	3 to 4	30 40	52	"
23	Harvey	Ju 29	89	36 to 39	"	3 to 4½	30 ..	50½	"
24	Prize Prolific	Aug. 8	99	36 to 40	Weak	3½ to 4¾	28 36	49	Badly.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				Inches.		Inches.	Bush. lbs.	Lbs	
1	Common	July 25	84	32 to 35	Medium	2½ to 3	52 24	47½	Slightly.
2	Claude	" 28	87	29 to 32	Weak	2½ to 3	52 4	48¼	Considerably.
3	Pioneer	" 29	88	35 to 38	Stiff	2½ to 3	50 40	50	Slightly.
4	Petschora	" 25	84	34 to 38	Weak	2½ to 3¼	50 40	48¾	"
5	Rennie's Improved	" 25	84	35 to 39	"	2 to 2¾	50 20	49	"
6	Royal	" 25	84	30 to 33	Stiff	2½ to 3	50 ..	50	"
7	Nugent	" 28	87	33 to 37	"	2 to 3	50 ..	48½	"
8	Trooper	" 26	85	33 to 36	"	2 to 2¾	49 8	49	"
9	Oderbruch	" 27	86	34 to 37	"	2 to 2½	49 8	49	"
10	Summit	Aug. 1	91	36 to 39	Medium	2½ to 3	48 16	50	"
11	Odessa	July 26	85	32 to 35	Stiff	2½ to 3	47 44	48¾	"
12	Yale	Aug. 1	91	35 to 38	Weak	2½ to 3	47 24	49	"
13	Vanguard	July 26	85	36 to 39	Stiff	2 to 3	47 4	48½	"
14	Stella	" 25	84	33 to 36	"	3 to 3½	46 32	50	"
15	Hulless Black	" 26	85	28 to 30	Weak	1½ to 2	46 32	58	"
16	Argyle	" 28	87	33 to 36	"	2½ to 3	46 12	48½	"
17	Blue (Long Head)	" 28	87	34 to 37	"	2½ to 3½	46 12	47½	"
18	Mansfield	" 28	87	34 to 37	Stiff	2½ to 3½	45 20	49	"
19	Mensury	" 29	88	39 to 42	Medium	3 to 4	44 8	49½	"
20	Garfield	" 28	87	35 to 38	Stiff	2½ to 3	43 16	48	"
21	Blue (Short Head)	Aug. 8	98	28 to 32	"	1½ to 2½	42 4	46½	"
22	Success	July 19	78	36 to 40	"	2½ to 3	41 32	46	"
23	Brome	Aug. 1	91	33 to 37	"	2 to 2½	41 12	48	"
24	Champion	July 26	85	42 to 45	Medium	2½ to 3½	40 40	46½	"
25	Phoenix	" 26	85	37 to 40	Weak	1¾ to 2¾	40 ..	47	"
26	Monde Hulless	" 20	79	31 to 34	"	2 to 2½	38 36	61½	"
27	Baxter	" 28	87	36 to 39	Medium	1¾ to 2¼	38 16	49	"
28	Excelsior	" 21	80	38 to 42	Stiff	3 to 3½	36 32	47	"
29	Hulless White	" 26	85	30 to 32	Weak	2 to 3	35 40	59	"
30	Empire	" 27	86	33 to 36	"	2 to 2½	34 8	48¾	"
31	Albert	" 29	88	39 to 42	Stiff	2 to 3	34 8	48½	"
32	Surprise	" 29	88	31 to 44	"	3 to 3½	30 40	48	"

EXPERIMENTS WITH FALL WHEAT.

The number of varieties of fall wheat under trial during the past season was twenty-five. These were all sown in plots of one-fortieth of an acre each on sandy loam soil on September 9, 1898. The winter was very unfavourable for this crop. The ground was bare of snow during portions of the early winter months when the temperature was low. In the spring of 1899 all the plots were found to be so badly winter-killed that they were ploughed under.

EXPERIMENTS WITH SPRING WHEAT.

The number of varieties of spring wheat under trial during the past season was sixty-five. The land used for these tests was also adjoining the oat plots but the soil was somewhat heavier and contained a larger proportion of clay. The preparation and treatment of the land was the same. The previous crop was oats. The size of the plots was one-fortieth of an acre each and all were sown on April 28 and 29, at the rate of 1½ bushels of seed per acre. The land was rolled before the grain came up The varieties tested this year included the following 41 cross-bred sorts, all of which were originated on the experimental farms: Preston, Laurel, Vernon, Captor, Stanley, Percy, Allen, Rideau, Admiral, Beauty, Progress, Weldon, Crown, Harold, Essex, Huron, Dawson, Blenheim, Cartier, Alpha, Chester, Clyde, Benton, Hastings, Bishop, Countess, Cassel, Fraser, Ebert, Crawford, Angus, Advance, Dufferin, Blair, Mason, Plumper, Early Riga, Dawn, Campbell, Byron and Norval.

Spring Wheat—Test of Varieties.

Name of Variety.	Date of Ripening.	Number of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
			In.		In.		Bush.	Lbs.	Lbs.	
Preston	Aug. 4	98	40—43	Stiff	3 —3½	Bearded	33	20	61	Slightly.
Wellman's Fife	" 9	102	46—50	"	3½—4½	Beardless.	32	40	60	"
Hungarian	" 5	99	38—42	"	3½—4	Bearded	31	20	62	"
Emporium	" 7	101	44—48	Weak	3½—4½	"	31	..	58½	Considerably.
Roumanian	" 12	106	42—46	Stiff	2½—3½	"	30	40	64	Slightly.
Rio Grande	" 7	101	44—48	Weak	3½—4½	"	29	..	61½	Considerably.
Colorado	" 5	99	40—44	Stiff	2½—3	"	28	20	62½	Slightly.
Laurel	" 8	102	40—44	"	3 —4	Beardless.	28	20	59	"
Pringle's Champlain	" 7	101	40—43	"	3 —4	Bearded	28	..	62	"
Monarch	" 8	102	44—48	"	3½—4½	Beardless.	27	..	60	"
White Connell	" 9	103	40—45	"	3 —4	"	27	..	61¾	"
White Fife	" 8	102	36—40	"	3 —4	"	27	..	61	"
White Russian	" 8	101	44—48	"	3½—4½	"	26	40	59	"
Pride of Baropa	" 9	102	44—48	Weak	2½—3	"	26	40	60½	Considerably.
Vernon	" 4	98	40—44	Stiff	3 —3½	Bearded	26	..	60½	"
Captor	" 8	102	45—49	"	3 —4	Beardless.	25	40	59	Slightly.
Stanley	" 5	99	38—41	"	2½—3½	"	25	20	61¼	"
Red Fern	" 14	108	46—50	"	3½—4½	Bearded	25	20	61	"
Percy	" 7	100	45—49	Medium	3½—4½	Beardless.	25	20	60	"
Allen	" 5	99	38—42	Weak	2½—3	"	25	20	60	Badly.
Rideau	" 2	95	38—42	Stiff	2½—4	"	25	20	59	Slightly.
Admiral	" 9	103	40—44	"	2½—3½	"	25	..	61	"
Beauty	" 7	101	40—43	"	3 —4½	"	24	40	58	Considerably.
Goose	" 12	106	42—46	"	2½—3½	Bearded	24	20	64	Slightly.
Dion's	" 14	108	46—50	"	3½—4½	"	24	20	61½	"
Progress	" 3	96	38—41	"	2 —3	Beardless.	24	20	61	"
Weldon	" 9	102	46—50	Medium	2½—3½	"	24	20	60½	Considerably.
Crown	" 7	101	40—43	Stiff	3 —4	Bearded	24	..	60½	Slightly.
Harold	July 26	91	35—38	Weak	2 —3	"	24	..	57	Badly.
Essex	Aug. 10	103	45—49	Stiff	3 — 4	Beardless.	24	..	59½	Slightly.
Huron	" 4	98	34—38	"	2½—3	Bearded	23	20	62½	"
Dawson	" 9	102	30—34	Weak	2½—3½	Beardless.	23	20	61	"
Blenheim	" 7	101	40—44	Stiff	3 —4	Bearded	23	..	60½	"
Cartier	" 6	100	38—42	Weak	2 —3½	"	22	40	58	Considerably.
Campbell's W. Chaff	" 9	103	40—43	Stiff	2 —3	Beardless.	22	40	57½	Slightly.
Ladoga	" 1	95	35—38	"	3 —3½	Bearded	22	40	59½	"
Alpha	" 8	101	40—45	"	2½—3½	Beardless.	22	40	61	"
Chester	" 6	100	35—40	"	3 —3½	"	22	20	60½	"
Clyde	" 8	102	40—45	"	3½—4½	"	22	..	60½	"
Benton	" 4	97	40—44	Medium	3 —3½	"	21	..	58	"
Hastings	" 3	96	40—43	Stiff	2 —3½	"	21	..	61	Considerably.
Bishop	" 2	95	40—43	"	2 —3	"	20	40	61	"
Countess	" 3	96	38—42	"	2½—3	"	20	40	61	Slightly.
Cassel	" 8	101	44—48	"	3½—4	"	20	..	60½	"
Fraser	" 1	95	39—41	Medium	2 —3	Bearded	19	40	57½	Considerably.
Red Swedish	" 5	99	38—42	Weak	2 —3½	"	19	20	56	Badly.
Red Fife	" 9	102	40—43	Stiff	3 —4	Beardless.	18	40	61	Slightly.
Ebert	" 3	96	35—40	Weak	2½—4	"	18	40	58½	Considerably.
Crawford	" 9	102	44—48	Stiff	2½—3½	"	18	20	58½	"
Beaudry	" 7	101	40—43	Weak	2½—3	Bearded	17	20	60½	"
Angus	" 8	101	42—46	Stiff	2½—3½	Beardless.	17	20	60½	Slightly.
Advance	" 7	101	46—50	"	3 —3½	Bearded	17	..	61	"
Dufferin	" 1	95	39—42	Weak	2½—3½	"	16	40	56¾	Considerably.
Blair	" 7	100	40—44	"	2½—3½	Beardless.	16	20	60	"
Herisson Bearded	" 7	101	36—40	Stiff	1½—2½	Bearded.	16	..	62	"
Black Sea	" 1	95	38—41	"	3 —3½	"	16	..	59½	Slightly.
Mason	" 6	100	40—45	"	2½—3½	Beardless.	16	..	59	Considerably.
Plumper	" 5	99	30—34	Weak	2 —3	Bearded	15	..	59½	Badly.
Early Riga	July 29	92	37—40	"	2½—3½	Beardless.	15	..	54	Considerably.
Dawn	Aug. 4	98	30—34	"	1½—2½	"	15	..	57½	"
Campbell	" 8	101	40—45	Stiff	3 —3½	"	15	..	56½	"
Byron	" 5	98	34—38	Weak	2½—3½	Bearded	14	40	56	"
Norval	" 7	101	34—37	"	1¾—2¼	"	11	20	58½	"
Golden Drop	" 5	98	33—36	Stiff	2 —3	Beardless.	9	20	57	"
Gehun	" 1	95	30—33	Weak	1½—2½	Bearded	8	40	56½	"

EXPERIMENTS WITH PEASE.

Sixty varieties of pease were sown on the trial grounds last year on plots of one-fortieth of an acre each. Many of them made good growth and promised fair crops. When most of the plots had been cut and were nearly ready to house, a sudden and violent wind storm arose on the 21st of August, which in a few moments carried the product of a large proportion of the plots to the lower end of the field where they were so mixed that it was impossible to separate them. Under these circumstances no comparisons can be made this year of the yields of the many varieties under trial.

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

The tests here recorded which comprise six successive sowings of one week apart were all conducted on similar land on $\frac{1}{20}$th acre plots, the plots adjoining each other. The soil was a sandy loam of fair quality which received a dressing of barn-yard manure, about 12 tons per acre in the autumn of 1895 when it was ploughed under. The land also received an application of unleached wood ashes in November, 1897, of about 125 bushels to the acre. No fertilizers have been applied since. The previous crop was grain in experimental plots, the different kinds of grain being sown in rotation. The land was ploughed very shallow shortly after harvest to start weed seeds, and again later in the autumn about 8 inches deep. In the spring a sufficient quantity of the land for the first set of plots was thoroughly stirred with a two-horse cultivator which loosened the soil about 6 inches deep, and harrowed twice with the smoothing harrow before sowing. The first sowing was made as soon as the land was in fit condition to receive the seed. The oats were sown at the rate of 2 bushels per acre, the Canadian Thorpe barley 2 bushels, the Odessa 1¾, the spring wheat 1½ bushels, the Mummy pease 2½ bushels, and the Golden Vine 2 bushels per acre. A sufficient portion of the land for the subsequent sowings was worked up from week to week as it was needed, in the same manner as that for the first set of plots, and in this way any weeds which had started were killed, and each series of plots were given at the outset, the same chance as far as condition of soil was concerned.

OATS AT DIFFERENT DATES.

Name of Variety.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Length of Straw.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.	Rusted.
				Inches.	Lbs.	Bush. Lbs.	Lbs.	
Banner	April 25	Aug. 5	102	44 to 48	3,290	50 30	.....	Very slightly
"	May 2	" 9	99	48 to 50	5,070	66 6	.....	" "
"	" 9	" 12	95	38 to 40	3,230	54 14	.....	" "
"	" 16	" 16	92	48 to 50	4,620	57 22	.....	Badly.
"	" 23	" 18	87	44 to 48	3,440	42 32	.....	"
"	" 30	" 22	84	44 to 46	2,530	40 20	.....	"
Abundance	April 25	Aug. 5	102	44 to 46	2,950	43 8	.....	Slightly.
"	May 2	" 7	97	44 to 48	5,070	55 10	.....	"
"	" 9	" 10	93	36 to 40	2,760	51 6	.....	"
"	" 16	" 15	91	44 to 48	4,420	49 14	.....	Badly.
"	" 23	" 16	85	44 to 46	2,560	39 14	.....	"
"	" 30	" 20	82	44 to 46	2,410	37 12	.....	"

SPRING WHEAT SOWN AT DIFFERENT DATES.

Name of Variety.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Length of Straw.	Weight of Straw per Acre.	Yield of grain per Acre.	Weight per Bushel.	Rusted.
				Inches.	Lbs.	Bush. Lbs.		
Red Fife	April 25	Aug. 11	108	20 to 24	2,420	8 50	60¼	Badly.
"	May 2	" 19	109	44 to 48	4,610	23 30	59½	Slightly.
"	" 9	" 24	107	44 to 46	3,700	16 10	60	Considerably.
"	" 16	" 25	101	44 to 46	3,860	12 30	58¼	"
"	" 23	" 28	97	40 to 44	2,390	12 10	60	"
"	" 30	" 31	93	30 to 36	2,070	8 10	58¼	Badly.
Stanley	April 25	" 9	106	18 to 24	1,730	7 30	60	"
"	May 2	" 16	106	40 to 46	3,380	20 30	59½	Slightly.
"	" 9	" 18	101	40 to 46	3,470	12 30	60	Badly.
"	" 16	" 19	95	40 to 42	3,390	11 10	60	"
"	" 23	" 22	91	38 to 40	2,250	10 10	58¾	Considerably.
"	" 30	" 28	90	30 to 38	2,219	6 50	60¼	Badly.

BARLEY SOWN AT DIFFERENT DATES.

Canadian Thorpe	April 25	July 29	95	30 to 36	2,350	26 2	50¼	Slightly.
"	May 2	Aug. 4	94	36 to 40	4,010	43 6	50	"
"	" 9	" 9	92	36 to 40	1,810	28 26	49½	"
"	" 16	" 11	87	48 to 52	2,890	34 18	50¼	Very slight y.
"	" 23	" 15	84	36 to 38	2,230	30 10	49¾	"
"	" 30	" 23	83	36 to 38	2,470	29 8	49	Considerably.
Odessa	April 25	July 26	92	30 to 39	2,640	23 16	50¼	Slightly.
"	May 2	" 31	90	36 to 39	3,840	47 4	49¾	Very slightly.
"	" 9	Aug. 7	90	32 to 36	1,640	26 12	48½	"
"	" 16	" 9	85	48 to 50	2,770	32 14	48¾	None.
"	" 23	" 12	81	34 to 36	2,150	32 34	47	Very slightly.
"	" 30	" 16	76	32 to 36	2,380	28 26	46	Slightly.

PEASE SOWN AT DIFFERENT DATES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.
				Inches.	Lbs.	Bush. Lbs.	Lbs.
Mummy	April 25	Aug. 13	110	48 to 60	3,310	32 40	63½
"	May 2	" 16	106	60 to 66	4,110	34 50	62½
"	" 9	" 20	103	52 to 60	4,050	33 30	63½
"	" 16	" 25	101	52 to 60	3,800	27 30	63½
"	" 23	" 27	96	52 to 60	4,230	23 10	63½
"	" 30	Sept. 2	95	48 to 52	2,310	19 30	63½
Golden Vine	April 25	Aug. 16	113	60 to 72	4,590	36 10	63
"	May 2	" 18	108	66 to 72	4,240	36 40	63½
"	" 9	" 22	105	66 to 72	4,340	33 40	63½
"	" 16	" 24	105	60 to 70	3,950	28 50	63½
"	" 23	" 31	100	60 to 69	4,190	26 10	63½
"	" 30	Sept. 5	98	52 to 60	2,690	20 40	63½

SUMMARY OF RESULTS OF EARLY, MEDIUM AND LATE SOWINGS FOR THE WHOLE PERIOD.

The following are the average crops which have been obtained during the full period these tests have been continued, that is ten years with the oats, barley and spring wheat, and five years with pease :—

Tests Continued for Ten Years.								Tests Continued for Five Years.		
Oats.	Average Yield per Acre.		Barley.	Average Yield per Acre.		Spring Wheat.	Average Yield per Acre.		Pease.	Average Yield per Acre.	
	Bus.	Lbs.		Bus.	Lbs.		Bus.	Lbs.		Bus.	Lbs.
1st Sowing....	53	9	1st Sowing....	38	21	1st Sowing.....	*17	59	1st Sowing....	30	26
2nd "	59	18	2nd "	44	9	2nd "	20	30	2nd "	33	57
3rd "	50	25	3rd "	33	26	3rd "	14	8	3rd "	32	48
4th "	45	32	4th "	31	24	4th "	12	12	4th "	29	56
5th "	40	7	5th "	26	3	5th "	10	18	5th "	26	18
6th "	31	30	6th "	23	35	6th "	8	33	6th "	23	46

*The first sowing of spring wheat in these plots in 1899 was so badly injured by standing water during the extremely wet weather in July that the returns in this connection would be misleading. The figures given in this instance cover only 9 years test.

SUMMARY.

The results of this ten years' trial of early, medium and late sowings of oats, barley and spring wheat should be carefully noted by every farmer in Ontario and Quebec. The experiments have been conducted on a piece of land very uniform in character with the same preparation and treatment and the same seed has been used in each case. There seems no reason to doubt that the results which have been had have been almost wholly due to the period of seeding. They show that the period when the second sowing in these experiments has been made, that is about one week after the ground is in that condition that sowing is practicable, is the most favourable time for the sowing of these crops at Ottawa.

LOSS IN CROP OF OATS BY DELAY IN SOWING.

These experiments show that in the sowing of oats a delay of one week beyond the time spoken of has caused an average loss of over 15 per cent, two weeks a loss of 22 per cent, three weeks a loss of over 32 per cent, and a delay of four weeks has resulted in an average loss of about 48 per cent of the crop.

LOSS IN CROP OF BARLEY BY DELAY IN SOWING.

With barley a delay of one week in sowing beyond the most favourable period shows an average loss of 23 per cent, a delay of two weeks a loss of more than 27 per cent, three weeks about 40 per cent and a delay of four weeks has entailed an average loss of nearly 46 per cent.

LOSS IN CROP OF SPRING WHEAT BY DELAY IN SOWING.

In the case of spring wheat a delay of one week beyond the period which these experiments show to have been most favourable has entailed a loss of over 30 per cent, two weeks fully 40 per cent, three weeks nearly 50 per cent, and a delay in sowing of four weeks beyond the time referred to has involved an average loss of over 56 per cent.

LOSS IN CROP OF PEASE BY DELAY IN SOWING.

The results obtained from the five years' trial of early, medium and late sowings of pease show that about a week after the ground is in that condition to make seeding practicable is the most favourable for this crop. That a delay of one week beyond this

period has caused an average loss of about 4 per cent, a delay of two weeks about 12 per cent, three weeks about 22 per cent, and a delay of four weeks has lessened the crop on an average over 30 per cent.

These experiments have now been continued long enough to demonstrate most conclusively how important it is that farmers should sow all their grain crops promptly and if possible within ten days after the ground,—prepared by ploughing in the autumn,—is ready for seeding. If this practice were to become universal the average crop in these provinces would be very much increased.

EXPERIMENTS WITH INDIAN CORN.

Thirty-three varieties of Indian corn were tested during the season of 1899 side by side on fairly uniform land. The soil was a sandy loam of medium quality which received a dressing of barn-yard manure, about twelve tons to the acre during the winter of 1898-9. This was placed on the frozen land fresh from the barn-yard in small heaps of about one-third of a cart load each and spread and ploughed under in the spring. The previous crop was spring wheat. The land was gang-ploughed shallow shortly after harvest to start weed seeds and shed grain, and ploughed again in the autumn 7 or 8 inches deep. In the spring of 1899, after the manure was ploughed under, it was twice harrowed with the smoothing harrow before sowing. The corn was sown with the seed drill in rows 3 feet apart, and subsequently the plants were thinned so as to leave them from 6 to 8 inches apart in the rows.

The varieties were all sown on May 25, and were cut for ensilage on September 14. The yield per acre has been calculated from the weight of the crop cut from two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in rows.
			Inches.		Sept. 14.	Tons. Lbs.
1	Angel of Midnight	Strong	96 to 108	Leafy	Late milk	25 600
2	Red Cob Ensilage	Very strong.	108 to 120	"	Watery	24 1,720
3	Early Mastodon	"	120 to 132	"	Late milk	24 1,500
4	Extra Early Szekley	Strong	72 to 84	Very leafy	Glazed	22 1,980
5	White Cap Yellow Dent	"	108 to 120	"	Late milk	22 1,320
6	Canada White Flint	"	90 to 102	Leafy	"	22 1,100
7	Sanford	"	84 to 96	"	"	20 700
8	Eureka	"	102 to 114	"	Early milk	20 700
9	Iowa Silver Mine	Very strong.	114 to 126	"	Watery	20 260
10	Champion White Pearl	Strong	96 to 108	Fairly leafy.	Early milk	19 1,600
11	Country Gentleman	"	72 to 84	Leafy	Late milk	19 1,160
12	Selected Leaming	"	120 to 132	"	"	19 610
13	Early Butler	"	108 to 120	"	Doughy	19 500
14	Cloud's Early Yellow	"	108 to 120	"	Late milk	18 1,400
15	Evergreen Sugar	"	108 to 120	"	Early milk	18 960
16	Compton's Early	"	84 to 108	"	Late milk	18 300
17	Iowa Gold Mine	Very strong.	108 to 120	"	Early milk	18 300
18	Giant Prolific Ensilage	"	108 to 120	"	"	17 100
19	Rural Thoroughbred White Flint	Strong	96 to 108	Very leafy	"	16 1,000
20	Mammoth Cuban	"	84 to 96	"	Late milk	15 1,900
21	Pride of the North	"	96 to 108	"	Early milk	15 1,900
22	Pearce's Prolific	"	96 to 108	Fairly leafy.	Late milk	15 800
23	Kendall's Early Giant	Medium	66 to 78	Leafy	Early milk	15 360
24	North Dakota White	Strong	90 to 102	Fairly leafy.	Late milk	15 250
25	Mammoth Eight-rowed Flint	"	84 to 102	Leafy	"	14 1,700
26	Black Mexican	"	84 to 96	"	"	14 600
27	Ruby Mexican	"	84 to 96	"	"	14 270
28	Longfellow	"	96 to 108	"	Glazed	13 1,500
29	King of the Earliest	"	108 to 120	"	Late milk	13 400
30	Extra Early Huron	"	90 to 108	Fairly leafy.	Glazed	12 1,300
31	Early Yellow Long Eared	Weak	60 to 72	"	"	12 1,300
32	Yellow Six Weeks Extra	Medium	72 to 84	"	"	12 200
33	Mitchell's Extra Early	"	60 to 72	"	"	9 1,800

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties of Indian corn were chosen for this test, the Longfellow, Selected Leaming and Champion White Pearl. These were sown in rows at four different distances, namely, 21, 28, 35 and 42 inches apart. The object of the experiment was to gain information as to the weight of crop produced when sown under these different conditions. The soil was a sandy loam of fair quality and the previous crop was wheat. The land was ploughed in 1898, soon after harvest, very shallow to start weed seeds and shed grain, and ploughed again later in the autumn about 7 inches deep. During the winter of 1898-9 barn-yard manure was applied to this land in the proportion of about 12 tons per acre. The manure was taken fresh from the barn-yard, and distributed over the land in small piles of about one-third of a cart load each to avoid fermentation. In the spring of 1899 the manure was spread and ploughed under about 6 inches deep and harrowed twice with the smoothing harrow before sowing. The corn was sown with the seed drill on May 25, and was cut for ensilage on September 14. Four rows were planted in each case, and the yield per acre has been estimated from the weight obtained from the two inside rows, each 66 feet long.

Particulars of the results are given in the following table:—

Name of Variety.	Width of Row.	Character of Growth.	Height when Cut.	Condition when Cut.	Weight per Acre.	
	Inches.		Feet.		Tons.	Lbs.
Longfellow	21	Strong	6 to 7	Early milk	14	294
"	28	"	6½ " 7½	"	11	654
"	35	Very strong	6½ " 8	Late milk	13	31
"	42	Strong	7 " 8	"	13	112
Selected Leaming	21	"	7 " 8	Early milk	15	1,302
"	28	"	7½ " 8½	"	12	346
"	35	Very strong	8 " 9	Late milk	15	1,585
"	42	"	8 " 9	"	14	1,184
Champion White Pearl	21	Medium	7 " 8	Early milk	15	738
" "	28	Strong	8 " 9	"	14	1,140
" "	35	Very strong	8½ " 9½	Late milk	11	1,771
" "	42	"	9 " 10	"	14	1,760

EXPERIMENTS WITH TURNIPS.

Twenty-five varieties of field turnips were tested during the past season, all sown side by side on similar land. The soil was a sandy loam of medium quality, which was manured during the winter of 1898–9, with about 12 tons of barn-yard manure per acre. The manure was taken fresh from the barn-yard during the winter, and put on the frozen land in small piles of about one-third of a cart load each and spread in the spring, when it was ploughed under about 6 or 7 inches deep and harrowed twice with a smoothing harrow. The land was then made up in drills 2 feet apart, and subsequently rolled with a heavy land roller, which flattened the drills nearly one half, leaving a firm seed bed. The seed was sown at the rate of 3 pounds per acre. Three sowings were made of each variety, the first on May 12, second on May 26, and the third on June 8, and all were pulled on October 14. The yield per acre has been calculated from the weight of roots pulled from one row 66 feet in length.

These turnips were sown in single rows across a field of 400 feet or more in length which gave opportunity for further experiment after the row of 66 feet, used to ascertain the yield on October 14, had been pulled. A portion of these roots were left in the

ground until later, to gain information as to what advantage, if any, arises from leaving turnips in the ground after the middle of October. All the varieties under test were so left until November 3, which allowed twenty-one days for additional growth. The results were as follows :—

TURNIPS.—TEST OF VARIETIES.—YIELD FROM FIRST PULLING, OCTOBER 14.

No.	Name of Variety.	1st Sowing.	2nd Sowing.	1st Sown Plots Pulled.	2nd Sown Plots Pulled.	Yield per Acre, 1st Sowing.	Yield per Acre, 2nd Sowing.	Yield per Acre, 3rd Sowing.
						Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
1	Purple Top Swede	May 12.	May 26.	Oct. 14.	Oct. 14.	34 1,300	30 1,050	23 695
2	Drummond Purple Top	" 12.	" 26.	" 14.	" 14.	34 310	21 570	27 450
3	Bangholm Selected	" 12.	" 26.	" 14.	" 14.	33 1,980	26 1,460	26 1,695
4	Skirvings	" 12.	" 26.	" 14.	" 14.	33 1,980	30 1,710	26 800
5	Prize Winner	" 12.	" 26.	" 14.	" 14.	33 1,980	26 1,790	21 1,895
6	Champion Purple Top	" 12.	" 26.	" 14.	" 14.	33 1,485	30 720	20 95
7	Champion Purple Top (Vil.)	" 12.	" 26.	" 14.	" 14.	33 1,320	27 1,440	24 730
8	Imperial Swede	" 12.	" 26.	" 14.	" 14.	33 990	27 120	23 1,685
9	Hardy Goliath	" 12.	" 26.	" 14.	" 14.	33 665	24 510	20 95
10	Jumbo	" 12.	" 26.	" 14.	" 14.	33 660	27 110	24 580
11	West Norfolk Red Top	" 12.	" 26.	" 14.	" 14.	33 165	30 720	23 1,190
12	Halewood's Bronze Top	" 12.	" 26.	" 14.	" 14.	33 165	30 1,050	23 1,190
13	Hall's Westbury	" 12.	" 26.	" 14.	" 14.	33	32 680	27 285
14	Mammoth Clyde	" 12.	" 26.	" 14.	" 14.	33	23 860	24 1,995
15	East Lothian	" 12.	" 26.	" 14.	" 14.	32 680	24 510	21 900
16	Shamrock Purple Top	" 12.	" 26.	" 14.	" 14.	32 680	27 1,020	23 860
17	Perfection Swede	" 12.	" 26.	" 14	" 14.	30 1,380	28 1,760	22 550
18	Prize Purple Top	" 12.	" 26.	" 14.	" 14.	30 1,050	24 1,500	21 1,395
19	New Arctic	" 12.	" 26.	" 14.	" 14.	30 60	25 820	23 365
20	Marquis of Lorne	" 12.	" 26.	" 14.	" 14.	29 1,400	22 880	18 960
21	Carter's Elephant	" 12.	" 26.	" 14.	" 14.	26 690	24 1,500	18 85
22	Oval	" 12.	" 26.	" 14.	" 14.	24 840	21 900	21 1,065
23	Giant King	" 12.	" 26.	" 14.	" 14.	21 1,890	21 900	20 1,250
24	Sutton's Champion	" 12.	" 26.	" 14.	" 14.	21 1,130	18 1,950	19 1,105
25	Hartley's Bronze	" 12.	" 26.	" 14.	" 14.	18 630	19 1,600	26 800
	Average of the several sowings	.....	.....	.....	.....	30 1,097	25 1,133	22 1,968

The average crops from the earliest sown plots have been much larger than the crops from those later sown. The average from the first sowing has exceeded that from the second sowing by 4 tons 1,964 pounds per acre, and the average crops from the first have exceeded those from the third sowing by 7 tons 1,029 pounds per acre. The average results from the second sowing are larger than those from the third sowing by 2 tons 1,165 pounds per acre.

YIELD OF TURNIPS PER ACRE FROM SECOND PULLING, NOVEMBER, 3.

No.	Name of Variety.	Yield per Acre from 1st Sowing, Second pulling November 3.		Yield per Acre from 2nd Sowing, Second pulling November 3.		Yield per Acre from 3rd Sowing, Second pulling November 3.	
		Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
1	Purple Top Swede	35	620	31	700	23	1,190
2	Drummond Purple Top	34	1,630	22	1,210	30	720
3	Bangholm Selected	35	1,940	27	1,440	28	100
4	Skirving's	34	1,960	32	1,670	26	1,460
5	Prize Winner	34	970	27	450	22	715
6	Champion Purple Top	34	1,300	31	40	24	1,665
7	Champion Purple Top (Vil)	35	950	29	740	25	325
8	Imperial Swede	34	1,300	28	100	24	1,665
9	Hardy Goliath	34	1,960	25	1,150	22	880
10	Jumbo	33	1,650	29	1,400	26	1,130
11	West Norfolk Red Top	33	1,320	30	1,710	23	1,850
12	Halewood's Bronze Top	33	1,320	31	40	24	1,170
13	Hall's Westbury	34	970	32	680	27	1,605
14	Mammoth Clyde	33	1,980	25	160	25	1,480
15	East Lothian	33	660	26	800	23	365
16	Shamrock Purple Top	23	860	28	100	23	1,685
17	Perfection Swede	30	1,380	28	1,420	23	530
18	Prize Purple Top	31	370	25	820	22	220
19	New Arctic	26	470	26	800	24	25
20	Marquis of Lorne	30	1,380	23	200	19	940
21	Carter's Elephant	26	1,330	29	80	18	1,620
22	Monarch	24	1,500	22	550	22	880
23	Giant King	28	430	22	1,540	21	1,065
24	Sutton's Champion	22	550	20	920	20	1,580
25	Hartley's Bronze Top	22	1,210	22	870	27	1,440
	Average yield of the several sowings when pulled late (Nov. 3)	32	4	27	383	24	812

By comparing the average crops here given with those given in the preceding table it will be seen that the turnips gained in weight during the twenty-one days additional time given them as follows :

	Tons.	Lbs.
1st Sowing average gain per acre	1	1,907
2nd " " "	1	1,250
3rd " " "	1	844

An average gain on the three sowings of all the varieties tested of 1 ton 1,333 pounds per acre.

EXPERIMENTS WITH MANGELS.

During the year 1899, twenty-one varieties of mangels were under test. These were all sown side by side adjoining the turnips. The land was similar and the treatment and preparation was the same. The previous crop was barley. The drills were made up 2 feet apart and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made, the first on May 11, and the second on May 25. The roots were all pulled on October 13, and the yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

MANGELS—TEST OF VARIETIES.

No.	Name of Variety.	Date of Sowing.		Date of Pulling.		Yield from 1st Sowing.		Yield from 2nd Sowing.	
		1st Sowing, May 11.	2nd Sowing, May 25.	1st Sown Plots, Oct. 13.	2nd Sown Plots, Oct. 13.				
						Tons.	Lbs.	Tons.	Lbs.
1	Gate Post					34	640	22	880
2	Mammoth Long Red					33	1,980	21	405
3	Canadian Giant					33	330	21	1,890
4	Prize Mammoth Long Red					33	330	20	260
5	Selected Mammoth Long Red					33	330	18	300
6	Giant Yellow Globe					32	350	21	75
7	Yellow Intermediate					31	370	18	1,620
8	Ward's Large Oval Shaped					30	1,050	14	1,205
9	Lion Yellow Intermediate					30	60	19	1,765
10	Giant Yellow Intermediate					29	1,565	20	260
11	Giant Yellow Half Long					29	1,400	19	610
12	Champion Yellow Globe					27	1,450	16	1,660
13	Mammoth Yellow Intermediate					25	1,315	16	1,010
14	Gate Post Yellow					25	820	14	215
15	Mammoth Oval Shaped					25	160	13	1,940
16	Warden Orange Globe					23	230	11	1,265
17	Norbitan Giant					23	200	15	360
18	Champion Yellow Globe					21	625	18	630
19	Yellow Fleshed Tankard					20	1,250	15	695
20	Golden Fleshed Tankard					19	1,600	15	1,680
21	Red Fleshed Tankard					18	740	14	50
	Average of difierent sowings					29	139	18	933

The average crop of the first sowing exceeded that from the second sowing by 10 tons, 1,206 pounds per acre.

EXPERIMENTS WITH CARROTS.

Twenty varieties of carrots were under trial during 1899, all sown side by side adjoining the turnips and mangels. The land was similar and the treatment and preparation was the same. The previous crop was pease. Drills were made up 2 feet apart and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made, the first on May 11, and the second on May 25. The roots were all pulled on October 13, and the yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

CARROTS—TEST OF VARIETIES.

No.	NAME OF VARIETY.	DATE OF SOWING.		DATE OF PULLING.		Yield from 1st Sowing.	Yield from 2nd Sowing.
		1st Sowing, May 11.	2nd Sowing, May 25.	1st Sown Plots, Oct. 13.	2nd Sown Plots, Oct. 13.		
						Tons. Lbs.	Tons. Lbs.
1	Iverson's Champion					33 660	33
2	Giant White Vosges					33 330	24 1,500
3	Improved Short White					33	31 700
4	Mammoth White Intermediate					32 1,340	32 20
5	New White Intermediate					32 680	28 1,420
6	Green Top White Orthe					28 1,750	24 1,830
7	Long Yellow Stump-rooted					28 1,420	27 450
8	Ontario Champion					28 1,090	22 880
9	White Belgian					28 760	24 510
10	Half Long White					27 1,770	22 550
11	Guerande or Ox Heart					26 1,955	25 1,150
12	Early Gem					25 820	20 920
13	Half Long Chantenay					25 820	20 590
14	Yellow Intermediate					24 1,170	23 1,190
15	White Large Short Vosges					22 385	20 1,250
16	Scarlet Intermediate					19 940	15 360
17	Carter's Orange Giant					18 1,950	18 300
18	Long Orange or Surrey					17 1,310	16 1,990
19	Scarlet Nantes					16 1,000	12 1,245
20	Long Scarlet Altringham					14 380	13 70
	Average of different sowings					24 1,358	21 1,567

The average crop of the first sowing exceeded that from the second sowing by 2 tons 1,791 pounds per acre.

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested in 1899. These were sown side by side on land adjoining that used for the trial plots of turnips, mangels and carrots. The soil was similar and the treatment preparation and method of sowing was the same. The previous crop was pease. Two sowings were made, the first on May 11, the second on May 25. The roots were all pulled on October 13, and the yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

SUGAR BEETS.—TEST OF VARIETIES.

Number.	Name of Variety.	Date of 1st Sowing. May 11.	Date of 2nd Sowing, May 25.	Date of pulling 1st Sown plots, Oct. 13.	Date of pulling 2nd Sown plots, Oct. 13.	Yield from 1st Sowing.	Yield from 2nd Sowing.
						Tons. Lbs.	Tons. Lbs.
1	Wanzleben					28 1,585	18 1,950
2	Improved Imperial					27 450	18 1,950
3	Vilmorin's Improved					26 800	15 690
4	Danish Improved					21 1,230	16 1,990
5	Danish Red Top					19 1,270	19 1,270
6	Red Top Sugar					18 1,290	16 1,660
	Average of different sowings					23 1,437	17 1,585

The average crop of the first sowing exceeded that of the second sowing by 5 tons 1,852 pounds per acre.

(POTATOES.)

The records of the results of the experiments with potatoes will be found in the report of the Horticulturist.

EXPERIMENTS WITH CLOVER.

Additional information has been gathered during the past year as to the benefit resulting to land from the ploughing under of green clover. The experience gained with crops grown on land so treated has shown that there is an increase in vigour of growth as well as a material addition to the weight of crop produced.

RESULTS OF SOWINGS OF OATS AFTER CLOVER.

Early in the spring of 1899 a field of four acres of land was ploughed about 4 inches deep. The soil was a sandy loam of medium quality, on two acres of this land barley had been grown in the spring of 1898 and with it 10 pounds of red clover seed had been sown. After the grain was harvested the clover made a rapid growth and before winter set in it had formed a good mat of foliage about a foot high. One acre had been in Brome grass, *Bromus inermis*, in 1898; half an acre had been sown with a mixture of pasture grasses without clover and another half acre with a mixture of pasture grasses associated with a good proportion of clover.

After ploughing and harrowing, the whole area of four acres was sown with one variety of oats—the Bavarian. Where clover had been ploughed under its effect was very clearly shown on the growth of the oats, the crop grown after clover was much greener in colour and more vigorous in growth of both leaf and stalk and when measured about the time the heads of grain were shooting out, the plants on an average were about a foot taller than the oats on the adjoining land where no clover had been used.

When harvested the results were as follows:—

	Per acre Bush.	Lbs.
1 acre of oats sown after Brome grass gave	33	8
½ acre after mixture of pasture grasses without clover	36	16
½ acre after mixture of pasture grasses with clover	46	4
2 acres sown after barley with clover	43	28

The average of the crop sown where no clover had been used was 34 bushels 10 pounds per acre, the average of that sown after clover was 44 bushels 10 pounds, a difference of ten bushels per acre in favour of the crops grown after the ploughing under of clover.

EFFECT OF CLOVER ON CROPS THE SECOND YEAR AFTER PLOUGHING UNDER.

In the Annual Report of the Experimental Farms for 1898, page 45, the results were given of the crops of Banner oats grown on eight plots of one-twentieth of an acre each which had been sown with grain in 1897; on four of these the grain had been grown that year with clover and on the other four plots the grain had been grown without clover. The results had in 1898 shcwn a considerable increase in the weight of straw harvested and an average increase in yield of grain on the plots where clover had been used of a little over 11 bushels per acre.

In 1899 these plots were all sown with one variety of barley, the Mensury, and again we find marked differences in favour of the land treated with clover. No other fertilizer has been used.

Plots.	1898. — Straw, yield per Acre.	1898. — Oats, yield per Acre.		1899. — Straw, yield per Acre.	1899. — Barley, yield per Acre.	
	Lbs.	Bush.	Lbs.	Lbs.	Bush.	Lbs.
Plot 1—On which Preston wheat was sown in 1897 with clover	3,770	56	6	3,120	40	20
Plot 2—Sown with Preston wheat in 1897 without clover	2,160	37	2	1,740	25	20
Plot 3—On which Odessa barley (six-rowed) was sown in 1897 with clover	2.180	37	12	2,620	32	24
Plot 4—Sown with Odessa barley (six-rowed) in 1897 without clover	1,450	30	10	2,440	27	44
Plot 5—On which Bolton barley (two-rowed) was sown in 1897 with clover	3,180	51	26	2,470	33	26
Plot 6—Sown with Bolton barley (two-rowed) in 1897 without clover	2,090	44	24	2,000	29	28
Plot 7—On which Banner oats was sown in 1897 with clover.	5,110	55	.	3,270	44	38
Plot 8—Sown with Banner oats in 1897 without clover.	2,260	44	4	2,320	33	36

INCREASE IN YIELD OF STRAW BY THE PLOUGHING UNDER OF GREEN CLOVER.

These figures show that the average yield of straw from the four plots treated with clover was for the first year 3,560 pounds per acre and for the second year 2,870 pounds, whereas the weight of straw obtained from the adjoining plots where no clover was used was 1,990 pounds per acre in 1898, and 2,125 pounds per acre in 1899. This shows a larger yield of straw where clover was used of 1,570 pounds per acre the first year and 745 pounds the second year.

INCREASE IN YIELD OF GRAIN BY THE PLOUGHING UNDER OF GREEN CLOVER.

The average increase in grain after the ploughing under of green clover was for the first year when oats were used, 11 bushels 1 pound per acre, and in 1899, when these same plots were sown with barley the average increase was 8 bushels 31 pounds per acre.

These results are indeed remarkable. They show that in the case of the plots under consideration that the ploughing under of a single crop of clover, sown with the grain in 1897, produced a wonderful increase both in straw and grain. From the added fertility and humus thus supplied the crop of straw, when compared with the adjoining plots on which no clover was used, was increased 78 per cent in 1898 and 35 per cent in 1899. The increase in the crop of grain was still more remarkable, since it shows a slightly higher percentage for the second year than it did for the first. The increase in the weight of grain on the plots treated with clover were in 1898 over 28 per cent whereas in 1899, they were over 29 per cent,

INCREASE IN YIELD OF POTATOES BY THE PLOUGHING UNDER OF GREEN CLOVER.

In the spring of 1899 a piece of rather light sandy loam of fair quality, was planted with potatoes of the variety known as Daisy. Nine rows of these were planted 560 feet long and 2½ feet apart on land on which barley had been grown the previous year. Common red clover had been sown with the barley in the propertion of 10 pounds of seed per acre. After the grain was cut, the clover made a rapid growth and had formed a good mat of foliage about 12 inches high by the middle of October, when it was

ploughed under about 7 or 8 inches deep. On land adjoining of the same quality and which had received similar cultivation, nine rows of the same variety of potatoes were planted on the same day. The previous crop on this latter piece of land had been on about $\frac{3}{4}$th of it pease and the other $\frac{1}{4}$th carrots.

The potatoes were planted on May 25, came up June 12, and were dug October 3,

On plot 1—Following barley, with clover turned under in October, 1898, the potatoes gave a total yield of 4,208 pounds.

On plot 2—Following pease and carrots, where no clover had been sown, the total yield was 3,025 pounds.

These results show a difference in favour of the crop where clover was used of about 28 per cent. The foliage of the potatoes grown after clover was much more vigorous and even, and was of a deeper green colour.

EXPERIMENTS WITH SOJA BEANS.

(Soja hispida.)

Experiments have been conducted in the growing of an early ripening variety of Soja beans for fodder purposes for the past three years, with the object of finding out the best time to plant and the most successful method of planting. Four plots of one-fortieth acre each were used for this purpose. The soil was a sandy loam of medium quality but somewhat variable. The previous crop was pease. The land was gang-ploughed soon after harvest and ploughed again later in the autumn about 7 inches deep. In the spring of 1899 it received a dressing of barn-yard manure, about 12 tons per acre. This was spread and ploughed under about 6 inches deep and harrowed twice with the smoothing harrow before sowing.

The beans were sown with the seed drill in rows 14, 21, 28 and 35 inches apart and cultivated twice during the season with a horse cultivator. They were all sown on May 31, and were cut for ensilage on September 15.

Plot 1. Sown in rows 14 inches apart. Growth strong and even, very leafy, average height 38 to 40 inches. The pods were just forming at the time the crop was cut. Yield of green fodder, 12 tons 800 pounds per acre.

Plot 2. Sown in rows 21 inches apart. Growth strong and even, very leafy, average height 40 to 44 inches. The pods were well formed, but the beans were still soft when the crop was cut. Yield of green fodder, 12 tons 1,600 pounds per acre.

Plot 3. Sown in rows 28 inches apart. The growth on this plot was medium but even; the weaker growth and smaller yield of this plot and the next was partly due to the soil being lighter. The plants were fairly leafy, and their height was from 40 to 44 inches. The pods were well formed at the time of cutting, and the beans of full size and beginning to harden. Yield of green fodder, 5 tons 1,600 pounds per acre.

Plot 4. Sown in rows 35 inches apart. Growth medium and even, fairly leafy; height, 40 to 44 inches. The plants were well podded, pods more numerous than on those plants in plot 3. The beans were beginning to harden at the time of cutting. Yield of green fodder, 4 tons 1,200 pounds per acre.

EXPERIMENTS WITH HORSE BEANS.

(Faba vulgaris var equina).

Four plots of one-fortieth acre each were devoted to experiments with this crop. The land was adjoining that used for the Soja beans. It was similar in character and quali me treatment and preparation. The previous crop was

pease. Imported seed was used, of the variety known as Tick beans. The object of this experiment was to gain information as to the crops obtainable from sowings made in rows at different distances apart. The beans were sown with the seed drill in rows 14, 21, 28 and 35 inches apart. All the plots were sown on May 17, and the crop was cut for ensilage on September 15. There was no blight on the plants this year.

Plot 1. Sown in rows 14 inches apart. The growth was medium to strong and even; height, 50 to 55 inches; length of pod, 2 to 2½ inches; plants well podded and beans nearly ripe at time of cutting, yield, 10 tons 1,880 pounds per acre.

Plot 2. Sown in rows 21 inches apart. Growth strong and even; height, 50 to 55 inches. Plants all well podded. Length of pods, 2 to 2½ inches; yield, 12 tons 1,640 pounds per acre.

Plot 3. Sown in rows 28 inches apart. Growth strong and even; height, 50 to 55 inches. Most of the beans on the plants on this plot were ripe at the time of cutting. Yield per acre, 5 tons 600 pounds.

Plot 4. Sown in rows 35 inches apart. Growth medium but even; height, 46 to 51 inches. The crop on this plot was well ripened, and the plants had lost much in weight by drying before it was cut. Yield per acre, 3 tons 1,200 pounds.

EXPERIMENTS WITH MILLETS.

Seven varieties were sown on plots of one-fortieth acre each; all were sown in drills 7 inches apart except the Japanese millet, which was sown in rows 9 inches apart. The soil was a sandy loam of medium quality; the previous crop was pease. The land received a dressing of barn-yard manure in the fall of 1898, which was spread out of the wagon and ploughed under to the the depth of 6 or 7 inches. In the spring of 1899, the ground was harrowed twice with the disc harrow and twice with the smoothing harrow before sowing. The seed was sown with a Planet Junior seed drill and all were sown on May 27.

	Name of Variety.	Date Cut.	Length of Straw in inches.	Character of Growth.	Weight, per acre, green.	Weight, per acre, dry.
					Tons. Lbs.	Tons. Lbs.
1	Pearl	Sept. 13	60·72	Very strong.	17 .	9 1,000
2	Japanese	Aug. 26	65·72	"	17 1,600	9 800
3	Algerian	" 26	60·70	"	14 400	8 800
4	White Round Extra French	" 25	55 60	Strong	12 400	5 400
5	Italian or Indian	Sept. 13	60·66	"	11 1,440	5 400
6	Moha Hungarian	Aug. 28	46·50	"	7 640	4 1,200
7	Siberian	" 28	44·48	"	8 800	4 760

These were all cut when the seed was in the soft or doughy stage.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the annual report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn, and five years' experience with crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continued; and as explanatory regarding the preparations made and the general plan, together with the way in which they have been carried on, the following paragraphs are quoted from the report of 1893:—

'A piece of sandy loam, more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded 6 inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles, on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping.

'The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. It was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn, and in 1889 all the series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890.' In all cases the plots in each series have been sown on the same day.

'In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also on the half of the barley plots cropped with sugar beets that year." In 1894, 1895, 1896, 1897 and 1898 the one-half of the oat plots were sown again with carrots and the half of the plots devoted to wheat and barley were planted with potatoes.

TREATMENT OF SOIL.

"The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again later, about 7 inches deep. In spring the plots have been gang-ploughed once before applying the fertilizers, which are then scattered over the surface and harrowed with the smoothing harrow before sowing. On those plots where barn-yard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and just before sowing. Wherever barn-yard manure is spoken of, it is understood to be a mixture of horse and cow manure in about equal proportions.'

A summary of these permanent fertilizer plots is given each year, taking the average yield of the whole previous period, adding the results of the current year, and then giving the average yield for the full time.

CHANGES MADE IN THE EXPERIMENTS.

After ten or eleven years of constant cropping it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened and the conditions for plant growth apart from the question of plant food had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring 10 pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats, all of which occupied the full one-tenth acre plots. The clover seed germinated well, and after the grain was cut the young clover plants made rapid growth and by October there was a thick mat of foliage varying in height and density on the different plots which was ploughed under October 12.

Ten years' experience had shown that the finely-ground untreated mineral phosphate was of no value as a fertilizer. This substance had been used every year in each series of tests on plots 4, 5, 6, 7 and 8 excepting in the experiments on roots, where it was used on plots 4, 5, 6 and 7. On all these plots the use of the finely-ground untreated mineral phosphate was discontinned in 1898, when there was used in its place similar weights of the Thomas' Phosphate Powder. In 1899 the Thomas' Phosphate Powder was again used on all these plots excepting No. 6 in each series.

Another direction in which information was sought was in reference to the length of time which a liberal application of barn-yard manure would continue to affect subsequent crops, and in 1899 on plots 1, 2 and 6 the barn-yard manure, which had been used for ten or eleven years in succession, was discontinued. The phosphate fertilizer was also omitted on plot 6 in each series. The growing of carrots and potatoes on one-half of the cereal plots was discontinued, and each plot of the wheat, barley and oats occupied the full tenth acre.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894; and the varieties used were as follows: In 1888–89–90 and 1891 White Russian, and in 1892–3 Campbell's White Chaff. In 1894 the Rio Grande wheat was used, and shortly before sowing, it was tested as to vitality and found to be deficient in germinating power,—less than half the kernels sprouted. As it was not practicable then to secure better seed, double the usual quantity was sown, namely, 3 bushels per acre, which gave a proportion of growth on each plot of about the usual thickness. In 1895, 1896, 1897, 1898 and 1899, Red Fife wheat was used in the usual quantity of 1½ bushels per acre. In 1899 the Red Fife was sown May 5, came up May 13, and was ripe from August 17 to 20.

The season of 1899 was moderately favourable for the growing of spring wheat at Ottawa and has given in most instances crops above the average.

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EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$TH ACRE EACH.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Eleven Years.		12th Season, 1899. Variety, Red Fife.		Average Yield for Twelve Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year after until 1899—no manure was used that season...	20 $56\frac{4}{11}$	3,709	23 40	5,280	21 10	3,839
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after until 1899—no manure was used that season.....	20 $52\frac{4}{11}$	3,699	27 40	5,910	21 $26\frac{4}{12}$	3,883
3	Unmanured	10 $16\frac{4}{11}$	1,899	10 35	1,300	10 $17\frac{11}{12}$	1,849
4	Thomas' phosphate, 500 lbs. per acre.....	10 $22\frac{3}{11}$	1,920	10 30	2,470	10 $22\frac{11}{12}$	1,965
5	Thomas' phosphate, 500 lbs.; nitrate of soda, 200 lbs. per acre..	12 $32\frac{8}{11}$	2,865	12 20	2,590	12 $31\frac{8}{12}$	2,842
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; Thomas' phosphate, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using, applied each year until 1899, no manure or phosphate were used that season*.	18 $11\frac{7}{11}$	3,094	21 10	4,445	18 $26\frac{8}{12}$	3,206
7	Thomas' phosphate, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	12 $43\frac{3}{11}$	2,235	12 50	3,880	12 $43\frac{10}{12}$	2,372
8	Thomas' phosphate, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	10 $41\frac{7}{11}$	1,867	10 50	3,260	10 $42\frac{4}{12}$	1,980
9	Mineral superphosphate, No. 1, 500 lbs. per acre	11 $37\frac{1}{11}$	1,776	11 30	2,175	11 $36\frac{6}{12}$	1,809
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	12 $51\frac{9}{11}$	3,035	14 5	3,110	12 $57\frac{11}{12}$	3,041
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	13 $30\frac{10}{11}$	2,665	18 30	3,840	13 $55\frac{10}{12}$	2,736
12	Unmanured.....	9 $43\frac{7}{11}$	1,650	9 5	2,685	9 $40\frac{5}{12}$	1,742
13	Bone finely ground, 500 lbs. per acre . ..	11 $40\frac{3}{11}$	1,834	12 15	2,635	11 $43\frac{2}{12}$	1,900
14	Bone finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	15 $12\frac{3}{11}$	2,274	14 35	3,315	15 $9\frac{2}{12}$	2,360
15	Nitrate of soda, 200 lbs. per acre.....	13 $22\frac{3}{11}$	2,300	12 30	2,550	13 $17\frac{11}{12}$	2,320
16	Muriate of potash, 150 lbs. per acre.....	15 $20\frac{3}{11}$	2,001	15 10	2,800	15 $19\frac{8}{12}$	2,067
17	Sulphate of ammonia, 300 lbs. per acre....	11 $44\frac{8}{11}$	2,277	15 50	2,940	12 $5\frac{2}{12}$	2,332
18	Sulphate of iron, 60 lbs. per acre..... .	12 $31\frac{4}{11}$	1,840	11 30	1,690	12 $26\frac{8}{12}$	1,881
19	Common salt (Sodium chloride) 300 lbs. per acre	13 15	1,639	14 20	1,810	13 $20\frac{5}{12}$	1,486
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	12 $35\frac{5}{11}$	1,880	11 30	1,880	12 30	1,880
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre. each year since.....	12 $26\frac{2}{11}$	1,850	13 50	2,400	12 $33\frac{2}{12}$	1,895

*Finely ground mineral phosphate was used on this plot from 1888 to 1897. Thomas' phosphate in 1898 only.

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, 1½ bushels in 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898 and

1899. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows: 1889, 1890 and 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894, 1895, 1896, 1897, 1898 and 1899, Canadian Thorpe, a selected form of the Duck-bill. In 1899 the Canadian Thorpe was sown on May 5, came up May 13 and was harvested on August 7 and 8.

In 1899 the yields of eleven of the barley plots were above the average of past seasons, the others were below the average.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each Year.	Average Yield for Ten Years.		11th Season, 1899. Variety, Canadian Thorpe.		Average Yield for Eleven Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year until 1899; no manure was used that season	34 34 7/10	3,054	34 43	2,835	34 35 5/11	3,034
2	Barn-yard manure, fresh, 15 tons per acre, each year until 1899; no manure was used that season	35 21 1/10	3,280	33 46	3,060	35 14 7/11	3,260
3	Unmanured	13 32 1/10	1,594	10 40	1,075	13 20 1/11	1,546
4	Thomas' phosphate, 500 lbs. per acre	13 42 1/10	1,470	15 ..	1,185	13 47 2/11	1,444
5	Thomas' phosphate, 500 lbs.; nitrate of soda, 200 lbs. per acre	19 8 7/10	2,159	25 20	2,970	19 35 10/11	2,232
6	Barn-yard manure, partly rotted, and actively fermenting, 6 tons per acre; Thomas' phosphate, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year until 1899; no manure or phosphate was used that season*	28 4 7/10	2,439	26 7	2,055	27 44 3/11	2,404
7	Thomas' phosphate, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	22 26 3/10	2,350	35 15	2,810	23 34	2,391
8	Thomas' phosphate, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	19 16 5/10	1,676	21 27	1,815	19 26 2/11	1,688
9	Mineral superphosphate, No. 1, 500 lbs. per acre	21 9	1,974	16 12	1,120	20 35 5/11	1,871
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	26 21 5/10	2,383	33 1	2,235	27 2 2/11	2,369
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	25 33 5/10	2,533	30 45	2,350	26 8 4/11	2,516
12	Unmanured	13 13 6/10	1,226	10 20	1,070	13 1	1,211
13	Bone, finely ground, 500 lbs. per acre	13 35	1,380	13 16	1,330	13 33 3/11	1,375
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	22 1 5/10	1,986	26 2	2,250	22 19	2,010
15	Nitrate of soda, 200 lbs. per acre	21 22	2,365	24 43	1,970	21 37	2,329
16	Muriate of potash, 150 lbs. per acre	21 42	1,876	23 46	1,445	22 3 1/11	1,836
17	Sulphate of ammonia, 300 lbs. per acre	17 28 5/10	2,003	24 33	1,835	18 11 5/11	1,987
18	Sulphate of iron, 60 lbs. per acre	17 35 1/10	1,732	17 24	1,400	17 34 5/11	1,741
19	Common salt (Sodium chloride) 300 lbs. per acre	28 5	2,114	26 7	1,475	27 44 5/11	2,056
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre	19 39 5/10	1,691	15 40	1,045	19 22 1/11	1,632
21	Mineral superphosphate, No. 2, 500 lbs. per acre	20 26	1,860	16 17	1,485	20 7 8/11	1,826

*Finely ground mineral phosphate was used on this plot from 1888 to 1897. Thomas' phosphate in 1898 only.

OAT PLOTS.

The quantity of seed sown per acre on the oat plots, was 2 bushels in 1889 and 1890; 1½ bushels in 1891, 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898 and 1899. The varieties used were as follows: In 1889, Early English; in 1890, 1891, 1892, 1893, Prize Cluster; and in 1894, 1895, 1896 1897, 1898 and 1899, Banner. In 1899 the Banner was sown May 8, came up May 14, and the plots were harvested from the 8th to 11th of August. The season of 1899 was favourable for the oat crop, and in most instances the return has been above the average.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, 1/10TH ACRE EACH.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Ten Years.		11th Season, 1899. Variety, Banner.		Average Yield for Eleven Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year until 1899; no manure was used that season	48 14	3,235	55 30	2,150	49 3 1/11	3,136
2	Barn-yard manure, fresh, 15 tons per acre each year until 1899; no manure was used that season	54 17	3,467	55 15	2,135	54 18 8/11	3,345
3	Unmanured	30 23 5/10	1,534	29 24	990	30 20 5/11	1,484
4	Thomas' phosphate, 500 lbs. per acre	30 18 3/10	1,762	31 11	985	30 23 3/11	1,691
5	Thomas' phosphate, 500 lbs., nitrate of soda, 200 lbs. per acre	48 7	2,713	52 27	2,785	48 21 3/11	2,719
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; Thomas' phosphate, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year until 1899; no manure or phosphate was used that season*	44 9	2,614	52 32	2,120	45 1 9/11	2,569
7	Thomas' phosphate, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	44 30 5/10	3,149	58 18	3,290	46 9 5/11	3,161
8	Thomas' phosphate, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	39 28 5/10	2,299	42 32	2,040	40 8 2/11	2,275
9	Mineral superphosphate, No. 1, 500 lbs. per acre	35 5/10	1,947	35 5	1,855	35 1 9/11	1,938
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	46 1	2,812	52 17	2,375	46 21	2,772
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	36 5 1/10	2,411	37 2	2,250	36 4 9/11	2,376
12	Unmanured	21 14	1,550	20 ..	930	21 9 7/11	1,493
13	Bone, finely ground, 500 lbs. per acre	33 1	1,969	41 1	1,875	33 25 5/11	1,960
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	37 6 5/10	2,186	42 27	2,085	37 27 1/11	2,176
15	Nitrate of soda, 200 lbs. per acre	45 24 5/10	2,669	49 29	2,835	46 7 4/11	2,684
16	Muriate of potash, 150 lbs. per acre	34 21	2,145	35 20	1,690	34 24	2,103
17	Sulphate of ammonia, 300 lbs. per acre	43 23 5/10	3,027	43 3	2,275	43 21 7/11	2,958
18	Sulphate of iron, 60 lbs. per acre	36 1 5/10	2,120	28 28	1,660	35 13 8/11	2,078
19	Common salt (Sodium chloride) 300 lbs. per acre	35 18	1,976	31 21	1,485	35 5 1/11	1,931
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre	32 24	2,024	33 8	1,602	32 24 8/11	1,995
21	Mineral superphosphate, No. 2, 500 lbs. per acre	33 4 5/10	1,871	33 28	1,660	33 6 7/11	1,851

*Finely ground mineral phosphate was used on this plot from 1888 to 1897. Thomas' phosphate in 1898 only.

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk, or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was tested under No. 1. The Mammoth Southern Sweet was tried in 1888, 1889 and 1890. In 1891 the Red Cob Ensilage was used, and in 1892, 1893, 1894, 1895, 1896, 1897, 1898 and 1899 a free growing Flint variety, the Rural Thoroughbred White Flint, was tested. On the other half of the plot (No. 2) the Canada Yellow Flint was used in 1888, 1889 and 1890, the Thoroughbred White Flint in 1891 Pearce's Prolific in 1892, 1893 and 1894, and the Mammoth Eight Rowed Flint in 1895, 1896, 1897, 1898 and 1899. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way and 4 or 5 kernels in a hill. During the past seven years both sorts have been grown in hills. The corn in both series of plots was planted in 1899 on May 25, and cut September 15. In every instance the yield of fodder on these plots during the past season has been below the average of previous years.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, $\frac{1}{10}$TH ACRE EACH, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Eleven Years.		12th Season, 1899.				Average Yield for Twelve Years.			
		½ Plot No. 1—weight of green fodder	½ Plot No. 2—weight of green fodder	½ Plot No. 1—Thoroughb'd White Flint, weight of green fodder		½ Plot No. 2—Mam. 8 rowed, weight of green fodder		½ Plot No. 1—weight of green fodder		½ Plot No. 2—weight of green fodder	
		Per acre.		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
1	Barn-yard manure, well rotted, 12 tons per acre each year until 1899, no manure was used that season	16	240	12	696	10	160	8	1,920	15	1,233	12	131
2	Barn-yard manure, fresh, 12 tons per acre each year until 1899, no manure was used that season	17	724	11	785	8	1,940	5	1,080	16	1,325	10	1,809
3	Unmanured	7	1,278	5	1,004	1	1,820	1	1,880	7	323	5	410
4	Thomas' phosphate, 800 lbs. per acre	7	204	5	285	4	1,840	3	540	6	1,840	4	305
5	Thomas' phosphate, 800 lbs.; nitrate of soda, 200 lbs. per acre	10	1,708	8	1,662	6	400	7	620	10	932	8	1,408
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; Thomas' phosphate, 500 lbs. per acre; composted together, intimately mixed and allowed to heat for several days before using, applied each year until 1899, no manure or phosphate was used that season*	16	729	11	899	9	400	6	1,560	15	1,534	11	120
7	Thomas' phosphate, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	15	305	10	1,782	9	820	8	960	14	1,347	10	1,380
8	Thomas' phosphate, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	11	1,156	8	1,020	6	640	5	260	11	279	8	456
9	Mineral superphosphate, No. 1, 500, lbs. per acre	10	1,129	7	1,997	5	760	3	1,740	10	264	7	1,309

*Finely ground mineral phosphate was used on this plot from 1888 to 1897. Thomas' phosphate in 1898 only.

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EXPERIMENTS WITH FERTILIZERS, ON PLOTS OF INDIAN CORN—*Concluded.*

No. of Plot.	Fertilizers applied each Year.	Average Yield for Eleven Years.		12th Season, 1899.				Average Yield for Twelve Years.			
		½ Plot No. 1—weight of green fodder	½ Plot No. 2—weight of green fodder	½ Plot No. 1—Thoroughb'd White Flint, weight of green fodder	1 Plot No. 2—Mam. 8 rowed, weight of green fodder			½ Plot No. 1—weight of green fodder	1 Plot No. 2—weight of green fodder		
		Per acre.		Per acre.				Per acre.		Per acre	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs
10	Mineral superphosphate, No. 1, 350 lbs. nitrate of soda, 200 lbs. per acre	13	1,014	10	718	6	1,100	6	580	12	1,854	10	39
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	16	139	11	1,769	8	1,800	8	300	15	944	11	1,146
12	Unmanured	10	1,103	8	1,350	5	300	3	1,160	10	202	8	500
13	Bone, finely ground, 500 lbs. per acre	11	1,105	8	1,740	6	1,780	5	600	11	327	8	1,145
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	12	345	8	1,990	6	1,780	6	80	11	1,464	8	1,497
15	Nitrate of soda, 200 lbs. per acre	12	1,181	9	1,073	7	1,620	6	1,480	12	384	9	607
16	Sulphate of ammonia, 300 lbs. per acre	12	1,696	9	1,516	8	1,460	8	200	12	1,009	9	1,239
17	Mineral superphosphate, No. 1, 600 lbs.; muriate of potash, 200 lbs.; sulphate of ammonia, 150 lbs. per acre	13	554	9	760	4	1,480	3	920	12	1,297	8	1,773
18	Muriate of potash, 300 lbs. per acre	9	15	5	1,987	3	1,500	3	560	8	1,138	5	1,534
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90; (muriate of potash, 200 lbs., substituted each year since); dried blood, 300 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre	11	1,415	7	1,873	5	1,940	4	100	11	458	7	1,225
20	Wood ashes, unleached, 1,900 lbs. per acre.	9	1,913	7	254	4	1,160	4	1,300	9	1,016	6	1,841
21	Bone, finely ground, 500 lbs.; sulphate of ammonia, 200 lbs.; muriate of potash, 200 lbs. per acre	12	1,418	8	1,558	5	1,070	3	1,170	12	222	6	692

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under, so that the plant food they have taken from the soil may be returned to it. One-half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips, and these crops have been alternated from year to year. The preparation of the land has been the same for both these roots. It was ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barn-yarn manure had been spread on plots 1, 2 and 6, and after gang-ploughing the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

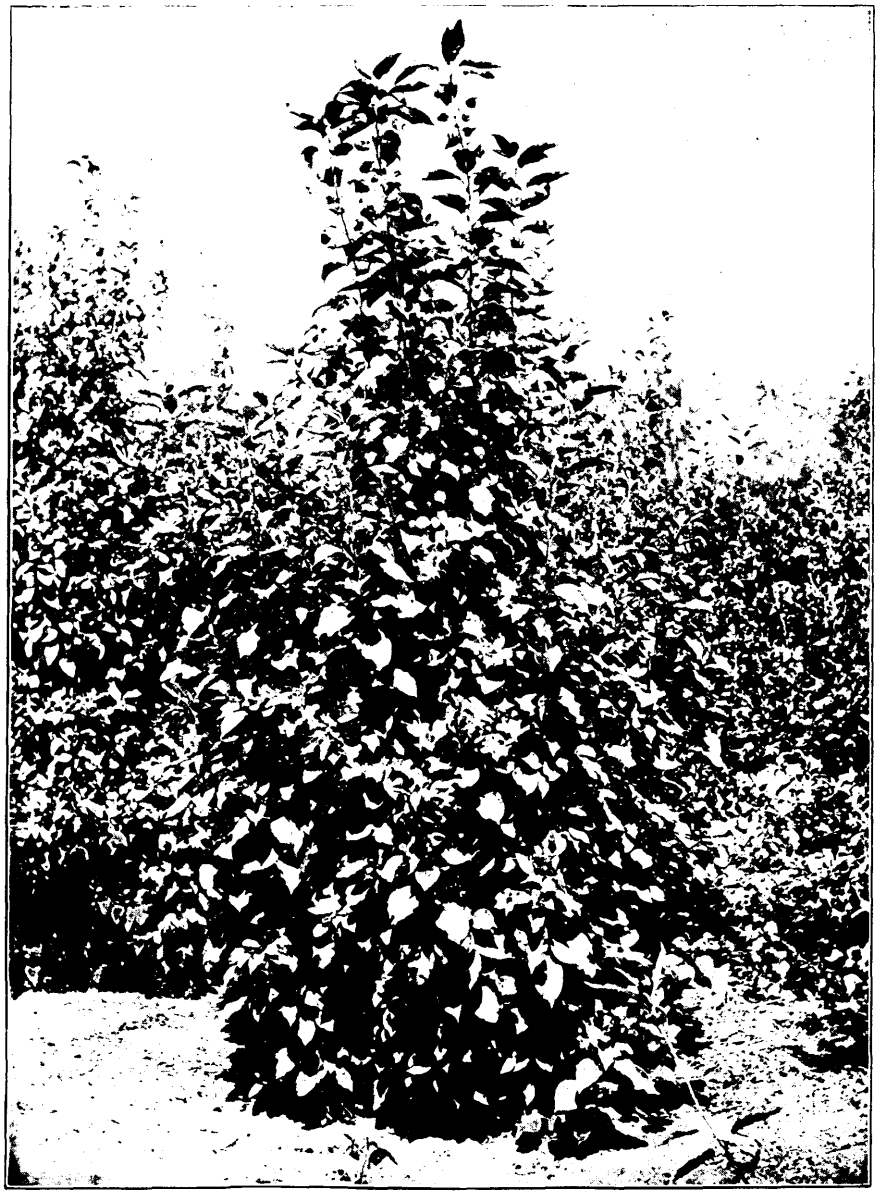
In 1889, the variety of mangel used was the Mammoth Long Red. In 1890, three varieties were sown: 15 rows of Mammoth Long Red, 6 of Mammoth Long Yellow, and 6 of Golden Intermediate on each plot. In 1891, each plot again had three varieties: 18 rows of Mammoth Long Red, 3 of Yellow Fleshed Tankard, and 6 of Golden Tankard. In 1892, 1893, 1894, 1895, 1896, 1897, 1898 and 1899, one variety only was used, namely, the Mammoth Long Red. About 4 pounds of seed were sown per acre, each year. In 1899 the mangels were sown May 8, came up May 17, and were pulled October 16.

Two varieties of turnips were sown on the half plots devoted to these roots in 1889; 25 rows of Carter's Prize Winner, and 2 rows of Carter's Queen of Swedes, and in 1890, a single variety, Carter's Elephant Swede. In 1891, six varieties were sown; 6 rows of Lord Derby Swede, 4 of New Giant King, 3 of Imperial Swede, 6 of Champion Swede, 4 of Purple Top Swede, and 4 of East Lothian Swede. In 1892 the Improved Purple Top Swede only was sown, in 1893 and 1894 the Prize Purple Top Swede, in 1895 the Imperial Swede, and in 1896, 1897, 1898 and 1899 the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner and the fertilizers spread on it at the same time as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. In 1899 the turnips were sown June 7, came up June 12, and were pulled October 20. In most instances the yield of both turnips and mangels in 1899 was below the average of past seasons.

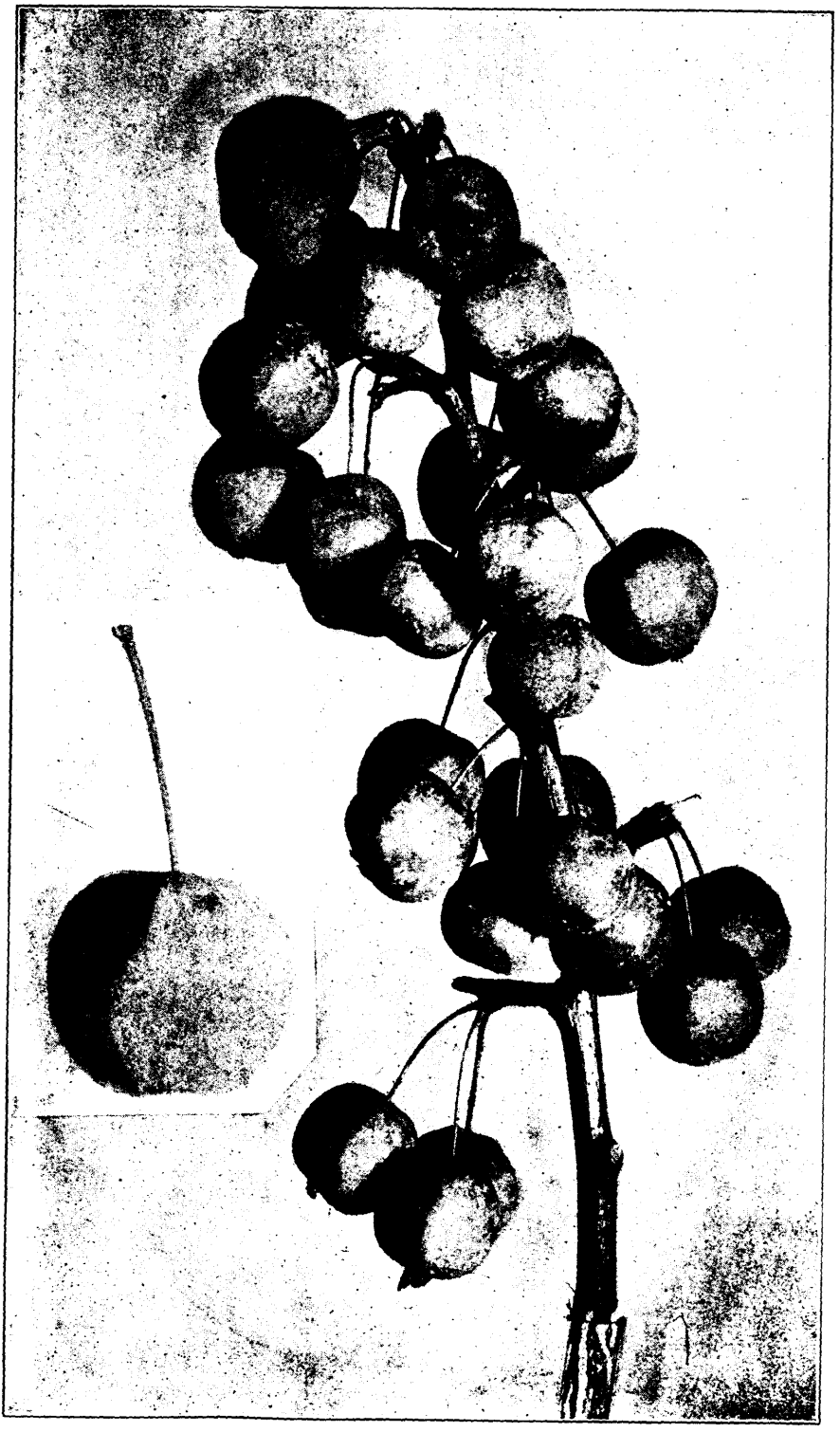
EXPERIMENTS WITH FERTILIZERS ON ROOTS; PLOTS OF MANGELS AND TURNIPS, $\frac{1}{20}$TH ACRE EACH.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Ten Years.		11th Season, 1899. Varieties.		Average Yield for Eleven Years.	
				West Half Plot.	East Half Plot.		
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red: Weight of Roots.	Turnips, Purple Top Swede: Weight of Roots.	Mangels, Weight of Roots.	Turnips, Weight of Roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
1	Barn-yard manure, well rotted, 20 tons per acre each year until 1899; no manure was used that season	23 212	15 196	17 800	15 60	22 1,174	15 183
2	Barn-yard manure, fresh, 20 tons per acre each year until 1899; no manure was used that season	22 269	15 854	15 1,300	14 140	21 1,090	15 607
3	Unmanured	9 214	7 124	5 1,320	5 1,260	8 1,587	6 1,863
4	Thomas' phosphate, 1,000 lbs. per ac.	8 1,101	7 599	6 80	7 540	8 644	7 593
5	Thomas' phosphate, 1,000 lbs.; nitrate of soda, 250 lbs.; wood ashes, unleached, 1,000 lbs. per acre	13 1,986	9 1,036	12 1,200	11 1,440	13 1,732	9 1,436
6	Barn-yard manure, partly rotted and actively fermenting, 12 tons per acre; Thomas' phosphate, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year until 1899; no manure or phosphate was used that season*	18 859	13 514	11 1,460	13 760	17 1,799	13 536
7	Thomas' phosphate, 1,000 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre	10 1,012	9 486	13 800	12 280	10 1,472	9 1,012
8	Mineral superphosphate, No. 1, 500 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs., in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre	14 820	12 455	8 780	8 480	13 1,725	11 1,730
9	Mineral superphosphate, No. 1, 500 lbs. per acre	9 827	8 1,780	5 1,060	6 800	9 120	8 1,327

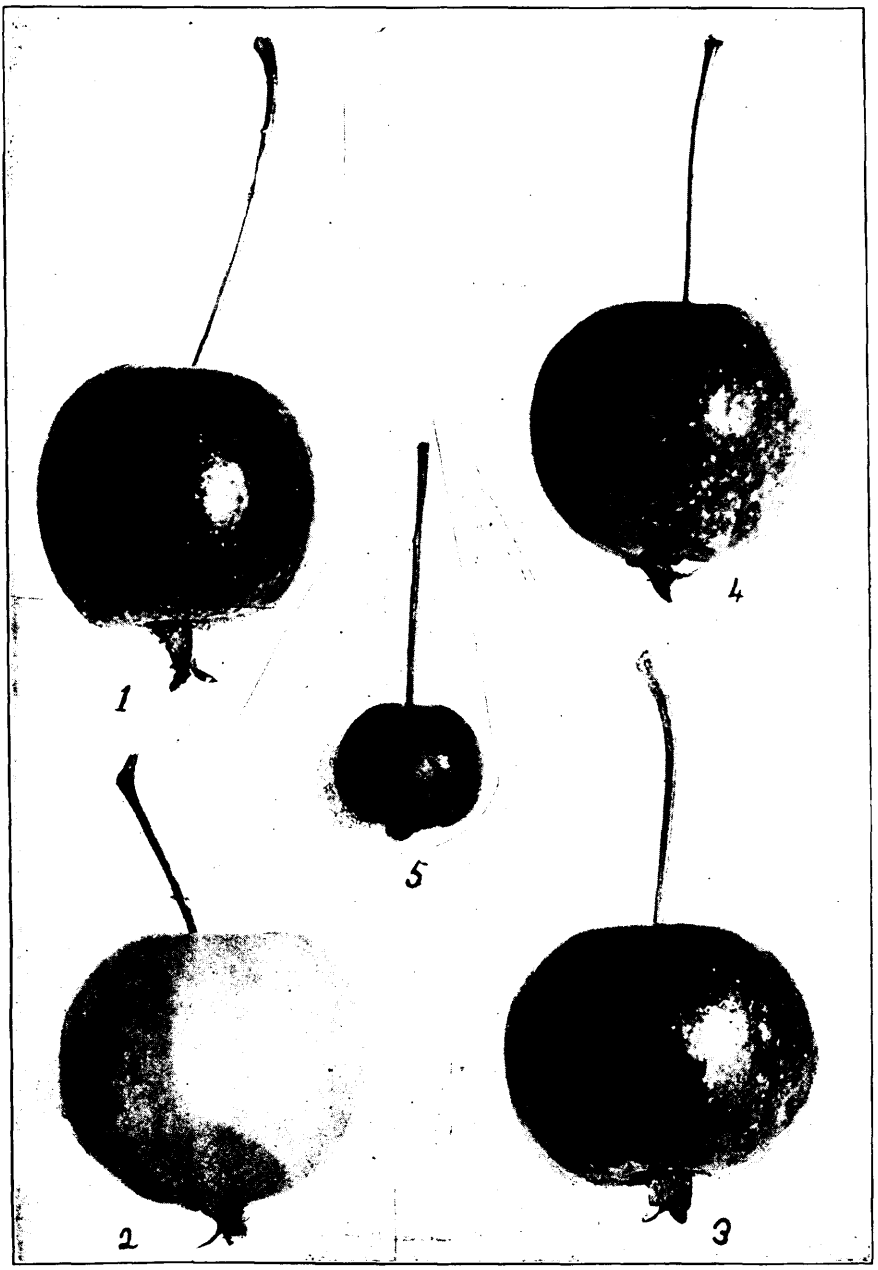
*Finely ground mineral phosphate was used on this plot from 1888 to 1897. Thomas' phosphate in 1898 only.



Cross-bred Pyrus Tree 'Charles,' Central Experimental Farm, Ottawa.



Cross-bred Pyrus 'Prairie Gem,' showing free fruiting habit and single specimen of natural size.



Specimens of Cross-bred Pyrus, natural size.
1.—Progress. 2.—Charles. 3.—Novelty. 4.—Aurora. 5.—Pyrus Baccata, natural size.

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EXPERIMENTS WITH FERTILIZERS ON ROOTS; PLOTS OF MANGELS AND TURNIPS—*Concluded.*

No. of Plot.	Fertilizers applied each Year.	Average Yield for Ten Years.		11th Season, 1899, Varieties.		Average Yield for Eleven Years.	
				West Half Plot.	East Half Plot.		
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red: Weight of Roots.	Turnips, Purple Top Swede: Weight of Roots.	Mangels, Weight of Roots.	Turnips, Weight of Roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
10	Nitrate of soda, 300 lbs. per acre	14 1,775	9 586	7 1,980	6 1,620	14 520	9 134
11	Sulphate of ammonia, 300 lbs. per ac.	11 1,600	10 1,684	6 1,540	5 500	10 145	10 667
12	Unmanured	7 1,008	7 233	3 1,820	4 120	7 354	6 1,677
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre	10 1,004	8 870	6 120	7 80	10 196	8 616
14	Wood ashes, unleached, 2,000 lbs. p. ac.	11 223	7 1,710	7 360	4 1,080	10 1,508	7 1,107
15	Common salt (Sodium chloride), 400 lbs. per acre	9 1,476	7 962	5 1,820	2 1,620	9 961	7 21
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per ac.	13 1,530	10 1,106	8 1,180	8 760	13 589	10 711
17	Mineral superphosphate, No. 1, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	12 1,816	9 659	8 680	5 1,760	12 985	9 31
18	Mineral superphosphate, No. 1, 500 lbs.; muriate of potash, 200 lbs. p. ac.	12 1,163	10 444	8 940	7 460	12 415	9 1,900
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since); dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre	13 1,714	11 1,059	10 1,520	9 1,520	13 1,150	11 737
20	Wood ashes, unleached, 1,500 lbs.; common salt (Sodium chloride), 300 lbs. per acre	14 1,073	10 582	9 1,500	8 100	14 202	10 183
21	Mineral superphosphate, No. 2, 500 lbs. per acre	15 127	10 1,544	9 1,820	7 500	14 1,190	10 903

Since the grain grown on the fertilized plots during the past year has occupied in each case the full one-tenth acre, there has been no opportunity of continuing the experiments with carrots and potatoes.

NEW HARDY HYBRID FRUITS FOR THE CANADIAN NORTH-WEST.

During the spring of 1897, shortly after the work of the Experimental Farms was begun, a number of varieties of seeds were kindly forwarded to the Director by the late Dr. Regel, who at that time had charge of the Royal Botanic Gardens at St. Petersburgh, Russia. Among these was a package of the seed of *Pyrus baccata* a wild form of crab-apple known as the berried crab, a native of the northern parts of Siberia. Young trees were grown from this seed, and in 1890 and 1891 specimens were sent to the Experimental Farms at Brandon, Manitoba, and at Indian Head in the North-west Territories, to test their hardiness in those localities. These trees have been found quite hardy at both of these western experimental farms, and have started from the terminal buds on the branches every year since they were planted.

As this was the only form of the apple which had proven hardy in the Canadian North-west, after several years experience had established its hardiness, a series of experiments were instituted to improve the size and quality of the fruit, which in its native form is not much larger than a cherry, and is often quite astringent. The trees, however, bear fruit abundantly.

In the spring of 1894 this small wild crab was crossed with several varieties of hardy apples such as Tetofsky and Wealthy, also with some of the larger crabs, including Transcendent, Orange and Hyslop. The seeds obtained from these crosses were sown in the autumn of that year and germinated the following spring, producing in all about 160 thrifty young trees. These were planted the next year in a small orchard, in rows 5 feet apart each way. Some of them have grown very rapidly and have made shapely young trees. During the past season (1899) 36 of these trees have fruited and some of them have borne heavy crops. The fact that so many of these cross-bred trees have fruited on the fourth year from the sowing of the seed is very encouraging and indicates a very early bearing habit. Of the 36 trees which have fruited this year, five have borne fruit of such size and quality as to justify their being named and propagated. Several others among those which have fruited are promising and will be further tested. Most of those of less promise have been dug up and destroyed, so as to give the remaining specimens more room. Following are the names and descriptions of the five varieties referred to, given in what is believed to be the order of their merit.

CHARLES—(Fig. 2, Plate 1.) A cross of Tetofsky male on *Pyrus baccata* female. Tree a very upright and vigorous grower with large leathery leaves. See Fig. 2, Plate 1. The blossoms are deep pink in bud, pinkish white when open, large with wide petals. The fruit set well and the tree was fairly well laden, the fruit being distributed very evenly over the tree. It was ripe September 3, size $1\frac{9}{16}$th inches across, $1\frac{6}{16}$th inches deep, very distinctly ribbed. Colour a uniform yellow, very attractive. Flesh yellow, solid, crisp, juicy, mildly acid with a pleasant flavour, and slightly astringent. The skin is thin and the fruit bakes well. When compared with the Transcendent crab, the size was practically the same, and the acidity and astringency a little less; stem long, calyx persistent.

NOVELTY.—(Fig. 3, Plate 1.) A cross of Wealthy male on *Pyrus baccata* female. Tree fairly upright and a vigorous grower with good foliage On this tree there were only a few bunches of blossoms, which were deep pink in bud, white when open, flowers large, petals broad. Fruit ripe September 19. Size, $1\frac{1}{2}$ inches across and $1\frac{1}{4}$ inches deep, smooth, colour deep red. Flesh a pale yellowish pink, firm, crisp and juicy, sub-acid and of fair quality. Stem long, calyx usually persistent; bakes well. The largest and best of the Wealthy crosses which have yet fruited.

AURORA.—(Fig. 4, Plate 1.) A cross of Tetofsky male on *Pyrus baccata* female. Tree a vigorous grower, upright in habit, leaves large, thick and leathery, blossomed freely. Flowers deep pink in bud, large when open and pure white, petals broad. The fruit set freely and was ripe September 11. Size $1\frac{7}{16}$ inches across, $1\frac{3}{16}$ inches deep. Colour bright red almost all over; very pretty; flesh crisp, juicy, acid and of fair flavour; astringency very slight. When baked this fruit is acid, but of good flavour. Stems long, calyx persistent.

PROGRESS.—(Fig. 1, Plate 1.) A cross of Wealthy male on *Pyrus baccata* female. The tree is a vigorous grower and fairly upright in habit. It blossomed freely; the blossoms were deep pink in bud, pinkish white when open, flowers large, petals wide. Fruit ripe September 14. Size $1\frac{5}{16}$ inches across and $1\frac{3}{16}$ inches deep. Colour red, with some yellow and with a dark red cheek. Flesh very firm, crisp, sub-acid, juicy, astringency scarcely preceptible; of fair flavour. Stem long, calyx persistent. On plate 1, fig. 5, the fruit of *Pyrus baccata* is represented of natural size.

PRAIRIE GEM.—A cross of Tetofsky male on *Pyrus baccata* female. This tree is a moderately vigorous grower, and rather spreading in habit. It was covered with blossoms, which were pink in bud, white when open, of medium size, with petals of medium width, and was covered with fruit from top to bottom. The fruit was ripe August 30. Size 1 inch across and 1 inch deep. Colour brilliant yellow and crimson. Flesh crisp, juicy, acid ; flavour good, almost free from astringency ; excellent for jelly. Deficient in size but promising for its earliness, quality and profuse bearing habit. On plate 3 a specimen of this fruit is shown of the natural size, also a branch of the same laden with fruit.

All these varieties are remarkable for the persistent manner in which the fruit is attached to the tree. The stems are so firmly fastened that they require a considerable effort to detach them. The trees are all very strongly built with the branches bound to the trees with bands of woody fibre which are difficult to break. Root grafts were made of some of these varieties in the spring of 1898, chosen on account of their promising growth. A number of these were sent at that time to Brandon and Indian Head, and thirty-one specimens of twenty-two varieties survived the winter at Indian Head and had made fair growth by the close of the season in 1899. At Brandon seventy-four specimens of twenty-five varieties passed safely through the winter of 1898 and made fair growth in 1899. In both these collections the variety named Charles is represented, three trees of this apple survived at Brandon and two at Indian Head. A further supply of root grafts of promising sorts was sent last spring, and now that the fruit of the five varieties referred to has proven of value these will be propagated more freely and arrangements are in progress for testing them in many different parts of the North-west country. There is every reason to expect that they will prove generally hardy and that they will be highly appreciated. It is not expected that these new fruits will be much esteemed where larger fruits can be grown, but if they can be grown without special care or protection by farmers generally throughout the North-west country and the colder sections of Ontario and Quebec where the larger sized apples do not succeed, they will prove a great boon to the settlers in those districts, and furnish a wholesome and healthful addition to the food of the people.

Since five good sorts have been found among the first thirty-six of these crosses which have fruited, it is probable that many other equally good or possibly superior sorts will occur among the many cross-bred trees,—about 270 now growing at Ottawa—which have not yet fruited.

Another series of crosses have been made on a species of *Pyrus* known as *Pyrus prunifolia* and its hardiness has been established by a test of several years on both of the North-west experimental farms. The natural fruit of this species is nearly double the size of *P. baccata*. The first crosses in this line were made in 1896, and some of the trees from this source are now two years old and are strong and vigorous in growth. The varieties of the different crosses with *Pyrus prunifolia* number about 200 in all, among which there will no doubt be many interesting sorts.

The results reported are but the first steps in a series of experiments which are full of promise. As the more useful of these hybrids bear fruit the seeds of the finest specimens are being sown from which we may expect many interesting sports. Now that the continuity of nature has been broken by the work of cross-fertilizing, the method of selection will be brought to bear on the best of the seedlings, from some of which increase in size and improvement in quality of fruit may be looked for, and within a few years we shall doubtless have from these sources a considerable number of useful sorts of apples ripening at different periods in the season which will endure the climate of all the settled parts of the North-west country.

DISTRIBUTION OF SEED GRAIN.

In 1899 a further distribution of seed grain was made consisting mainly of samples of the most promising sorts which have been tested at the several experimental farms. These distributions are designed to place within reach of farmers for the improvement

of seed, pure samples and true to name of the best and most productive varieties in cultivation. By the careful handling of one of these samples of 3 pounds of grain, any farmer can soon obtain sufficient seed to sow a large area and may thus in a short time be provided with some of the best sorts, without cost beyond that of his own labour. This part of the farm work is much commended and highly appreciated by a very large number of practical farmers and the need of the work is shown by the large demand each year for samples.

Preparations have been made for another distribution in 1900, which will consist as heretofore of the most promising sorts of oats, barley, spring wheat, pease, Indian corn and potatoes. The several branch farms will also again distribute samples to farmers residing in the provinces and territories where these farms have been established.

The samples sent out from the Central Experimental Farm during the early months of 1899, were distributed as follows.

Kind of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
Oats	793	1,335	1,454	2,017	2,081	753	432	70
Barley	169	466	204	904	780	143	87	23
Wheat	594	894	1,347	2,304	1,167	421	224	37
Pease	74	426	396	925	653	255	151	46
Indian Corn	42	208	199	360	587	53	15	19
Potatoes	438	731	1,084	1,262	1,914	461	278	106
Total	2,110	4,060	4,684	7,772	7,182	2,086	1,187	301

Total number of samples distributed 29,405
Number of applicants supplied 29,382

The following list shows the number of 3-pound packages of the different varieties which have been sent out:—

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		BARLEY.	
		Six-rowed.	
Improved Ligowo	1,799	Mensury	651
Banner	1,160	Odessa	385
Abundance	1,050	Royal	277
Siberian O.A.C.	949	Trooper	264
Wallis	939	Oderbruch	163
American Beauty	932	Champion	159
Bavarian	700	Success	118
Golden Giant	471		
Golden Beauty	393	*Two-rowed.*	
Joanette	340		
Early Gothland	128	Sidney	324
Mennonite	111	French Chevalier	143
White Schonen	8	Danish Chevalier	79
		Beaver	3
Total	8,980	Total	2,566

Number of 3-pound packages of the different varieties which have been sent out—*Con.*

Name of Variety.	Number of Packages.
SPRING WHEAT.	
Preston	1,503
Red Fife	1,268
White Connell	924
Wellman's Fife	715
White Fife	715
Percy	668
Monarch	277
Red Fern	257
White Russian	257
Rio Grande	125
Beauty	107
Ladoga	15
Total	6,831
PEASE.	
Victoria	977
Wisconsin Blue	564
Canadian Beauty	337
Prussian Blue	276
French Canner	157
Arthur	143
Improved Sugar Marrow	129
Pride	58
Total	2,641
INDIAN CORN.	
Selected Leaming	629
White Cap Yellow Dent	304
Longfellow	275
Angel of Midnight	132
Mitchell's Early	73

Name of Variety.	Number of Packages.
INDIAN CORN—*Concluded.*	
Mammoth Eight-rowed Flint	35
Compton's Early	22
Champion White Pearl	21
Pearce's Prolific	8
Total	1,499
POTATOES.	
Northern Spy	673
Daisy	592
Empire State	555
Wonder of the World	520
American Wonder	455
Burnaby Seedling	443
Carman No. 1	343
Vanier	342
Dakota Red	341
Early Harvest	313
Late Puritan	288
Lee's Favourite	284
Rochester Rose	277
I. X. L	275
Clarke's No. 1	266
May Queen Early	211
Early Sunrise	196
Early Rose	162
Queen of the Valley	126
Burpee's Extra Early	109
Everett	88
Irish Daisy	6
Holborn Abundance	6
Other varieties in all	17
Total	6,888

A NEW FEATURE IN THE GRAIN DISTRIBUTION.

During the past year a new feature has been introduced in connection with the distribution of seed grain. In sending out the 3-pound samples in the past it has scarcely been practicable to prescribe any particular size of plot on which these samples should be sown, each applicant has used his own judgment in that respect and there has been much variation in this particular. On this account no information could be obtained as to the relative yield per acre of the different sorts under trial. Under the new arrangement sufficient seed has been sent to sow one-tenth of an acre for which 8 pounds of oats and 10 pounds of barley or spring wheat have been supplied.

Fourteen of the best varieties of grain were chosen for this special purpose, six of oats, four of spring wheat and four of barley. As it was not practicable to send this quantity of grain to all applicants a select list of farmers was made by choosing from each constituency a few of those who had shown by their reports on the 3-pound samples that they were much interested in this important work. A circular was sent to each one with the names of the different sorts of grain to be sent out, and an opportunity afforded for each farmer to make choice of the variety he preferred. An active interest was taken in this subject by farmers in all parts of the Dominion and the total number who have taken part in the test is 4,320.

These samples were distributed by provinces as follows :—

Name of Grain.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	N.W.T.	B.C.
Oats	64	209	240	587	744	130	113	50
Spring wheat	80	98	211	508	329	50	20	23
Barley	37	116	69	304	256	48	16	12
Total	181	423	520	1,399	1,329	228	149	85

The following list shows the number of 8-pound or 10-pound packages of the different varieties which have been sent out.

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		BARLEY.	
Abundance	630	*Two-rowed.*	
Improved Ligowo	343		
Banner	340	Beaver	161
American Beauty	334	Sidney	68
Golden Giant	295		
Bavarian	179		
		Six-rowed.	
Total	2,121		
		Royal	466
SPRING WHEAT.		Trooper	155
Preston	730		
Percy	342		
Stanley	205		
Advance	76		
Total	1,353	Total	860

Many samples have also been distributed from the branch experimental farms. Full particulars relating to these will be found in the reports of the Superintendents of the branch farms.

TESTS OF THE VITALITY OF GRAIN AND OTHER SEEDS FOR 1899.

During the season of 1899, 2,058 samples of seed grain and other seeds were tested chiefly for farmers, to ascertain the proportion which would germinate. Many of the samples received for test are much below the average and do not fairly represent the germinating power of the grain of average quality grown in different parts of the Dominion. The object in view in carrying on this work from year to year, is to give farmers the opportunity of having any samples which may be of doubtful vitality through injury during harvesting or storing, or from frost, thoroughly tested so that their value for seed purposes may be ascertained. Samples may be sent free through the mail and the quantity of grain sent should not be less than one ounce. The samples are tested and reported on free of charge and their proportion of vitality can usually be determined within a fortnight after they are received.

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RESULTS of Tests of Seeds for Vitality, 1898-99.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	808	100·0	3·0	79·2	5·8	85·0
Barley	315	100·0	19·0	80·3	8·8	89·1
Oats	449	100·0	8·0	81·7	6·0	87·7
Rye	3	92·0	84·0	84·6	4·0	88·6
Pease	155	100·0	28·0			85·2
Corn	5	100·0	10·0			56·0
Grass	20	95·0	6·0			62·2
Clover	7	89·0	19·0			73·0
Turnips	21	93·0	29·0			66·7
Mangels	3	74·0	50·0			61·3
Carrots	10	62·0	21·0			45·2
Cabbage	33	90·0	13·0			54·9
Tomatoes	18	82·0	4·0			35·5
Radish	10	74·0	27·0			51·4
Lettuce	24	90·0	1·0			42·3
Spinach	6	60·0	16·0			39·3
Onions	20	75 0	25·0			51·6
Celery	18	82·0	4·0			35·5
Squash	18	80·0	0·0			42·2
Cucumber	11	80·0	0·0			43·3
Musk Melon	16	80·0	8·0			39·0
Water Melon	14	72·0	0·0			31·0
Flax	6	94·0	17·0			65·5
Cauliflower	6	63·0	44·0			54·3
Borecole	3	78 0	38·0			64·0
Brussel Sprouts	2	85·0	84·0			84·5
Parsley	3	39·0	15·0			31·0
Pepper	4	41·0	4·0			17·5
Salsify	3	83·0	43·0			58·6
Chicory	2	77·0	68·0			72·5
Leeks	2	53·0	37·0			45·0
Cress	3	73·0	45·0			63·6
Asparagus	3	39·0	3·0			17·3
Tares	2	91·0	26·0			58·5
Nasturtium	2	92·0	64·0			78·0
Carraway Seed	2	6·0	2·0			4·0
Tobacco	2	59·0	43·0			51·0
Mignonette	4	39·0	18·0			29·5
Horehound	2	9·0	1·0			5·0
Sweet Basil	2	92·0	44·0			68·0
Sweet Marjoram	3	32·0	14·0			20·6
Summer Savory	2	22·0	15·0			18 5
Sage	1	71·0	71·0			71·0
Saffron	1	13·0	13·0			13·0
Fennel	1	21·0	21·0			21·0
Thyme	1	16·0	16·0			16 0
Balm	1	7·0	7 0			7·0
Lavender	1	23·0	23·0			23·0
Rue	1	32·0	32·0			32·0
Egg Plant	1	5·0	5·0			5·0
Beans	1	100·0	100·0			100·0
Canary Seed	1	73·0	73·0			73·0
Rape	1	97·0	97·0			97·0
Rhubarb	1	70·0	70·0			70·0
Parsnips	1	3·0	3·0			3·0
Mustard	1	74·0	74·0			74·0
Endive	1	74·0	74·0			74·0
Chervil	1	18·0	18·0			18·0
Total number of samples tested, highest and lowest percentage	2,058	100·0	0·0			

TABLE showing Results of Grain Tests for each Province.

ONTARIO.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	217	100·0	3·0	78·4	4·7	83·1
Barley	114	100·0	27·0	74·3	12·3	86·6
Oats	147	100·0	38·0	92·0	4·2	96·2

QUEBEC.

Wheat	52	100·0	74·0	89·6	4·3	93·9
Barley	45	100·0	85·0	88·2	6·2	94·4
Oats	23	100·0	85·0	91·3	3·2	94·5

MANITOBA.

Wheat	327	100·0	14·0	74·9	6·9	81·8
Barley	62	100·0	19·0	83·2	6·9	90·1
Oats	104	100·0	8·0	83·6	6·3	89·9

NORTH-WEST TERRITORIES.

Wheat	134	99·0	64·0	82·7	6·3	89·0
Barley	57	100·0	64·0	82·4	6·8	89·2
Oats	118	100·0	15·0	60·3	9·9	70·2

NOVA SCOTIA.

Wheat	30	99·0	64·0	85·3	4·9	90·2
Barley	18	97·0	67·0	76·2	9·2	85·4
Oats	16	100·0	77·0	87·8	4·7	92·5

NEW BRUNSWICK.

Wheat	25	100·0	62·0	86·7	4·5	91·2
Barley	10	100·0	80·0	86·8	6·5	93·3
Oats	16	100·0	85·0	92·3	3·2	95·5

PRINCE EDWARD ISLAND.

Wheat	16	99·0	55·0	83·0	6·1	89·1
Barley	6	99·0	68·0	76·8	7·2	84·0
Oats	15	100·0	91·0	93 3	3·3	96·6

BRITISH COLUMBIA.

Wheat	7	100·0	88·0	92·6	2·1	94·7
Barley	3	100·0	88·0	92·6	3·0	95·6
Oats	10	100·0	92·0	96·2	1·6	97·8

WILLIAM T. ELLIS,
In charge of Seed Tests.

METEOROLOGICAL OBSERVATIONS.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1899; maximum, minimum and mean temperature for each month, with date of occurrence, also rainfall and snowfall.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days' Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		in.	in.	in.		in.	
Jan.....	24·67	2·33	22·34	13·50	46·0	5th	—22·9	10th	1·13	10·50	2·18	20	0·42	15th
Feb.....	21·22	3·53	17·69	12·37	41·0	20th	—24·1	12th	0·29	5·75	0·86	14	0·35	22nd
March ..	30·14	13·55	16·59	21·84	41·0	3rd	—8·6	17th	1·13	44·75	5·60	17	1·00	19th
April ..	52·24	32·20	20·04	42·22	84·0	30th	15·7	6th	1·03	.....	1·03	10	0·53	8th
May.. ..	68·91	45 85	23·06	57·38	80·0	26th	37·2	10th	4·72	.....	4·72	13	1·26	30th
June....	76·74	54·57	22·17	65·66	88·9	5th	46·2	11th	2·97	....	2·97	12	0·73	15th
July.....	78·31	57·25	21·05	67·77	86·8	2nd	43·8	20th	9·85	..	9·85	17	2·92	11th
August..	81·75	56·95	24·80	69·35	93·7	19th	45·9	14th	0·38	.....	0·38	7	0·24	22nd
Sept ...	65·69	46·09	19·60	55·89	84·2	3rd	32·5	23rd	5·59	.....	5·59	17	1·76	26th
Oct.....	56·29	39·46	16·83	47·87	72·1	25th	25·0	22nd	2·71	.....	2·71	11	0·84	29th
Nov.....	39·68	28·48	11·19	34·07	51·5	7th	14·0	13th	1·90	0·50	1·95	10	0·56	1st
Dec	29·20	15·53	13 66	22·36	48·5	12th	—17·9	31st	2·16	15·75	3·79	18	0·91	24th
									33·86	77·25	41·63	166		

Rain or snow fell on 166 days during the 12 months.
Heaviest rainfall in 24 hours, 2·92 inches on July 11.
Heaviest snowfall in 24 hours, 10·00 inches on March 19.
It will be seen the highest temperature during the 12 months was 93·°7 on August 19.
The lowest temperature during the 12 months was −24·°1 on February 12.
During the growing season rain fell on 10 days in April, 13 days in May, 12 days in June, 17 days in July, 7 days in August and 17 days in September.
August shows the lowest number of days on which rain fell, viz., 7.
Rain or snow fell on 20 days in January.
Total precipitation during the 12 months, 41·63 inches, as compared with 37·17 inches during 1898.

WM. T. ELLIS, *Observer.*

RECORD OF SUNSHINE AT CENTRAL EXPERIMENTAL FARM, OTTAWA, 1899.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	18	13	91·2	2·94
February	19	9	102 1	3·64
March	17	14	124·1	4 00
April	26	4	228·8	7·62
May	27	4	225·4	7·27
June	29	1	257·1	8·57
July	29	2	271·3	8·75
August	31	0	271·2	8·74
September	22	8	128·9	4·29
October	23	8	120·4	3·88
November	17	13	77·0	2·56
December	17	14	50·1	1·61

RAINFALL, Snowfall and total Precipitation for 10 years, 1890 to 1899, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	Inches.	Inches	Inches.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	36·02
1899	33·86	77·25	41·63
Total	264·87	853·10	350·27
Yearly average	26·48	85·31	35·02

WM. T. ELLIS, *Observer.*

WHAT THE EXPERIMENTAL FARMS HAVE DONE TO STIMULATE TREE PLANTING.

Experiments in tree planting were begun at all the Experimental Farms as soon as practicable after the sites selected were secured, but as the need for forest shelter is greater on the open plains in the North-west country, special attention has been given to this subject on the branch experimental farms at Brandon, Manitoba; and at Indian Head, in the North-west Territories.

CENTRAL EXPERIMENTAL FARM.

In 1888 forest tree planting was begun on this farm and two blocks of land devoted to this purpose. One of these 165 feet in width extends entirely across the west end of the farm, the other a narrower piece 65 feet in width, extends the full length of the north boundary. It was not practicable to complete this planting quickly, about 3,000 trees were planted in 1888, 7,700 in 1889 and the area of planting was added to from year to year until 1894 when the work was completed. These forest plantations contain about 20,800 trees including most of the more important timber trees which are hardy in this climate.

The objects in view in planting these forest belts at Ottawa were:—

1st. To ascertain the relative growth, in height and circumference of trunk of a number of different trees when planted at different distances apart. The distances chosen in this instance for trial were 5 feet by 5, 5 feet by 10 and 10 feet by 10.

2nd. To gain information as to the relative growth of these trees when planted in blocks of one sort, as compared with mixed clumps.

3rd. To find out how far farm crops located near tree belts will be influenced by the shelter they afford.

The pleasing effects produced on the landscape by blocks of trees when suitably grouped were not overlooked, but the main purpose has been to gain such practical information relating to the growth of the more important timber trees in this climate, as would be useful to those who may in future engage in timber growing in this country. Measurements of the annual growth of representative examples of the different sorts of

trees have been taken from time to time and the particulars published in the Reports of the Experimental Farms.

Forest trees sent to the branch experimental farms and to settlers for test.

In 1888, 2,800 young forest trees of twenty-eight sorts were sent from the Central Farm to the branch experimental farm at Nappan, Nova Scotia, to be tested in that climate, 20,000 were also sent to the branch farm at Indian Head, in the North-west Territories.

In 1889 some additional smaller supplies of trees were sent to Nappan, 12,000 trees and shrubs of 118 varieties were sent to the branch experimental farm at Brandon, Man., 15,000 to Indian Head, N.W.T., and 7,000, chiefly of the most valuable hard woods of the East, were sent to the branch experimental farm at Agassiz, in British Columbia.

Experimental gardens in which forest trees were to be tested, were laid out that year by the Canadian Pacific Railway at twenty-five different points on the main line between Moosejaw and Calgary. To each of these stations a bundle of well-rooted young forest trees was sent from the Central Experimental Farm, each package containing 175 trees of thirty-seven different species.

During this season 700 1-pound bags of tree seed were also distributed for test, consisting chiefly of box elder, green ash, butternut and black walnut. These were sent to farmers for planting, in different parts of the Dominion.

In 1890, 21,700 trees and shrubs were sent to the branch farm at Brandon, Man., 15,000 to Indian Head, N.W.T., and 8,000 to Agassiz, B.C.

To farmers—mainly to those residing in the Canadian North-west, there were sent that season 131,600 young forest trees and shrubs in 1,316 packages of 100 each, with instructions for planting and care. About 3,500 trees, in packages of about 150 each were also sent to the chief stations of the Mounted Police and to the Indian agencies in different parts of the North-west country.

In 1891 smaller supplies of trees and shrubs, including sorts not hitherto tested, were sent to the branch farms at Nappan, N.S., Brandon, Man., and Indian Head, N.W.T., and an additional supply of 7,284 to Agassiz, B.C.

The young forest trees sent by mail that year to settlers in Manitoba and the North-west Territories numbered 200,000. These were sent in 2,000 packages, each containing 100 trees.

During 1890 the native trees growing in the coulées and bluffs in the North-west bore an abundant crop of seeds, and with the aid of Indians and Half-breeds, nearly three tons of these were collected. These seeds were chiefly box elder and green ash, of which 4,053 1-pound bags were sent to applicants in Manitoba and the Territories. Limited distributions were also made at Brandon and Indian Head, and the remainder planted at these two farms in large seed beds.

In 1891 frosts destroyed most of the tree seeds, and very few could be obtained.

1892. In this and every subsequent season to the present, many additional species and varieties of trees and shrubs have been sent to each of the branch farms, new sorts which could not be procured earlier, including all those obtainable which were likely to prove hardy and useful in the different climates in which these farms are located.

This year 45,218 trees, a large proportion of which were evergreens, were sent in 983 packages by mail to North-west settlers for trial, and 91,800 cuttings of hardy poplars and willows were similarly distributed.

As no tree-seeds could be had in 1891, and the trees in 1892 were again well laden, nearly 3 tons more were collected in the autumn of that year.

In 1893, 83,000 young trees and cuttings were sent out to settlers, also 1,523 1-pound bags of tree seeds.

Since 1893, arrangements have been made to supply settlers in Manitoba as far as is practicable with young forest trees and tree seeds from the experimental farm at Brandon, and those residing in the Territories from the farm at Indian Head. Many applications, however, continue to be made to the Central Farm for tree seeds, and to meet this demand about 300 pounds have been obtained each year from the supplies collected at Brandon and Indian Head, and sent out from Ottawa.

The tree planting and tree distribution during the past twelve years at the Central Experimental Farm has aggregated as follows:--Planted at Ottawa, including forest belts, ornamental grounds, avenues, hedges and Arboretum, over 40,000 specimens. Total number of trees sent to the branch farms at Nappan, about 4,000; Brandon, 65,000; Indian Head, 70,000; Agassiz, 35,000.

The distribution from the Central Farm throughout the Dominion has been chiefly to settlers in the North-west. To these there have been sent during the same period about 560,000 young forest trees and cuttings, mostly in bundles of 100 each, and about 9,000 pounds (4½ tons) of tree seeds.

EXPERIMENTAL FARM, NAPPAN, N.S.

From the supplies of forest trees and shrubs sent to Nappan, much useful information has been gathered in reference to the hardiness and suitability of the different species to that climate. Permanent plantations have been made and a limited number of trees and shrubs have been sent for trial to farmers in different parts of the Maritime Provinces.

EXPERIMENTAL FARM, BRANDON, MAN.

A large proportion of the 65,000 trees and shrubs sent from the Central farm to Brandon, have been used for trial planting on that farm; while many of the varieties have proved tender in that climate and a large number of trees have died, many others have been successfully grown. At the same time many thousand young trees have been raised from seed of native species and these have been set out in the plantations. The number of trees now growing on this branch farm in wind-breaks, avenues, hedges, Arboretum and nurseries is estimated at from 70,000 to 80,000. The Brandon farm has greatly aided tree growing in Manitoba by the practical object lessons it has given to the public in the various methods of tree planting adopted there. It has also distributed among the farmers of Manitoba young trees for test usually in bundles of 100 to each farmer and tree seeds in 1-pound bags as follows:—

In 1891	Trees and cuttings	....	20,500				
1892	"	"	 40,000				
1893	"	"	 60,000	Tree seeds	1-lb.	bags....	400
1894	"	"	 46,800	"	"	....	350
1895	"	"	 29,550	"	"	....	226
1896	"	"	 77,700	"	"	....	——
1897	"	"	 90,600	"	"	....	385
1898	"	"	148,700	"	"	....	165

Making in all 513,850 young forest trees and cuttings and 1,526 one pound bags of tree seeds sent out from this farm to the end of 1898.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

The branch farm at Indian Head has also done much to promote tree growing on the plains. To the 70,000 trees sent there from the Central Farm, there have been added a very large number of native trees grown from seed collected in the Territories, and it is estimated that there are now growing on that farm about 125,000 trees.

There has also been sent from the Indian Head farm to settlers in the Territories, young forest trees and cuttings in mail packages of about 100 each, and of tree seeds in 1-pound bags as follows:—

In 1890 trees and cuttings		12,000			
1892	" "	17,700			
1893	" "	5,000	Tree seeds 1-lb. bags		200
1894	" "	14,576	" "		532
1895	" "	19,350	" "		360
1896	" "	18,055	" "		. .
1897	" "	16,796	" "		1,460
1898	" "	23,920	" "		424
1899	" "	59,700	" "		381
		187,097			3,357

Making a total of 187,097 young forest trees and cuttings, and 3,357 one pound bags of tree seeds sent out during the period named.

EXPERIMENTAL FARM, AGASSIZ, B.C.

The 35,000 young trees sent to this farm—about two-thirds of which were of hard woods from the East—have been mostly used for planting on the Experimental Farm, chiefly on the sides of the low mountains forming part of the farm property. This has been done with the object of finding out whether these useful trees so valuable for their timber can be successfully grown in this climate. A limited distribution from among these has, however, been made to parties specially interested in tree growing in British Columbia. A few varieties including some of the more ornamental sorts have also been sent for planting on the grounds about the more important stations on the line of the Canadian Pacific Railway.

SUMMARY.

From the figures presented it will be seen that during the comparatively brief period of twelve years, since the experimental farms were founded, these useful institutions have laid the foundation for a great advancement in tree growing in Canada in the near future. There are now growing on the five Experimental Farms a grand total of about 245,000 trees. There has also been sent out from these farms during the period mentioned to individual lovers of trees in small lots of about 100 each 1,261,000 (more than 1¼ millions) young forest trees and cuttings and 14,000 pounds (7 tons) of tree seeds, every pound of which with reasonable care may be expected to produce from 500 to 800 young seedlings. The results of this work are now everywhere apparent. On homesteads in almost every part of Manitoba and the Territories there are small plantations of forest trees which furnish more or less shelter for the growing of garden vegetables, small fruits and flowers, also for buildings and stock and at the same time make the dwellings of the settlers more attractive and home like.

Since experience has shown that the box elder or Manitoba maple, the tree which has been most largely used in this work, begins to produce seed when about six or seven years old a large number of the trees early distributed must now have reached a seed-bearing age. On the western experimental farms a very large quantity of tree seeds are now ripened every season, on young trees planted since the farms were established, and from this time forward all over the country year after year as the number of seed bearing trees increase, immense and constantly increasing quantities of seed will be available and convenient for use, and thus an enormous impetus will be given to tree-growing especially on the North-west plains.

CORRESPONDENCE.

The following is a summary of the letters received and sent out at the Central Experimental Farm from November 30, 1898, to November 30, 1899, also the number of reports, bulletins and circulars forwarded by mail during the same period :—

—	Letters Received.	Letters Sent.
Director	42,653	19,325
Agriculturist	1,361	2,512
Horticulturist	1,318	1,346
Chemist	1,257	1,595
Entomologist and Botanist	2,495	2,320
Poultry Manager	1,507	1,092
Accountant	1,086	1,343
Totals	51,677	29,533

Circular letters sent, including circulars sent with samples of seed grain	43,132
Number of reports and bulletins mailed	152,826

SOME JOURNEYS UNDERTAKEN DURING THE YEAR.

EXPERIMENTAL FARM, NAPPAN, N.S.

Two visits were made to the Experimental Farm at Nappan, Nova Scotia, during 1899, the first early in May and the second during the month of October. On both these occasions careful inquiry was made regarding the work in progress. At both times the dairy herd was found in good condition and the cows were giving a good flow of milk. The steers which had been fed during the winter of 1898-9 were disposed of before my early visit was made, at good prices. Their presence during the feeding period had materially increased the quantity of barn-yard manure available for the ensuing crops. An additional area of land was cleared during the winter of 1898–9, which has since been utilized as pasture for cattle. The water supply provided last year, drawn from springs on the rear end of the farm, has proved an abundant one, ample for the stock barns as well as for the dwellings on the farm. The quality of the water is excellent.

In October I found the crops all gathered with the exception of the turnips, which were then being brought in. Nothwithstanding the cold and backward spring which had delayed seeding, most of the grain crops had turned out remarkably well. The oats and wheat both gave yields considerably above the average. The straw was strong and bright and the grain well developed and plump. The root crop was also good.

The fruit trees in the orchards had made fair growth, and all sorts of small fruits had done well. The hedges, shelter belts and plantations of shrubs and trees were all in a thriving condition and had made satisfactory progress.

ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

About the middle of August I visited Columbus, Ohio, where I had the privilege of attending the meetings of the American Association for the Advancement of Science, also the meetings of the Society for the Promotion of Scientific Agriculture. The attendance was large, and distinguished men representing every branch of science were there, and many valuable contributions were made to our knowledge in the papers which

were presented. The facts submitted relating to the progress of agriculture were especially valuable to those interested in that subject and elicited much discussion and comment. The meetings were held in the large and commodious buildings of the University of Ohio, and opportunities were thus afforded of visiting the museums rich in botanical, entomological and other specimens and of examining the large collection of trees and shrubs on the University grounds. The week spent there was a profitable one.

MINNESOTA EXPERIMENT STATION.

Journeying westward, two days were given to an examination of the work in progress at the Minnesota Experiment Station at St. Anthony's Park near Minneapolis. Much advancement has been made since my visit there in 1894. Many new buildings have been erected and the grounds very much improved by the growth which has taken place in the trees and shrubs as well as by additional planting.

Although the grain crops had all been harvested, there was much to interest one in the plantations of small and large fruits as well as in ornamental trees and shrubs. A large collection of improved varieties of American plums has been brought together there and under the guidance of the Horticulturist, I had ample opportunities for testing the relative merits of a number of different sorts which were then in process of ripening. Many varieties of the hardier sorts of Russian apples were being tried with a considerable degree of success.

In company with the assistant agriculturist, I also had the privilege of visiting some of the large flour mills in Minneapolis, and of inquiring into the newer methods in use there of determining the relative value of the different sorts of wheat when converted into flour.

NORTH DAKOTA EXPERIMENT STATION.

The experiment station of North Dakota was next visited, which is located near Fargo. At the outset the conditions and surroundings of this institution were much like those of the experimental farm at Indian Head. Both originally were started on bare prairie lands and much attention has been given to tree planting for shelter and ornament. The progress made at Indian Head has been much more rapid and the field of work covered more extended than at Fargo. There were, however, many things of interest to be seen and inquired into, which made the day spent there under the kind guidance of the station officials both pleasant and profitable.

EXPERIMENTAL FARM, BRANDON, MAN.

Leaving Fargo, the journey was continued to the branch farm at Brandon. Although too late to see many of the standing crops most of the grain from the experimental plots was still in stook. Notwithstanding that the season had opened unfavourably and that wet weather had delayed seeding in the spring, the grain crops at this farm were excellent and the yield in some cases very large. This was notably the case with oats and wheat. Some of the most productive sorts of oats had given from 100 to 110 bushels per acre, and some of the best of the wheats from 30 to 45 bushels per acre. Pease had yielded good crops. Awnless Brome grass and some native grasses gave remarkably good returns, the yields of field roots and potatoes were about an average, while Indian corn and Millets gave lighter crops than usual.

The stock was in a healthy state, the implements well cared for and the progress of the farm work in a general way very satisfactory. The small fruit plantations had done well and the ornamental trees, shrubs and hedges had made excellent growth. The flower beds about the buildings were gay with bloom of varied hues, and were proving very attractive to a large and increasing circle of visitors.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

This farm was next visited, and the various branches of work conducted there inquired into. The horses, cattle, swine and poultry were all in good condition and gave evidence of careful handling. The barns were well stored with excellent hay, the product of the fields of Awnless Brome grass and native Western Rye grass on the farm. Owing to the unusually favourable conditions of moisture in 1899, the hay crop has been very good.

The spring was very wet which made seeding unusually late and after it was fairly begun its progress was several times interrupted by heavy storms. With abundance of moisture and a very rich soil the growth of straw was rank, and in some districts this delayed the ripening of the grain so that some of it was injured by frost before it was fully matured. At the Indian Head farm, however, all the cereal crops gave a bountiful return. Most of the best varieties of wheat gave from 30 to 38 bushels per acre, oats from 80 to 95 bushels, and barley from 55 to 65 bushels per acre.

Good crops of field roots have also been produced, but the crop of Indian corn has been light. The shelter belts and other tree plantations have made remarkable growth and the wood ripened fairly well before winter set in. Many of the early planted trees on this farm are now yielding an abundance of seed which is gathered each season and distributed among farmers who apply for it in different parts of the Territories.

WESTWARD THROUGH THE CROW'S NEST PASS.

Proceeding westward a trip was made through the Crow's Nest Pass where the scenery although not nearly so grand as on the main line of the Canadian Pacific Railway is very varied and interesting. Wonderful development is going on in that portion of the Dominion. The output of coal is enormous and the growth of some of the towns phenomenal. At Fernie, on the western slope of the Rocky Mountains, a place but little more than a year old there is a population of nearly a thousand people. The coal there is specially adapted to the making of coke of excellent quality for smelting and at the time of my visit 150 coke ovens were in constant use, turning out 1,200 tons of coke per week, while 50 additional ovens were in course of construction. The advent of the railway by which large and valuable coal deposits have been reached has been an important factor in the progress of mining industry in that region, which is advancing by leaps and bounds. Cranbrook is an older and more populous town in which a large business is done.

All along the route through the Kootenay country, the district is so mountainous and rocky that there does not appear to be much land available for agricultural purposes. From the few crops visible from the trains and the fruit trees seen growing in the gardens in some of the older towns, it was evident that in many parts of that country the climate is well adapted to the growing of agricultural crops and also of fruits of high quality. Some very fine pears, apples and plums were seen on the trees in some of the older gardens. A day was spent at Nelson and another at Rossland, both of which are now important and interesting places. In both these towns, mining is being actively pushed and the daily output of ore is very large. At Rossland the formation of the mountains is such as to resemble a large basin and part way up the steep sides of this basin at an elevation of about 3,000 feet the town is built. The railway climbs to this height by a succession of steep grades. Although only four years old this town has a population of several thousand and business of all sorts seemed to be very brisk. On the way to Rossland, Trail was passed, where there is a very large smelter which was then being worked to the fullest capacity, and the valuable metals were extracted from an enormous quantity of ore every week. On the way up the Arrow Lakes from Robson to Revelstoke, the new line of railway recently built to the eastern part of the boundary country was seen. This runs along the sides of the mountains which skirt the margin of the Arrow Lakes for about 30 miles, then turning south-westerly up the valley of Kettle Creek, is soon lost to view. Taking a sleeper from Revelstoke the journey was made to Agassiz, B.C., by about ten the following morning.

SESSIONAL PAPER No. 8a

EXPERIMENTAL FARM, AGASSIZ, B.C.

The work on this branch experimental farm is making good progress. An additional area of land is cleared every year and the portions devoted to orchards and field crops are being gradually enlarged. About 140 acres are now under cultivation nearly one-half of which has been planted with fruit. A very large number of varieties of fruit have been brought together on this farm from many different countries, and as these trees come to a bearing age much useful information is gained from year to year as to the sorts best suited to the climate and most profitable to the grower.

The season of 1899 has been a most unfavourable one here for fruit. The spring was very late and rain was so frequent, with dull weather intervening all through the blossoming period that very little fruit set. Some varieties, however, of apples and plums and a few of the pears bore a partial crop, but the total yield was very disappointing. The crops of hay and oats were good, barley also has given a fair yield. The quantity of wheat grown in this province is small, but the crop was about an average one. The season was unusually cool as well as wet, which was unfavourable for Indian corn and this crop was light. Field roots gave satisfactory returns. The hedges, avenues and plantations of forest and ornamental trees had made excellent growth.

A VISIT TO THE DOUKHOBORS.

On returning east a trip was taken up the Manitoba and North-western railway from Portage la Prairie to Yorkton, and thence by vehicle nearly 100 miles to the north trail of the Swan River near Thunder Hill. Journeying then eastward for many miles the Swan was again forded and travel continued on the south trail until the Dauphin Railway was reached. During this drive of about 150 miles, many villages of the Doukhobors were passed and inquiries made as to their progress in these new settlements, in providing shelter and food for the winter and in preparing land for crop next season. At the time of my visit nearly all the able-bodied men were away from the villages working on the railways or assisting the settlers within reach in their harvesting and threshing, thus earning money to buy supplies for the winter, while some of the older men and the boys with the help of a number of the strong and active women were building houses and preparing land for crop next year. They are a very industrious people and appear to be well satisfied with the country. Most of the land in their settlements is of good quality and the locations they have chosen are more or less wooded, affording convenient supplies for building operations, and for firewood. They are all vegetarians and will not eat animal food as they consider it a sin to kill, many of them, however, will eat fish, and some of their villages are located near small lakes in which fish are abundant. They like butter, cheese and eggs, but as yet can get very little of these useful concentrated foods, as their stock of cows is so small as to give them but a meagre supply of milk, and they have very few fowls. At the time of my visit they were subsisting chiefly on dry bread made from a low grade of flour, with soup made by boiling a mixture of flour and water, with vegetables such as cabbages, onions and beets and in some instances potatoes of which they are very fond. In most of the villages considerable quantities of vegetables have been grown, but not nearly enough for the requirements of the people for the winter.

HOW THEY LIVE.

The houses of the Doukhobors are substantially built of logs, and roofed with poles, on which prairie sod about 4 inches thick is laid and the interstices filled with fine earth. The sides of the houses are well plastered on the outside with clay mixed with cut straw or hay and sometimes on the inside also with the same material. The furniture in the houses is all of their own make and consists of a few rough stools to sit on, and higher benches which serve as tables. The beds are made of a series of poplar poles about 6 feet long and 3 or 4 inches in diameter, placed close together along

one or both sides of the house, with the ends to the wall. On these some hay is placed and over this a piece of thick felt. The people recline on this structure with their heads to the wall, feet outwards using such bed clothes as they can command. A few have feather beds and curtains to divide the sleeping places into compartments. Most of the houses consist of one large room for living, cooking, eating and sleeping. The aim is to have in all their villages a house for each family, and these houses were being erected at varying distances in two rows with a wide street between them. Although new houses are going up rapidly in every village, the absence of the able bodied men necessarily interferes with the progress of this work, and in some of the villages at that time each house was occupied by from 10 to 20 people and in a few instances the inmates numbered from 25 to 40.

In these densely populated buildings the beds are arranged in a double tier the upper one being reached by a ladder. In each house there is a Russian oven similar to those used by the Mennonites in Manitoba, which serves for the warming of the building and cooking the food.

These people seem very contented and although in many instances conditions were met with, which would with us be regarded as cases of hardship, not a word of complaint was heard from any of them. They are honest, truthful and hard working, cleanly in their habits and use neither liquor nor tobacco. Being vegetarians they are at present at a disadvantage as compared with other settlers, as there is much game about their settlements with which they could easily supplement their vegetable diet with great advantage. They appear, however, to be very strong and hardy and will I believe prove a very useful class of people in the districts in which they are settled, and will soon form prosperous communities which will aid much in the development of the country. They may, however, need some assistance for a time until they can earn enough, together with the produce they can get from their land to sustain them.

THE RETURN JOURNEY.

The return was made by the Canadian Northern Railway which runs through the Dauphin country from Gladstone to Swan River. The Manitoba and North western and the Canadian Northern are both substantially built roads, which connect with the main line of the Canadian Pacific at Portage la Prairie. Each line runs through portions of the country where much of the land is of excellent quality and the conditions are favourable for mixed farming. Settlement is proceeding rapidly and traffic is increasing and the returns are improving from year to year.

THE PARIS EXPOSITION.

Much work has been done at all the Experimental Farms in providing choice material, both in grain and fruit, for the forthcoming Paris Exposition. A large number of varieties of cereals and other agricultural products have been put up in suitable form for display both in straw and as cleaned grain.

The Central Experimental Farm has contributed 18 cases of cereals and 224 bottles of fruits preserved in antiseptic fluids, and the branch farm at Nappan, Nova Scotia, 7 boxes of grain and 214 bottles of fruit. The farm at Brandon, Man., has sent 8 cases of cereals and 81 bottles of small fruits and vegetables; Indian Head, N.W.T., has forwarded 9 boxes and 25 bags of grain and 123 bottles of vegetables and small fruits, while from Agassiz there has been sent 5 cases of grain, 188 bottles of preserved fruit and 17 cases of fresh fruit. The Experimental Farms have thus contributed materially to the magnificent display of agricultural and horticultural products which will be made by Canada on this important occasion.

ACKNOWLEDGMENTS.

To the Director of the Royal Gardens, Kew, England, grateful acknowledgments are due for another valuable collection of the seeds of trees, shrubs and plants from

many countries. Also to the Director of the Arnold Arboretum Jamaica Plains, Mass., for seeds of rare and promising varieties. To the United States Department of Agriculture at Washington, I am indebted for a number of different sorts of cereals, and to Prof. John Macoun, Naturalist, of the Geological and Natural History Survey, and to Mr. J. M. Macoun, Assistant Naturalist, my thanks are due for seeds of many interesting native species, gathered in different parts of Canada.

The faithful services rendered by all the officers at the Central and Branch Experimental Farms, and their earnest co-operation in carrying out the many lines of experimental work planned, are gratefully acknowledged.

My thanks are also due to those members of the staff who have rendered most efficient help in those branches of the work of which I have had personal charge: to the Horticulturist, Mr. W. T. Macoun, who has supervised the labour given to the lawns, and to the trees and shrubs planted on the ornamental grounds: to the Farm Foreman, Mr. John Fixter, who has carefully watched over the different branches of the work, taken special charge of the fertilized plots, and aided me much by his practical suggestions: to Mr. Harry Fixter, who has managed the work connected with the experimental plots of cereals, fodder crops and field roots, and has taken records of the growth and yield of all the varieties grown in the uniform test plots, to whom I am also indebted for the careful management of the many details connected with the distribution of samples of seed grain. Careful work has also been done by Mr. Wm. Ellis, in testing the vitality of seeds, in the management of the green house plants, in the propagation of many useful and ornamental species and in the taking of the meteorological records. The employees also of all the farms, in every branch of work, have shown commendable care, and have faithfully discharged their respective duties.

WM. SAUNDERS,

Director Experimental Farms.

REPORT OF THE AGRICULTURIST.

(J. H. GRISDALE, B. Agr.)

DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports on (1) Horses, (2) Pure-bred Breeding Stock. (3) The Dairy Herd. (4) Experiments in Beef Production. (5) Experiments in Pork Production. (6) Sheep. (7) The Farm Dairy, and (8) The 200 Acre Farm, rotation, methods of cultivation and crops thereon.

I have addressed meetings at Merivale, Shawville, Rockland, Kingston, Eastern Ontario Dairymen's Association, St. Jerome, Quebec Dairymen's Association, London, Leicester Breeders' Association, Mattawa, Carleton Place and Almonte.

I am indebted to John Fixter, farm foreman, and to R. R. Elliott, herdsman, for particularly valuable assistance, both in carrying on the work reported upon and in the preparation of the submitted report.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist

HORSES.

There are in the farm stables at present thirteen horses. A number of these are rather old animals and will need to be replaced at an early date. During the year two were sold and a young team bought to replace them.

Three of the above horses are required for the omnibus, which runs from the farm to the city, making three trips daily. One is used as a driver, and one for general jobbing.

The remaining eight horses constitute the teams for general work upon the farm, in the garden and orchards, upon the lawns and in the Arboretum, as well as for cartage. This number of horses has during the past year proven to be very far short of the requirements as detailed above, and it has been found necessary to hire additional teams.

PURE-BRED BREEDING CATTLE.

There are on the farm at present representatives of three breeds of cattle: Ayrshires, Guernseys, and Shorthorns. They are as follows:—

Ayrshires:

1 bull, "Matchless Again," [8,757] ..... 2 years old.
1 heifer, "Darling" ..... 1 year 8 mos. old.

Guernseys:

1 bull, "Wedgewood," [5,113] ..... 5 years old.
2 bulls ..... 1 year old.
1 heifer ..... 1 year 9 mos.

Shorthorns:

1 bull, "Royal Don," [24,639]..... .....4 years old.

It is proposed to secure a few more females of each breed represented, and maintain small herds of these breeds.

The bulls are used upon our grade cattle, and small graded herds of each breed are to be built up. The services of the stock bulls are available to farmers upon payment of a moderate charge.

DAIRY CATTLE.

The herd of dairy cattle consists of twenty-nine females all told. They are:—

Canadian grades	5
Yearlings	5
Ayrshire and other grades	15
Calves	4

During the year no experimental work in feeding has been conducted, save that the ration being fed on my taking charge has been allowed to continue for a year, as the basis of some experimental work in feeding for increased milk production.

During the year some of the older, and less valuable, and a few younger, rather inferior, cattle have been sold to the butcher.

The dairy cows have been fed a roughage ration, of corn ensilage, 35 pounds, chaff, 3 pounds, hay, 5 pounds, and mangels, 20 pounds daily; some receiving slightly more, others, somewhat less, according to requirements. The grain ration has been from 2 to 8 pounds per diem of a mixture of equal parts of oats, pease, barley and bran. The cows when dry have received the same roughage ration with no meal, and the heifers have been fed similarly.

During the year, twenty-five cows have been milked, the number of days in lactation varying from 49 to 365, or an average of 284 days per cow. The total milk sold was 135,346 pounds, which, valued at current factory prices, amounted to $1,280.47. This makes an average of $51.22 per cow.

Valuing our feed stuffs as follows:—

Bran and meal	$15 00 per ton.
Ensilage	2 00 "
Roots (mangels)	2 00 "
Clover hay	5 00 "
Chaff	3 00 "
Pasture	2 00 per month per cow.
Dry cows	2 00 "

The cost of maintaining our herd for the year was $1,030.51 or an average of $41.22 per cow. This leaves a net average profit of $10 per cow.

The past summer has been a most trying one on our dairy herd, since it was impossible to protect them properly from sun and flies, owing to lack of shade trees in the pasture and the practical impossibility of stabling them at will during the season of excessive heat and many flies, owing to insufficient fencing.

STEERS.

During the year a number of steers have been fed experimentally to test the comparative values of certain rations, a particular description of the composition of which, and the plan of feeding the steers, follows:

Thirty-two steers were bought in October, 1898. These were fed a uniform ration of roots 25 pounds, ensilage 50 pounds, hay 5 pounds, straw 5 pounds, at the rate of 50 pounds each daily.

On December 1, they were divided into eight lots of four each. Following are statements of the treatment of each group, with data obtained in the sixteen weeks during which the experiment was continued, viz., from December 1, 1898, to March 23, 1899. On March 23, the steers were again put on a uniform roughage ration of ensilage 33 pounds, hay 8 pounds, roots 12 pounds, 6 pounds meal, equal parts oats, pease, and barley, and were kept on this ration till April 4. On this date the roots were finished and 12 to 15 pounds of ensilage was substituted. This ration was maintained till May 22, when the lot was sold at $4.60 per cwt. live weight.

Lot 1 was fed on a roughage ration of 46 pounds per steer daily, made up of the following feeds in the given proportion: Corn ensilage 50 pounds, roots 25 pounds, hay, mixed (cut) 5 pounds, oat straw (cut) 5 pounds.

During the first four weeks period no meal was fed. During the second four weeks period 2 pounds meal, equal parts oats, pease, and barley was fed daily per head. During the third four weeks period 4 pounds meal was fed daily per head. During the fourth period of four weeks 6 pounds meal was fed per head.

Lot 1.	Starting Weight.	Final Weight.	No. of Days Fed.	Total Gain.	Daily Rate of Gain.	Total Cost of Feed.	Cost of 1 Pound Gain.
4 Steers.....	4,075	4,680	112	605	1·35	$35.41	5.86 cts.

This lot cost to feed during November, $3.86, December 1 to March 23, $35.41, and from March 23 to May 22, $28.70, making a total cost of $67.97.

The net proceeds from this lot were.....	$ 217 35
Their gross cost	197 67
A net gain of.....	$ 19 68

Lot 2 was fed a roughage ration of 46 pounds per diem, made up of the following feeds in the given proportion. Corn ensilage 50 pounds, roots 25 pounds, hay, mixed (cut) 5 pounds, oat straw (cut) 5 pounds. During the first four weeks no meal was fed. During the second four weeks period 2 pounds meal (half cotton seed meal and half pease, oats and barley) was fed. During the third period of four weeks 4 pounds meal (half cotton seed and half pease, oats and barley) was fed. During the fourth period of four weeks 6 pounds of meal was fed, 2 pounds cotton seed meal and 4 pounds meal, equal parts pease, oats, barley, in each case to each animal daily.

Lot 2.	Starting Weight.	Final Weight.	No. of Days Fed.	Total Gain,	Daily Rate of Gain.	Total Cost of Feed.	Cost of 1 Pound Gain.
4 Steers.....	4,080	4,648	112	568	1·27	$36.89	6·50 cts.

This lot cost to feed during November, $3.86, December 1 to March 23, $36.89, and from March 23 to May 22, $28.70, making a total cost of $69.45 for feed.

The net proceeds from this lot were.....	$217 78
The gross cost was.....	199 15
A net gain of.....	$18 63

Lot 3 was fed a roughage ration of 46 pounds per diem, made up of the following feeds in the given proportion:—Corn ensilage, 50 pounds; roots, 25 pounds; hay, mixed

(cut) 5 pounds; oat straw (cut) 5 pounds. During the first period of four weeks no meal was fed. During the second four weeks period 2 pounds meal (half oil cake and half pease, oats and barley equal parts) was fed. During the third four weeks period 4 pounds of the same mixture was fed to each animal daily. During the fourth four weeks period 6 pounds per steer was fed of a mixture of 2 pounds oil meal to 4 pounds of a mixture of oats, pease and barley equal parts.

Lot 3.	Starting Weight.	Final Weight	No. of Days Fed.	Total Gain.	Daily Rate of Gain.	Total Cost of Feed.	Cost 1 lb. Gain.
4 Steers.....	4,080	4,720	112	640	1·43	$37.28	5·82 cts.

This lot cost to feed during November, $3.86, December 1 to March 23, $37.28, and from March 23 to May 22, $28.70, making a total cost of $69.84 for feed.

The net proceeds for this lot were.....	$214 59
The gross cost was.....	200 70
A net gain of.....	$13.89

Lot 4 was fed a roughage ration of 46 pounds per diem, made up of the following feeds in the given proportion :—Corn ensilage, 50 pounds ; roots, 25 pounds ; hay, mixed (cut) 5 pounds ; oat straw (cut) 5 pounds. During the first period of four weeks no meal was fed. During the second four weeks period 2 pounds, meal (half corn and half pease, oats and barley, equal parts) was fed daily per steer. During the third period of four weeks 4 pounds of the same mixture was fed, aud 6 pounds during the fourth four weeks period.

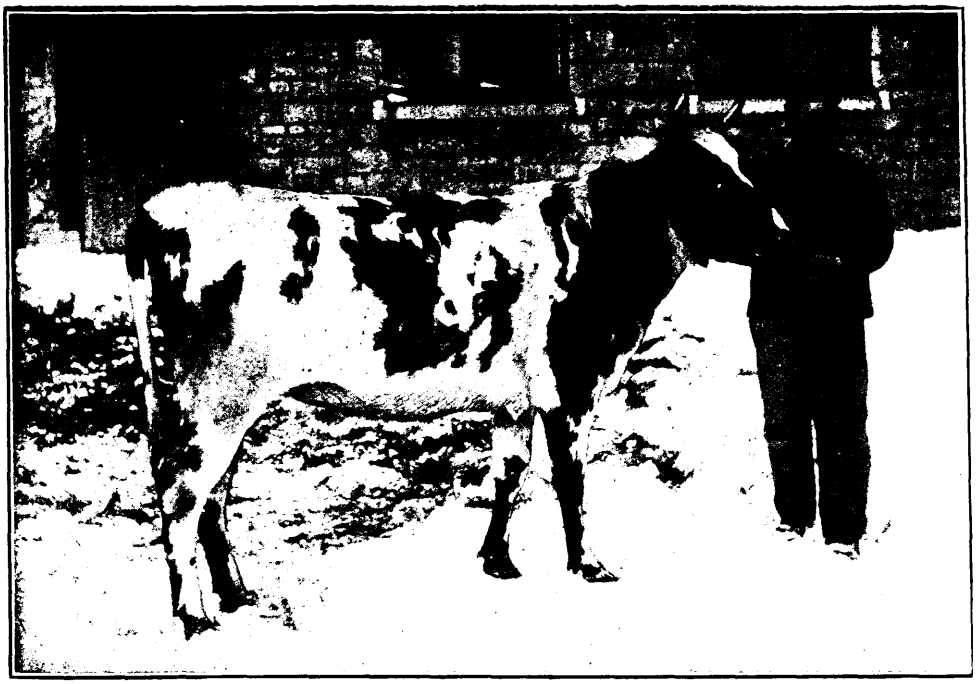
Lot 4.	Starting Weight.	Final Weight.	No. of Days Fed.	Total Gain.	Daily Rate of Gain.	Total Cost of Feed.	Cost 1 lb. Gain.
4 Steers.....	4,090	4,747	112	657	1·47	$35.60	5·42 cts.

This lot cost to feed during November $3.86, December 1 to March 23, $35.60, and from March 23 to May 22, $28.70, making a total cost of $68.16 for feed.

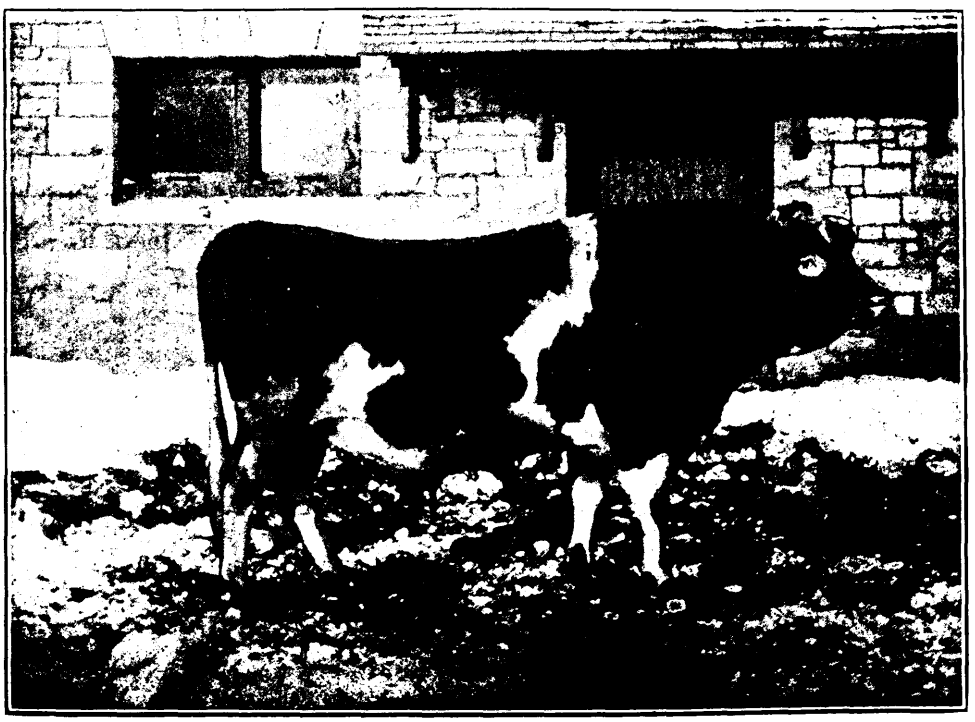
The net proceeds for this lot were.....	$219 37
The gross cost was.....	199 51
A net gain of.....	$19 86

Lot 5 was fed a roughage ration of 46 pounds per diem, made up of the following feeds in the given proportion :—Corn ensilage, 50 pounds ; roots, 25 pounds ; hay, mixed (cut) 5 pounds ; oat straw (cut) 5 pounds. During the first period of four weeks no meal was fed. During the second four weeks period 3 pounds of meal (half corn and half bran) was fed each steer daily. During the third four weeks period 4 pounds of the same mixture was the daily ration per steer, and 6 pounds daily per steer during the fourth four weeks period.

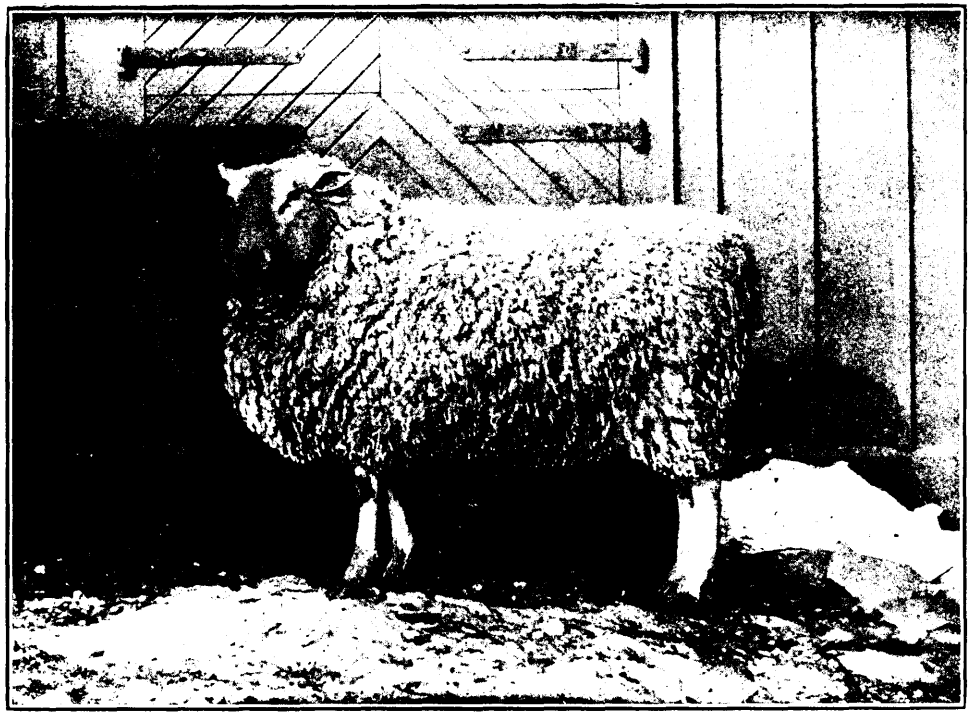
Lot 5.	Starting weight.	Final weight.	No. of days fed.	Total gain.	Daily rate of gain.	Total cost of feed.	Cost of one pound gain.	Cost to feed 1 steer 1 day.
4 Steers.....	4,095	4,715	112	615	1·38	$34.82	5·66 cts.	7·77 cts.



Ayrshire Heifer "Darling," (yearling)—Central Experimental Farm, Ottawa.



Guernsey Bull "Wedgewood," 5 years old, Central Experimental Farm, Ottawa.



Leicester Ram "Laurier," (Shearling.) Central Experimental Farm, Ottawa.

This lot cost to feed during November, $3.86, December 1 to March 23, $34.82, and from March 23 to May 22, $28.70, making a total cost of $67.38 for feed.

The net proceeds for this lot were	$ 218 13
The gross cost was	198 73
A net gain of	$ 19·40

Lot 6 was fed a roughage ration of 46 pounds per diem, made up of the following feeds in the given proportion :—Corn ensilage, 50 pounds ; roots, 25 pounds ; hay, mixed (cut) 5 pounds ; oat straw (cut) 5 pounds. During the first period of four weeks no meal was fed. During the second four weeks period 2 pounds of meal (equal parts cotton seed meal, oil cake, cornmeal and bran) was fed per steer daily. During the third four weeks period 4 pounds of the same mixture, and 6 pounds during the fourth four weeks period was fed daily to each steer.

Lot 6.	Starting weight.	Final weight.	No. of days fed.	Total gain.	Daily rate of gain.	Total cost of feed.	Cost of one pound gain.	Cost to feed 1 steer 1 day.
4 Steers	4,095	4,655	112	560	1·25	$35.08	6·26 cts.	7·83 cts.

This lot cost to feed during November, $3.86, December 1 to March 23, $35.08, and from March 23 to May 22, $28.70, making a total cost of $67.64 for feed.

The net proceeds for this lot were	$215 69
The gross cost was	198 00
A net profit of	$ 17 69

Lot 7 was fed a roughage ration of 46 pounds per diem per steer, made up of the following feeds in the given proportion :—Corn meal 50 pounds; hay, mixed (cut) 5 pounds; oat straw (cut) 5 pounds. During the first period of four weeks no meal was fed. During the second period 2 pounds meal (half corn meal and half pease, oats and barley equal parts) was fed to each animal daily. During the third four weeks period 4 pounds of the same mixture, and 6 pounds during the fourth four weeks period was fed daily to each steer.

Lot 7.	Starting weight.	Final weight.	No. of days fed.	Total gain.	Daily rate of gain.	Total cost of feed.	Cost of one pound gain.	Cost to feed 1 steer 1 day.
4 Steers	4,100	4,685	112	585	1·30	$32.07	5·46 cts.	7·16 cts.

This lot cost to feed during November, $3.86, December 1 to March 23, $32.07, and from March 23 to May 22, $28.70, making a total of $64.63 for feed.

The net proceeds for this lot were	$217 85
The gross cost was	194 50
A net gain of	$ 23 35

Lot 8 was fed night and morning with 30 pounds of a mixture of corn ensilage and oat straw in the proportion of 10 to 1, while at noon they received 25 pounds roots and 5 pounds long hay. During the first four weeks period no meal was fed. During the second period of four weeks 1 pound meal (half cotton seed meal and half oats, pease and

barley) was fed to each steer daily. During the third four weeks period 2 pounds of the same mixture, and 4 pounds during the fourth four weeks period was fed daily to each steer.

Lot 8.	Starting weight.	Final weight.	No. of days fed.	Total gain.	Daily rate of gain.	Total cost of feed.	Cost of 1 lb.	Average Cost to feed 1 steer 1 day.
4 Steers.	4,115	4,725	112	610	1·36	$36.87	6·04 cts.	8·23 cts.

This lot cost to feed during November, $3.86, December 1 to March 23, $36.87, and from March 23 to May 22, $28.70, making a total cost of $69.43.

The net proceeds of this lot were	$	216 00
The gross cost was		200 78
A net gain of		$15 22

SPRING STEER FEEDING.

On February 21, twenty steers were bought in, and on March 29, nine more were purchased. These steers were fed on ensilage and long hay for roughage and a meal ration of oats, pease and barley. The twenty-nine steers made a gain of 6,825 pounds during the period fed, or a daily average gain of 2·06 pounds.

Cost of steers	$	874 00
Cost of meal consumed		80 00
Value of roughage fed		125 60
Gross cost	$	1,079 60
Net proceeds of sale	$	1,094 34
		1,079 60
Net gain		$14 74

These lots of steers were fed for the special purpose of making a market for a large amount of ensilage and clover hay which would otherwise have been on hand during the summer, and would thus have lost considerably in value, as well as been an inconvenience. By thus feeding this roughage, considerable valuable and necessary manure was at our command.

EXPERIMENTS FOR 1900.

During the past autumn 77 steers have been purchased. The average cost has been $3.47 per cwt. live weight. These are being fed experimentally, the chief objects in view being (1) a dehorning test, (2) a comparison of three year olds, two year olds, and yearlings as economical beef producers, and (3) a test of tied versus loose fed steers as economical flesh producers.

DEHORNING STEERS.

To gain some information as to the exact cost of dehorning steers in loss of flesh due to excitement, loss of blood, and pain caused by operation, an experiment along this line has been conducted.

The steers, twenty-two in number, all two year old, were placed as follows :

Lots. Nos. 2 and 3, of nine each, were tied in two rows (1 lot in each) facing each other. Lot No. 4, of nine steers, was loose in a box stall 36 by 15 ft. ; Lot No. 6, of nine steers, was tied in a separate building ; and Lot No. 7, of six steers, was loose in a box stall 24 by 14 ft.

Lots. Nos. 3 and 4, and half of Lot No. 7 were dehorned November 16. The saw was used on six of them, three in each of Lots. Nos. 3 and 4 ; the Keystone Clipper on six more, three in each of Lots. Nos. 3 and 4 ; the large double-action, straight cut clipper on six more, three in each of Lots. Nos. 3 and 4 ; and the single-action straight cut on three in Lot No. 7.

The dehorned cattle, as well as those in Lot No. 2, were weighed daily for a time. The following are the gross weights recorded :—

Lot.	Treatment.	Gross Weight of Lots.					
		November.					December.
		16	17	18	20	28	5
2	Tied, not dehorned facing 3.....	8,905	8,715	8,525	8,595	8,580	8,915
3	Tied, dehorned.....	8,655	8,470	8,370	8,360	8,415	8,630
4	Loose, dehorned.....	8,340	8,300	8,270	8,315	8,400	8,540
6	Tied, not dehorned.....	7,700	Not	Not	Not	7,825	7,865
7	3 dehorned steers loose with ..	2,420	weighed.	weighed.	weighed.	2,350	2,395
7	3 hornless steers	2,730	"	"	"	2,752	2,795

It will be observed that Lot No. 2, though not dehorned, lost in weight. This might be ascribed to their position facing Lot No. 3, as they suffered from excitement as much almost as the dehorned lot.

Lots Nos. 2 and 3, it will be observed, recovered their original weight about the same date.

Lot No. 4, took only six days to recover from the operation, for on November 21, they weighed 8,345 pounds, 5 pounds above their weight on November 10.

The check lot in the separate stable, designated Lot No. 6, was not weighed daily, but made slow, steady progress.

The dehorned steers in Lot No. 7, lost considerable weight and did not finally recover till December 20. This was doubtless due to their being loose with the other steers, which were not sore, and besides were larger steers. These latter, it will be observed, made some gain.

While no positive conclusions may be reached as to the exact cost of dehorning, it would appear from a comparison of Lot No. 2, with Lot No. 4 ; of Lot No. 4, with Lot No. 6 ; and of dehorned part of Lot No. 7 with hornless part of the same lot, that no great setback is suffered by steers from this operation. It was observed that nervous, irritable individual animals were much more affected than sluggish, phlegmatic ones. It must be remembered that all these steers had just been stabled, and so would, of course, be making very little progress in any case during this period.

No great difference was observable in the effect of the different instruments used in dehorning, save that there was practically no blood lost where the saw was used.

One animal in lot No. 3, dehorned with the Keystone Clippers lost a great deal of blood, but in no other case was there any serious bleeding.

STEER CALVES

An experiment with calves is being incepted. Ten calves, Shorthorn grades, divided into two equal lots, will be fed : Lot 1, a good growing ration ; Lot 2, a ration sufficient

to keep the calves in high condition from the first. It is desired to ascertain (1) the comparative economy of these systems, and (2) the actual cost of raising a steer to the age of two years, (*a*) ready for the block, (*b*) ready to feed, under such conditions as maintain in this latitude.

SHEEP.

In April, it was decided to introduce sheep upon the farm, and the following is the sum of the flocks at present.

Leicesters:	1 ram	1 year old.
	1 ewe	2 years.
	3 ewes	shearlings.
	3 lambs	8 months.
Shropshires:	1 ram	1 year old.
	4 ewes	shearlings.
	4 "	lambs (8 mos.)
Grades:	10 "	shearlings.
	8 "	lambs (8 mos.)

Two of the Shropshire shearlings were imported from England, the remaining pure-breds, both Shropshire and Leicester, were bought in Canada. The grades were secured from a city butcher, and were selected as the average of large lots intended for the block.

Since the space available for sheep is at present very limited, it was possible to keep only two flocks. The Shropshire and Leicester were accordingly selected as being fairly typical representatives of the short and long woolled breeds.

It is hoped that a few more breeds may in time be introduced.

In most parts of Canada the sheep bred by the average farmer are of a very inferior class. Further, in many sections, especially suited for the profitable production of mutton and wool, very few or no sheep are raised, owing, in many cases, to uncertainty as to the possibilities of this class of animals as money-makers. It is proposed, therefore, to show, by the use of pure-bred rams upon grade ewes, the advisability of using good sires to improve our flocks, and the superiority of well-graded flocks over scrubs as money producers, as well as to help the introduction of this class of live stock into more general favour.

It is desired also to gain some data as to the cost of fitting lambs and shearlings for our markets, foreign and domestic, as well as to study the quality of mutton best suited for the same.

The study of the value of sheep as enrichers of the soil will also enter into this work, and their value as weed destroyers be tested to a certain extent.

PIGS.

At present the stock of breeding pigs consists of the following pure-bred animals :—

Large Improved Yorkshires	1 boar	3 years old.
	1 sow	1 year "
	2 sows	9 months old.
Improved Berkshires	1 boar	1½ years "
	1 sow	3 " "
	1 "	1½ " "
Tamworths	1 boar	2 " "
	1 sow	3 " "
Poland Chinas	1 boar	2 " "
	1 sow	1½ " "
	1 "	8 months.

There are besides nineteen cross-bred pigs of our own breeding about three months old, which are to be fed off experimentally.

BREEDING

For some years past experimental work has been carried on in cross-breeding. This line, it is now intended to discontinue for a time, and its place will be taken by work in "grading up."

EXPERIMENTAL FEEDING.

During the year a number of swine have been fed experimentally for the purpose of: (*a*) discovering the cause or causes of "soft" pork; (*b*) contrasting ground with whole grain as an economical pork producer; (*c*) studying the economy of a limited grain ration as compared with an unlimited one; and (*d*) studying the effect of "finishing" on rape and roots upon: (1) economy of pork production; (2) quality of flesh.

Part of the data from (*a*) and the whole of that from (*b*) and (*c*) have appeared in Bulletin No. 33, recently issued by this division.

An extensive experiment for the purpose of discovering the cause or causes of "soft" pork was begun in July, and is still in progress. This will be reported upon later.

Below are the details of, and data obtained from an experiment recently completed.

FEEDING PIGS ON RAPE.

On August 2, 1899, two lots of six pigs each were placed on a rape plot of about ¼ acre. This rape had been sowed in drill on May 20, but owing to wet weather, had made rather poor growth, and so was only about 15 inches high at date of turning in the pigs. For some time after their introduction they failed to eat much of the crop, especially the younger lot. Very little grain was given, however, and finally both lots fed heartily upon the juicy young plants. The growing rape was pretty well eaten down by October 1, and from that date till November 30, an allowance of 4 pounds of rape per pig was fed daily from another field. The five remaining after November 30, received as much mangolds as they would eat, about 4 pounds each, daily.

The following table gives the particulars as to increase and the daily rate of gain:—

Lot No. 1.	First Weight.	Last Weight.	Gain.	Days Fed.	Daily Rate of Gain.	Remarks.
No 81....	59	176	117	119	·97	Pure bred Chester White.
82....	68	190	121	119	1·02	"
83.... .. .	56	180	124	119	1·04	"
84..... .	64	190	126	119	1·06	"
85	76	191	115	119	·97	Poland China.
90.....	59	173	114	119	·96	"
Total.....	383	1,100	717	119	*1·004	

* Average rate of gain.

Lot No. 2.	First Weight.	Last Weight.	Gain.	Days Fed.	Daily Rate of Gain.	Remarks.
No. 86	32	165	133	148	·90	Grade Yorks.
87	32	190	158	148	1·07	"
88	30	161	131	148	·89	"
89	38	170	132	148	·90	"
91	54	202	148	148	1·00	"
00	30	45	15	... .	....	Died September 6.
Total.	216	923	717	148	* ·95	

* Average rate of gain.

One pig in lot No. 2 died after being fed for thirty-five days. The pigs in lot No. 2 appeared to be too young to introduce upon rape, as they did not thrive for about a month after being confined in the lot. The dew and moisture from the plants seemed to affect them, causing their skin to crack. Lot No. 1 was not affected in this way.

Below is a statement of cost and proceeds of eleven finished hogs:—

Eleven pigs at $2, average	$22 00
Rent of lot	2 00
3,000 pounds rape and roots at $2 per ton	3 00
4,402 pounds meal at $1 per cwt	44 02
	$71 02
Proceeds of 1,988 pounds of pork at $4.50 per cwt	$89 46
Net profit	18 44

It was, of course, impossible to determine the quantity of rape grown on the lot, so a rental of $2 is charged for the one-quarter acre.

Below is a statement of the results and criticisms at the Geo. Matthews Co. packing house, Hull, Que.:—

Pig No.	Live Weight.	Dressed Weight.	Per cent Dressed.	Date of Killing.	Yard Criticism.	Quality of Pork.
81	176	128	72 7	Nov. 30	Straight	Poor.
82	190	136	71·6	" 30	"	Fair.
83	180	133	73·9	" 30	"	Very poor.
84	190	136	71·6	" 30	"	"
85	191	144	75·4	" 30	"	Fair.
90	173	125	72·2	" 30	Short	Poor.
86	165	125	75·7	Dec. 29	Straight	Good.
87	190	137	72·1	" 29	"	Very good.
88	161	118	73·3	" 29	"	"
89	170	121	71·2	" 29	"	"
91	202	147	72·7	" 29	"	Good.

The date of killing is given in each case, since, though all were treated in the same way till November 30, after that date the remaining pigs were fed roots instead of rape. It will be observed that the lot killed December 29, were all firm in quality, any one of them being superior to the best in Lot No. 1, killed November 30.

COST OF PRODUCING PORK.

The two lots produced in all 1,434 pounds of pork during the period of the experiment. The cost of feed was $49.02, thus making the cost of 100 pounds increase $3 42. This being very materially less than the average cost of producing pork on grain alone is thus of considerable interest. Had the pigs been from earlier litters a still lower cost per pound increase would doubtless have been the result, since the cold weather necessitated a larger grain ration.

THE DAIRY.

It is aimed to make the dairy in connection with the dairy herd such as might be of use as a model for any farmer desirous of carrying on a private dairy enterprise. A new turbine separator was put in this year and is giving satisfaction. The other appliances are older, but are suited to the work in hand. The refrigerator chamber has been recently remodelled upon the most approved and scientific plans.

The work carried on is the testing of home dairy appliances to a limited extent, the testing of samples of milk, cream, etc., sent in from time to time, and the carrying on of experimental work in pasteurizing, ripening and churning cream. All this is subordinate, however, to the manufacturing of the farm milk produce into butter. During the year 135,346 pounds of milk was handled.

THE FARM.

It was decided in the early part of the year that some 200 acres of land be set apart to be managed, so far as our peculiar circumstances will permit, just as any other farm of similar proportions might be managed. Below will be found a report of the treatment, and of the crops upon this 200 acres.

SOIL.

The land included in this area has been, heretofore, under no regular rotation of crops and is of a varied character indeed. No particular kind of soil may be said to constitute the principal part of the area. Some of the varieties well represented are, blue clay, white clay, loamy clay, clayey loam, loam, sandy loam, loamy sand, red sand, white sand, gravel and muck. Much of the sub-soil is a clayey hard-pan, lying from 1 to 30 inches below the surface.

ROTATION.

The whole 200 acres has been divided into five lots of about 40 acres each. These will in turn be under similar crops, thus making up a regular rotation of five years duration. The first year might be said to be pasture; the second, pease, and oats and pease mixed, seeded with clover; the third, corn, potatoes and roots; the fourth, cereal crops of oats, barley and wheat and seeded down with Timothy and clover; the fifth, meadow.

Below is a diagrammatic representation of the rotation with the successive crops indicated on the different plots.

1899—Pasture. 1900—Pease, mixed crop seeded to clover. 1901—Corn, roots, &c. 1902—Cereal crop, seeded down. 1903—Hay. 1904—Pasture, &c.	1899—Hay. 1900—Pasture. 1901—Pease, mixed crops, seeded to clover. 1902—Corn, roots, &c. 1903—Cereal crop, seeded down. 1904—Hay.
1899—Pease, mixed crop, seeded to clover. 1900—Corn, roots, &c. 1901—Cereal crop, seeded down. 1902—Hay. 1903—Pasture. 1904—Pease, mixed crop, seeded to clover, &c.	1899—Corn, roots, &c. 1900—Cereal crop, seeded down. 1901—Hay. 1902—Pasture. 1903—Pease, mixed crop, seeded to clover. 1904—Corn, roots, &c.
1899—Cereal crop, seeded down. 1900—Hay. 1901—Pasture. 1902—Pease, mixed crop seeded to clover. 1903—Corn, roots, &c. 1904—Cereal crop, seeded down, &c.	

CULTIVATION.

The sod or pasture land is ploughed in July and August, a shallow furrow of not over 4 inches being turned. Depending upon the weather, this is at once rolled or

disc-harrowed. During the remainder of the summer it is cultivated at intervals with the broad share cultivator, to destroy weeds and aid in the decomposition of the sod.

The succeeding spring it is cultivated and sown to pease, and mixed crop with clover.

Immediately after harvest, it is gang ploughed and kept free of weeds till late autumn by use of harrow and cultivator.

Corn, potatoes, and roots follow the next spring, the land having been manured the preceding autumn or during the winter.

Previous to sowing the corn, potatoes and roots in the spring, the subsoil is stirred by means of a deep cutting cultivator, which loosens the soil to a depth of about 8 inches.

After the harvesting of the corn, potatoes, &c., the land is put in narrow drills instead of being ploughed. In the case of corn land, the drills are about 21 inches apart, and thus contain the rows of corn and roots in alternate drills. This may be done most rapidly by using the double mould board plough.

The drills are broken down the next spring, by the disc harrow or spring tooth cultivator and the land put under oats, barley and wheat, and seeded down with a mixture of Red clover, Alsike clover, and Timothy.

After the crop of hay has been cut the succeeding summer, the cattle are turned upon it.

Shallow ploughing will, as is quite evident, retain the humus near the surface of the soil, so rendering it easily and quickly available to the young plants, as well as keeping it where it will best serve the most useful ends, of conserving soil moisture and improving the physical conditions of the soil. The use of the deep cutting cultivator will loosen the upper subsoil, and allow any surplus water to sink and the deeper growing roots to penetrate at will.

DRAINING.

Much of the 200 acre section is low lying land, with very poor natural drainage, either by flow or percolation. It has been decided to supplement these and the already existing tile drains by a complete system of underground drains. With this end in view, a large main drain, 12 inches in diameter, was put down the past autumn and some progress made in the laying of the lesser mains and laterals. This work will, it is expected, be continued until all the low parts have been properly drained.

MEADOWS.

Owing to insufficient drainage, a large proportion of the clover was winter-killed, thus rendering our hay crop rather light. The quality was excellent, however, and we succeeded, in spite of adverse weather conditions, in saving it in good condition.

THE PASTURE.

One lot of 40 acres, as indicated in the diagram, was used for pasture during the past season. This section had been down to hay for 2 years, and so did not afford very good feed for our dairy stock. To this disadvantage was added the unfavourable character of the season, the large rain-fall in July rendering about one-quarter of the whole section valueless.

THE GRAIN CROPS.

Wheat: Only three varieties were grown this year. Detailed reports are as follows:

Preston.—1 acre. The soil was a heavy sandy loam, partly clay, of good quality, manured in the autumn of 1894 with about 18 tons of barn-yard manure per

acre. No fertilizer had been applied subsequently. The previous crop was sunflowers and English Horse beans. It was ploughed in the autumn of 1898 about 8 inches deep, and the following spring it was disc-harrowed once, and harrowed twice with the smoothing harrow before sowing. Sown April 29, 1½ bushels per acre; came up May 7, and was ripe August 3. The time to mature was 96 days. Yield per acre, 24 bushels 31 pounds; weight per bushel, 60½ pounds. Length of head, 3¼ to 3½ inches; bearded; length of straw, 40 to 46 inches. Growth, medium to strong; all standing well. There was no smut, but a small amount of rust.

Percy.—1 acre. This and the next plot were adjoining Preston. The soil was similar, and so were the preparation and treatment of the land. Sown, April 29, 1½ bushels per acre; came up May 7, and was ripe August 7. The time to mature was 100 days. Yield per acre, 21 bushels; weight per bushel, 57¾ pounds; length of head, 3 to 3½ inches; beardless; length of straw, 38 to 44 inches. Growth medium to strong; all standing well. There was no smut, and very little rust.

Stanley.—2 acres. Sown April 29, 1½ bushels per acre; came up May 7, was ripe August 7. The time to mature was 100 days. Yield per acre, 20 bushels 40 pounds, weight per bushel, 60½ pounds. Length of head, 3 to 3¼ inches; beardless; length of straw, 40 to 42 inches. Growth, medium and even; all standing well. There was no smut, and very little rust.

MIXED CROPS.

Mixture composed of oats 1½ bushels, pease ¾ bushel per acre. Mixed crop, 6¼ acres. Soil, a sandy loam of fair quality, a part of it peaty. The previous crop was oats. The land received an application of barn-yard manure of about 10 tons per acre in the spring of 1898. Ploughed in the autumn of 1898 about 8 inches deep, and disc-harrowed once the following spring, and harrowed twice with the smoothing harrow before sowing. Sown May 12, 2¼ bushels per acre; came up May 24, and was ripe August 15. The time to mature was 95 days. Yield per acre, 33 bushels 22 pounds. Heads large; straw very heavy, but very badly rusted. Grain very light.

FIELD CROPS OF OATS.

The following are detailed reports of the different varieties of oats grown upon the 200 acre farm:—

Fifteen sorts were grown as field crops, covering 46¾ acres in all The soil of these fields varied much in quality, which has materially affected the relative yields per acre.

Golden Giant.—3½ acres. The soil was a sandy loam of fair quality. The previous crop was corn. The land was manured in the spring of 1898 with about 12 tons of barn-yard manure per acre. It was ploughed late in the autumn of 1898 about 8 inches deep, and the following spring it was disc harrowed once and harrowed twice with the smoothing harrow before sowing.

Sown April 26, 2 bushels per acre; came up May 4, and was ripe August 14. The time to mature was 110 days. Yield per acre, 50 bushels 3 pounds, weight per bushel, 37 pounds; length of head, 9 to 11 inches sided; length of straw, 48 to 52 inches. Made a strong and even growth; standing fairly well. There was no smut, the leaves and stems were badly rusted.

Banner.—3½ acres. This variety was sown adjoining the Golden Giant; the quality of the soil and the preparation and treatment of the land was the same. Sown, April 28, 2 bushels per acre; came up May 7; ripe, August 2. The time to mature was 96 days. Yield per acre, 61 bushels 12 pounds; weight per bushel, 35¾ pounds; length of head, 9 to 11 inches, branching; length of straw, 48 to 54 inches. Growth,

strong and even; standing fairly well. There was no smut, but the leaves and stems were badly rusted.

Improved Ligowo:—6¼ acres. This also was adjoining the Golden Giant, and the character and treatment of the land was similar. Sown April 28, 2 bushels per acre; came up May 7, and was ripe August 1. The time to mature was 95 days. Yield per acre, 55 bushels 3 pounds; weight per bushel, 35¾ pounds; length of head, 8 to 10 inches, branching; length of straw, 48 to 54 inches. Made a strong and even growth; was considerably lodged, although straw fairly strong. There was no smut, but the leaves and stems were badly rusted.

Golden Beauty.—Soil, a sandy loam of fair quality, with patches of heavier soil, which were partly clay. This land received a dressing of about 15 tons of barn-yard manure per acre in the spring of 1897. No fertilizer had been applied subsequently, but a heavy sod had been ploughed under in the spring of 1899. This plot had been sown with permanent pasture mixture in the spring of 1898, with barley as a cover crop. The land was ploughed in the spring and disc harrowed once, and harrowed twice with the smoothing harrow before sowing. Sown May 5, 2 bushels per acre; came up, May 12, and was ripe August 3. The time to mature was 90 days. Yield per acre 57 bushels 3 pounds; weight per bushel, 35½ pounds; length of head, 7 to 10 inches, branching; length of straw, 48 to 54 inches; made a strong, even growth, standing fairly well; few spots lodged. There was no smut, but the leaves and stems were slightly rusted.

American Beauty.—5 acres. This was adjoining the 3½ acres of Golden Beauty, and the character and treatment of the land were similar. Sown May 5, 2 bushels per acre; came up May 12, and was ripe August 3. The time to mature was 90 days. The yield per acre was 45 bushels 25 pounds; weight per bushel, 34 pounds; length of head, 8 to 10 inches; branching; length of straw, 48 to 52 inches. Growth strong and even. Standing fairly well, few spots lodged. There was no smut, but the leaves and straw were considerably rusted.

Bavarian.—4 acres. The soil was a sandy loam of fair quality, which was manured in the spring of 1896 with about 10 tons of barn-yard manure per acre. The previous crop was 2 acres clover, 1 acre Brome grass, 1 acre permanent pasture mixture. This was not ploughed in the autumn, but was ploughed about 4 inches deep in the spring of 1899, and disc harrowed once and harrowed three times with the smoothing harrow before sowing. Sown May 6, 2 bushels per acre; came up May 12, and was ripe August 8. The time to mature was 94 days. Yield per acre, 40 bushels 19 pounds; weight per bushel, 30 pounds; length of head, 9 to 10 inches; branching; length of straw 48 to 50 inches. Part of plot made a strong, even growth, some was considerably odged. There was no smut, but leaves and stems were badly rusted.

Wallis.—3½ acres. The soil was a sandy loam of fair quality, which was manured in the spring of 1896 with about 10 tons of barnyard manure per acre. The previous crop was clover. This was not ploughed in the autumn, but was ploughed about 4 inches deep in the spring of 1899, and disc harrowed once, and harrowed three times with the smoothing harrow before sowing. Sown May 6, 2 bushels per acre; came up May 12, and was ripe August 8. The time to mature was 94 days. Yield per acre, 41 bushels 29 pounds; weight per bushel, 30 pounds; length of head, 9 to 11 inches, branching; length of straw, 48 to 50 inches. Growth, strong and even, and was considerably lodged. There was no smut, but the leaves and stems were considerably rusted.

Abundance.—3 acres. Soil, part clay loam, part sandy loam, and part peaty. This land was manured in the spring of 1896 with about 12 tons of barn-yard manure per acre. Half of field in autumn 1898, and balance in spring of 1899, thick mats of clover were ploughed under. The previous crop was barley, with which the clover was sown

at the rate of 10 pounds of seed per acre. Half of each plot was ploughed in the autumn of 1898, balance of field was ploughed in the spring of 1899, disc harrowed once, and harrowed twice with the smoothing harrow before sowing. Sown May 6, 2 bushels per acre, came up May 13, and was ripe August 8. The time to mature was 94 days. Yield per acre, 41 bushels 31 pounds; weight per bushel, 34½ pounds; length of head, 8 to 9 inches, branching; length of straw, 40 to 42 inches; growth, strong and even, and was considerably lodged. There was no smut, but the leaves and stems were slightly rusted.

Salines.—1 acre. This and the five following plots were adjoining that of Abundance. The soil was similar, and the preparation and treatment of the land the same. Sown, May 6, 2 bushels per acre; came up May 13, and was ripe August 14. The time to mature was 100 days; yield per acre, 27 bushels 17 pounds; weight per bushel 25½ pounds; length of head, 9 to 11 inches branching; length of straw, 40 to 46 inches. Growth, strong and even, and all standing well. There was no smut, but the leaves and stems were badly rusted.

Columbus.—1 acre. Sown, May 6, 2 bushels per acre; came up, May 14, and was ripe August 11. The time to mature was 99 days. Yield per acre, 35 bushels 15 pounds; weight per bushel, 32 pounds; length of head, 8 to 10 inches, branching; length of straw, 40 to 46 inches. Made a medium growth, straw considerably broken down. There was some smut, and the leaves and stems were slightly rusted.

Black Tartarian.—1 acre. Sown, May 6, 2 bushels per acre; came up, May 13, and was ripe August 12. The time to mature was 98 days. Yield per acre, 23 bushels 3 pounds; weight per bushel, 23 pounds; length of head, 9 to 11 inches, branching; length of straw, 46 to 54 inches. Growth, strong and even, and all standing well. There was no smut, but the leaves and stems were very badly rusted.

California Prolific, Black.—1 acre. Sown, May 6, 2 bushels per acre; came up, May 13, and was ripe August 12 The time to mature was 98 days. Yield per acre, 20 bushels 30 pounds; weight per bushel, 23 pounds, length of head, 9 to 11 inches, branching; length of straw, 46 to 52 inches. Growth strong and even, all standing well. There was no smut, but the leaves and stems were badly rusted.

Joanette.—2 acres. Sown, May 6, 1¾ bushels per acre; came up, May 13, and was ripe August 14. The time to mature was 100 days. Yield per acre, 42 bushels 17 pounds, weight per bushel 29¾ pounds; length of head, 7 to 9 inches, branching; length of straw, 33 to 40 inches. Growth, strong and even, and all standing well. There was no smut, but the leaves and stems were badly rusted.

Siberian.—4 acres cut green. Sown, May 7, 2 bushels per acre; came up, May 13, and was ripe August 11. The time to mature was 97 days. The yield per acre was 42 bushels; weight per bushel, 36 pounds; length of head, 9 to 10 inches, branching; length of straw, 44 to 50 inches. Made a strong, even growth, all standing well. There was no smut, but the leaves and stems were slightly rusted.

White Schonen.—3 acres. Soil a sandy loam of fair quality. The previous crop was oats. The land received an application of barn-yard manure of about 10 tons per acre in the spring of 1898. The land was ploughed in the autumn of 1898 about 8 inches deep, and disc-harrowed once the following spring, and harrowed twice with the smoothing harrow before sowing. Sown, May 12, 1¾ bushels per acre, came up, May 20, and was ripe August 14. The time to mature was 93 days. The yield per acre was 32 bushels 5 pounds; weight per bushel 24½ pounds; length of head, 8 to 10 inches, branching; length of straw, 44 to 50 inches. Made a strong, even growth; all standing well. There was no smut, but the leaves and stems were considerably rusted.

FIELD CROPS OF BARLEY.

Six varieties of barley were grown, occupying 11½ acres in all. Below is a detailed report of the same:

Canadian Thorpe.—2 rowed, 1 acre. Soil a sandy loam, rather light, of poor quality; received a coating of barn-yard manure of about 12 tons per acre in the spring of 1895. No manure or other fertilizer has been applied since, except two good crops of green clover, which had been sown with previous crops. The previous crop was oats. The land was ploughed in the spring about 4 inches deep, when a good mat of clover was turned, under and harrowed 8 times with the smoothing harrow before sowing. Sown, May 10, 2 bushels per acre; came up, May 21, and was ripe August 8. The time to mature was 89 days. Yield per acre, 28 bushels 21 pounds: weight per bushel, 52¼ pounds; length of head, 3 to 3½ inches; length of straw, 36 to 42 inches. Growth, strong and even; all standing well. There was no smut, but the leaves and stems were slightly rusted.

Sidney.—2 rowed, 1 acre. This and the four following plots were adjoining that of Canadian Thorpe. The soil was similar and the preparation and treatment of the land the same. Sown' May 10, 2 bushels per acre; came up May 21, and was ripe August 7. The time to mature was 88 days. Yield per acre, 32 bushels 14 pounds; weight per bushel, 51 pounds; length of head, 3½ to 4 inches; length of straw, 36 to 42 inches. Growth strong and even; standing fairly well. There was no smut; leaves and stems were slightly rusted.

Champion.—1 acre. Sown, May 10, 1¾ bushels per acre; came up, May 21, and was ripe August 6. The time to mature was 87 days. Yield per acre, 23 bushels 11 pounds, weight per bushel, 43½ pounds; length of head, 3 to 3½ inches, beardless; length of straw, 36 to 42 inches. Growth, medium to weak; all standing well. There was no smut, but the leaves and stems were slightly rusted.

Trooper.—6 rowed 1 acre. Sown, May 10, 1¾ bushels per acre; came up, May 21, and was ripe August 8. The time to mature was 89 days. Yield per acre, 24 bushels 25 pounds; weight per bushel, 52½ pounds; length of head, 2¾ to 3 inches; length of straw, 30 to 36 inches. Growth uneven, weak; all standing. There was no smut, but the leaves were slightly rusted.

Royal.—6 rowed, 1 acre. Sown, May 10, 1¾ bushels per acre; came up, May 21, and was ripe August 7. The time to mature was 88 days. Yield per acre, 24 bushels 5 pounds; weight per bushel, 51 pounds; length of head, 3 to 3½ inches; length of straw, 36 to 42 inches. Growth even, medium to weak; all standing well. There was some smut, and leaves and stems were slightly rusted.

Mensury.—6½ acres. Sown, May 10, 1¾ bushels per acre; came up, May 21, and was ripe August 7. The time to mature was 88 days. Yield per acre, 40 bushels 11 pounds; weight per bushel, 52½ pounds; length of head, 3½ to 3½ inches; length of straw, 42 to 44 inches. Growth strong and even; all standing well. There was no smut, but leaves and stems were slightly rusted.

FIELD CROPS OF PEASE.

A number of varieties of this legume were sown, but immediately after cutting, and before ready to store, a very strong wind storm arose, which mixed the varieties so much as to render it impossible to distinguish one kind from another. The following is, therefore, a general report upon the field:

Pease.—15½ acres. Soil, part sandy loam of rather poor quality, and part peaty. Six acres of the land manured in the autumn of 1898 with about 12 tons of barn-yard

manure per acre: balance of field manured in the spring of 1897 with about 12 tons of barn-yard manure per acre. It was all ploughed in the autumn of 1898 about 8 inches deep, and the following spring it was disc harrowed once, and harrowed twice with the smoothing harrow before sowing. The previous crop was part hay; balance, oats. Sown, May 10, 2½ bushels per acre; came up May 23, and was ripe August 15. The time to mature was 96 days. Yield per acre, 18 bushels 32 pounds: weight per bushel 62¼ pounds. This field suffered from water several times during the summer, the yield per acre being for this reason considerably less than would have been the case under better conditions.

ENSILAGE CORN.

About 17 acres was under corn for ensilage. The following three varieties were sown adjoining each other on similar soil, and received similar treatment. The soil was a heavy sandy loam of good quality, more or less mixed with clay. The previous crop was clover. The land was ploughed late in the autumn of 1898, when a good swarth of second growth clover was ploughed under. The land received an application of barn-yard manure of about 15 tons per acre, which was distributed on the frozen ground in small piles of about one-third of a cart-load each, and spread in the spring. It was then ploughed under about 4 inches deep and harrowed with the smoothing harrow before sowing.

Longfellow.—7 acres. Sown, May 25, in rows 35 inches apart: came up, June 7, and was cut for ensilage September 13. Growth, medium to weak, on account of water, leafy from top to bottom, and 5 to 8 feet high; the stalks were poorly eared; ears beginning to glaze. Yield per acre, 10 tons 75 pounds.

Angel of Midnight.—2 acres. Sown, May 25, came up June 7, and was cut for ensilage September 15. Growth, uneven, weak, on account of wet weather; leafy from top to bottom, and from 4 to 7½ feet high; stalks were poorly eared; ears in dough state. Yield per acre, 8 tons 12½ pounds.

Compton's Early.—2 acres. Sown, May 25; came up, June 7, and was cut for ensilage September 15. Growth, uneven, weak; leafy from top to bottom; height, 4 to 7½ feet; stalks, fairly well eared; ears in dough state. Yield 11 tons 1,555 pounds per acre.

Selected Leaming.—2 acres. Soil part sandy loam and part peaty. The previous crop was oats. The land received an application of barn-yard manure of about 15 tons per acre, which was distributed on the frozen ground in small piles of about ⅓ of a cart load each, and spread in the spring. It was then ploughed under about 4 inches deep, and harrowed twice with the smoothing harrow before sowing. Sown, May 25; came up, June 7, and was cut for ensilage September 16. Growth, strong and even; leafy at top and very few leaves at bottom; height, 8 to 11 feet; stalks eared well; ears in late milk or early dough. Yield per acre, 11 tons 1,340 pounds.

Cloud's Early Yellow.—½ acre. This and the next five plots referred to were adjacent to the Selected Leaming; the soil was very similar, and so were the preparation and treatment of the land. Sown, May 25; came up, June 7, and was cut for ensilage September 16. Growth, medium, leafy at top, fewer leaves at bottom; height, 8 to 10 feet; stalks, well eared; ears in dough state. Yield, 9 tons 1,619 pounds per acre.

Giant Prolific Ensilage Sweet.—½ acre. Sown, May 25; came up, June 7, and was cut for ensilage September 18. Growth, strong, even, leafy at top with very few leaves at bottom; height, 10 to 11 feet, ears fairly plentiful in late milk stage. Yield, 11 tons 190 pounds per acre.

White Cap Yellow Dent.—½ acre. Sown, May 28; came up, June 7, and was cut for ensilage September 18. Growth uneven on account of water. Leafy top to bottom; height, 9 to 11 feet; stalks fairly well eared; ears in late milk. Yield, 13 tons 30 pounds per acre.

Mammoth Cuban.—½ acre. Sown, May 35; came up, June 7, and was cut for ensilage September 18. Growth strong and even, leafy on top, fairly leafy on bottom; height, 10 to 12 feet; stalks well eared, ears in late milk. Yield per acre, 13 tons 1,880 pounds.

Early Mastodon.—½ acre. Sown, May 25; came up, June 7, and was cut for ensilage September 18. Growth strong and even; leafy on top, fairly leafy on bottom; height, 10 to 12 feet; stalks well eared, ears in dough stage. Yield per acre, 14 tons 110 pounds.

Eureka.—½ acre. This and the two following plots were adjoining each other. The soil was similar and so were the preparation and treatment of the land throughout. Soil sandy loam, good quality. The land was manured in 1896 about 12 tons per acre.

Eureka: Sown, May 26; came up June 1, and was cut for ensilage September 19. Growth, strong, leafy on top, almost clean at bottom; no ears; height, 10 to 11 feet. Yield per acre, 14 tons 1730 pounds.

Iowa Silver Mine.—½ acre. Sown, May 26; came up, June 1, cut for ensilage September 19. Growth, strong, leafy on top, very few at bottom, no ears; height 10 to 11 feet. Yield per acre, 13 tons 820 pounds.

Iowa Gold Mine.—½ acre. Sown, May 26; came up June and was cut for ensilage September 19. Growth strong and even, leafy on top, very few at bottom; height, 10 to 12 feet, no cobs or ears. Yield per acre, 14 tons 1380 pounds.

FIELD PLOTS OF MANGELS.

The following seven plots were all sown in the same field adjoining each other, on similar soil and with similar treatment. The soil was a sandy loam of fair quality, and the previous crop was roots. The land was ploughed in the autumn of 1898, about 8 inches deep, and in the spring of 1899 it was grubbed about 6 inches deep, and harrowed with the smoothing harrow. The land was then made up in drills 2 feet apart and subsequently rolled with a heavy land roller which flattened the ridges nearly one-half, leaving a firm seed bed. The seed was then sown at the rate of 3 pounds per acre. All sown May 8, came up May 17; pulled, October 17.

	Yield per acre. Tons.	Lbs.	Yield per acre. Bush.	Lbs.
Gate Post 2 acres	11	1,950	399	10
½ a. Mammoth long Red (Vil)	10	490	341	30
½ a. Giant Yellow Intermediate (Vil)	8	170	269	30
½ a. " S. B. & Co.	7	400	240	—
½ a. Giant Yellow Globe (wet low land)	9	1,160	319	20
½ a. Gate Post Duplicate	5	1,570	192	50
1 a. Mammoth Long Red (Graham)	9	820	313	40

FIELD PLOTS OF CARROTS.

Three varieties were sown adjoining the mangels, the soil was similar and the preparation and treatment of the land the same, all sown 3 pounds seed per acre. Sown May 9 came up May 20, pulled October 24.

	Yield per acre. Tons.	Lbs.	Yield per acre. Bush.	Lbs.
1 acre Carrots Improved Short White	14	65	467	45
½ " Mammoth White Intermediate	14	1,950	499	10
½ " Giant White Vosges	14	510	475	10

FIELD PLOTS OF TURNIPS.

Three following varieties were sown adjoining the mangels. The soil was similar and the preparation and treatment of the land the same, all sown 2 pounds per acre. Sown June 7 came up June 13, and were pulled November 6.

	Yield per acre. Tons.	Lbs.	Yield per acre. Bush.	Lbs.
½ acre Perfection Swede	8	1,220	287	—
½ " Hardy Goliath	8	140	269	—
⅜ " Improved Bronze top	10	448	340	48

Purple Top Swede.—Soil a sandy loam of fair quality. This land received a dressing of about 12 tons of barn-yard manure per acre, distributed fresh from the barn-yard in small piles of about one-third of a cart load each during the winter, was spread in the spring, and ploughed under in spring of 1899 about 4 inches deep, and harrowed twice with the smoothing harrow. The land was then made up in drills two feet apart and subsequently rolled with a heavy land roller which flattened the drills nearly one-half, leaving a firm seed bed. The seed was sown at the rate of 2 pounds per acre. Sown, June 7; came up June 13, pulled November 6.

	Yield per acre. Tons.	Lbs.	Yield per acre. Bush.	Lbs.
1 acre Purple Top Swede (Steele)	18	275	604	35
1 " Hartley's Bronze	17	565	576	5
¾ Prize Purple Top Swede	16	1,963	566	3

FIELD CROPS OF POTATOES.

The following table gives particulars of the results obtained from fifteen plots which were all grown adjoining each other in the same field. The land was similar throughout, and the preparation and treatment was the same for all. The soil was a light sandy loam, and the previous crop was barley. This land received an application of fresh barn-yard manure of about 12 tons per acre in spring of 1899, it was ploughed under 4 to 5 inches deep, harrowed with the smoothing harrow. The land was then made up in drills 2½ feet apart, and 6 inches deep for planting.

Name of Variety.	Size of Plot.	When Planted.	Came up.	When dug.	Yield per Acre.	
	acre.				Bush.	lbs.
Wonder of the World	⅛	May 25	June 12	Oct. 2	134	12
American Wonder	⅛	" 25	" 12	" 2	177	20
Daisy	⅛	" 25	" 12	" 3	241	6
Dakota Red	⅛	" 25	" 13	" 3	265	36
Early Rose	⅛	" 25	" 12	" 3	186	43
Early Sunrise	⅛	" 25	" 12	" 4	227	3
Lee's Favorite	⅛	" 25	" 12	" 4	210	27
Clarke's No. 1	⅛	" 25	" 12	" 4	188	30
Empire State	⅛	" 25	" 12	" 4	229	12
Carman's No. 1	⅛	" 25	" 12	" 4	236	15
Everett	⅛	" 25	" 12	" 4	129	15
Rochester's Rose	⅛	" 25	" 12	" 5	182	39
Henderson's Late Puritan	⅛	" 25	" 12	" 5	177	12
Vanier	⅛	" 25	" 12	" 5	231	30
Early Harvest	⅛	" 25	" 12	" 5	135	31

SORGHUM.

The value of sorghum as a fodder crop is in some sections very great. It needs a rather dry warm spring, however, and is, therefore an uncertain crop in this latitude. The cultivation required is quite similar to that demanded by corn.

Two varieties were sown this year, Early Amber and Early Orange.

One-half acre Early Amber was sown 8 pounds to the acre, June 1. A period of cold wet weather followed and for six weeks it made very little progress. In August the dry hot weather suited it well and it made great growth. It was fed green to swine and was eaten with great relish by these animals.

One half acre Early Orange was sown 8 pounds to the acre, May 25. It failed to germinate, however, and had to be sown over again on June 12. This variety was thus even more backward than the Early Amber. It was fed green to swine.

RAPE.

The value of this plant as a soiling crop can scarcely be overestimated. It is very little cultivated by our farmers, however, too many of whom appear to know nothing of its great value.

It yields a large crop of very succulent and nutritious forage valuable as pasturage for sheep or swine and may be fed to cattle with good results. The method of cultivation is similar to that required for turnips, save that the plants do not need to be thinned in the row.

It will yield two crops in the season of from 3 to 6 tons per acre each if cut, and if pastured will stand very heavy stocking. Dwarf Essex is the variety best suited for common use and should be sown at the rate of about 3 pounds per acre.

It may be sown broadcast as well as in drills, when almost equally good results are obtained but if the soil is weedy it will be found advantageous to sow in drills. The soil for this crop needs to be well manured.

The date of sowing may be varied and a good crop may be anticipated from seed sown any where from May 10, to Aug. 15. It is thus possible to grow a crop of rape upon a grain field after harvest in the same year.

About 1¼ acres was sown to rape alone the past season, most of this was fed to swine, some of it to sheep, and pigs were pastured upon a small lot with very good results. On an acre of land sown to oats about 5 pounds of rape seed was drilled in from the grass seed box of the seeder at the same time as the oats were sown (May 4.) This lot did not succeed very well and appeared to have been sown too thinly. It yielded between 2 and 3 tons per acre in September.

SESSIONAL PAPER No. 8a

REPORT OF THE HORTICULTURIST.

(W. T. MACOUN.)

DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit, herewith, for your approval, the thirteenth annual report of this division. Owing to the large number of branches of horticultural work included in this division, it is not possible in the annual report to give in detail all the experiments conducted and the results obtained during the year, but the matter contained in the following pages is that which was thought to be of greatest value and interest to farmers and fruit growers throughout Canada.

CHARACTER OF SEASON.

The winter of 1898-9 was one of the most disastrous in the history of fruit growing in southern and south-western Ontario; thousands of peach trees were root-killed, and other fruits suffered badly, the results being that the bright prospects of many a fruit grower were dashed to the ground. In northern and eastern Ontario this was not the case, what winter-killing there was being about normal. Very little snow fell at Ottawa during the early part of last winter, and it was feared at one time that winter-killing would be severe, but during the month of March more than 44 inches of snow fell. This came at a very opportune time, preventing the thawing and freezing of the ground, which is liable to take place during March and early in April, and which often proves very harmful to fruits. It was not an early spring this year, though not a very late one. The frost was out of the ground enough to use the spade on April 18, which was six days later than last year. The weather was comparatively cool during April and May. Little rain fell during April and the early part of May, but from the latter part of that month until the end of July there was rain in plenty. In July, alone, 9·85 inches fell. It was not a warm summer and crops which require much heat did not do as well as usual. Beginning with August 1, there was little rain until September 11, but in the horticultural department the lawn grass was all that suffered very much. Copious rain fell during September, October and November. On September 23, a frost killed the tomatoes, cucumbers, melons, squash and other tender things, but on October 2 there was one much more severe, which froze the ground to a depth of about three-fourths of an inch. This frost killed the leaves on the grape vines, and injured the fruit very much. October and November were exceptionally mild months and outside work was continued up to December 2. Winter set in on December 4, eight days later than last year.

FRUIT CROP.

There was a light crop of apples this year, what fruit there was being of good quality, however. There were a few pears on some of the trees, but all were of inferior varieties. The crop of native plums was light also, though a few trees were well loaded. Cherries were a failure altogether. If the season had been favourable there would have been an excellent crop of grapes, but the weather was not hot enough at the time of ripening, the result being that many varieties failed to mature and a severe frost coming

on October 2 injured them badly. There were good crops of small fruits, strawberries doing especially well.

PROGRESS OF THE WORK.

The work in connection with this division has made satisfactory progress this year, and much useful information has been obtained and data accumulated, which will be published from time to time to help forward the interests of horticulture in this country.

In the orchards and small fruit plantations the trees and bushes have received careful attention. Records were kept of the hardiness, growth and yield of the different varieties, and descriptions taken of as many of them as possible. The trees were thoroughly sprayed, as usual, and experiments conducted with different mixtures and solutions. One experiment, which was made, in whitewashing trees to prevent the swelling of the buds, while yielding affirmative results in that respect, showed the value of whitewash in ridding trees of the oyster-shell bark-louse.

New strawberry and gooseberry plantations were made this year, in which about 350 varieties of strawberries and 124 varieties of gooseberries are being tested.

Tobacco was grown to a larger extent than usual, there being 1½ acres devoted to this crop. A curing house has been erected after the most modern plan, and with the latest system of ventilation, and good results should be had in curing tobacco in future.

The nurseries in connection with this division, which, hitherto, had been divided into two sections, some distance from each other, have been consolidated into one and a wire fence built around it, which encloses also the hot-beds.

Another large area in the Arboretum was seeded down to lawn grass, which has added very much to the appearance of the place, and will make it much easier to get about in the outlying parts.

A new permanent label of galvanized iron for trees, shrubs and plants has been adopted, which can be made cheaply and will be much more conspicuous than the smaller zinc labels hitherto used.

During the year a catalogue of the trees and shrubs growing in the Arboretum was published in conjunction with the Director, in which interesting notes are given of the species and varieties tested. The total number of species and varieties tried thus far being 3,071.

Several thousand young *Pyrus baccata* seedlings have been raised this year, which will be used for distribution to Manitoba and the North-west Territories, and for grafting and budding the hybrids, between this crab and the cultivated varieties of apples, originated by Dr. Wm. Saunders and Dr. C. E. Saunders.

The work of top-grafting the tenderer varieties of our best apples on hardy stocks has been an important feature of the work. It is hoped that some varieties that have not hitherto succeeded here will do so on these stocks.

During the past five years blossoming dates of fruits have been recorded by a large number of observers for this division. The records of the apples have been tabulated and a synopsis given in this report. It is important for the fruit grower to know the relative dates of blossoming of the different varieties, that he may plant those which bloom at the same time in close proximity. The information given in this report will help him to do this.

Through correspondence we have endeavored to render assistance to fruit growers throughout Canada. Many have expressed their appreciation of this part of the work.

MEETINGS ATTENDED AND PLACES VISITED.

It has been my privilege during the past year to attend a large number of meetings of farmers and fruit growers, and to visit some of the important Arboreta and Botanic Gardens in the United States. On January 31 and February 1, I attended the winter meeting of the Quebec Pomological Society at Montreal, and on February 21 and 22, the annual meeting of the Nova Scotia Fruit Growers' Association at Wolfville. A series

of farmers' meetings were arranged for on Prince Edward Island during the last week of February and the first week of March, during which time I addressed audiences at Rustico on February 27 ; Kensington and Summerside, on February 28 ; O'Leary and Alberton on March 1 ; St. Peters and Souris on March 2 ; Charlottetown on March 3 ; Hunter River and Murray Harbour South on March 4, and Georgetown on March 6. At the invitation of the Secretary of the Ontario Fruit Growers' Association, I addressed meetings of Horticultural Societies at Brockville on March 15 ; Cardinal on March 16 ; Iroquois on March 17 ; Smith's Falls on March 21 ; Carleton Place on March 23 ; Arnprior on March 24, and Kemptville on March 28. The biennial meeting of the American Pomological Society was held at Philadelphia on September 7 and 8, at which I had the pleasure of attending. It was also my privilege to attend and to give an address at the annual meeting of the Ontario Fruit Growers' Association, which was held at Whitby on December 5 and 6. The last meeting attended was that of the Ontario Agricultural and Experimental Union, at Guelph, Ont., on December 7.

During the month of September I visited, under your instruction, the New York Botanic Garden at Bronx Park, New York, and the Arnold Arboretum, Boston, Mass., at which places much information was obtained which will be useful in our work at Ottawa. On December 8 and 9, I visited St. Catharines and Niagara and arranged for experiments in whitewashing trees to determine whether lime would destroy the San José Scale or not.

ACKNOWLEDGMENTS.

I have been greatly assisted in my work during the past year by many who have paid especial attention to certain branches of horticulture and who are authorities in their work. There are others also who have kindly furnished information on various subjects whenever asked, and who, by their willingness to assist me in matters pertaining to horticulture, have made it much easier to obtain a knowledge of some things than it otherwise would have been. To those who, for the past five years, have regularly recorded the blossoming dates of fruits for this Division I am very grateful, and fully appreciate the trouble they have taken from year to year. Their names are recorded in another part of this report. Among those who have rendered me special assistance I desire to mention Mr. W. H. Dempsey, Trenton, Ont., Prof. F. A. Waugh, Burlington, Vt., U. S., Mr. Wm. A. Taylor, Washington, D.C., U.S., Mr. R. Hamilton, Grenville, Que., Mr. G. E. Fisher, Freeman, Ont., Mr. Robert Brodie, St. Henri de Montreal.

During the year my secretary, Mr. J. F. Watson, has again shown his knowledge of the details of this Division by the accuracy he has displayed in the correspondence and in other matters relating to his work. Mr. H. Holz, foreman, has also performed his duties in a thoroughly satisfactory manner, and his assistance has been of great value to me.

DONATIONS.

The following donations were received during the year, and this opportunity is taken to gratefully acknowledge the same:—

Sender.	Donation.
Aylmer Iron Works, Aylmer, Ont.	Spray pump No. 2, barrel pump.
Anderson, Wm., Woodstock, Ont.	Apple scions.
Anderson, J. C., Fallbrook, Ont.	Scions, Lanark Greening, Iroquois apples.
Arnold Arboretum, Boston, Mass., U.S.	Collection of seeds.
Barr, Peter, London, Eng.	57 species and varieties of pæonies.
Brown, C. E., Yarmouth, N.S.	Scions of double-flowering hawthorn.
Craig, Wm., Maritana, Que.	Scions, Guerin apple and plum trees.
Cairncross, G., London Junction, Ont.	3 varieties rhubarb.
Dempsey, W. H., Trenton, Ont.	Apple scions.
Foster, Mrs. S., Knowlton, Que.	Scions, Hardy and Edgehill apples.
Freemantle, Henry, Coalfields, Assa.	5 cuttings Freemantle Redpath Ruby Red Currant.
Hay, G. U., St. John, N.B.	Specimens of American arbor vitæ and *Ilex verticillata*.
Hamilton, Robert, Grenville, Que.	Apple scions.
Iowa Experiment Station, Ames, Ia., U.S.	Apple scions.
Johnston, Asa. A., Cowansville, Que.	Scions, Kinkead, No. 2, No. 3, No. 7, apples.
Johnstone, John, Long River, P.E.I.	Sample McIntyre Potato.
Kettle, Stephen, Ursa, Ont.	Seeds of gorse, broom and holly.
Lalonde, Antoine, Isle Verret, Que.	Tobacco seed.
Lagace, Jules, Madawaski, Que.	Scions, seedling apple.
Leef, W. H., Orillia, Ont.	Scions of seedling plum.
Marsh, J. D., Mille Roches, Ont.	Scions, No. 2, seedling apple.
Morris, Stone & Wellington, Welland, Ont.	Apple scions.
Mallory, N.E., Guilds, Ont.	25 plants Edgar strawberry.
New York Botanic Gardens, Bronx Park, N.Y.	44 species perennials.
Ontario Agricultural College, Guelph, Ont.	Collection of 13 varieties of strawberries, 6 varieties of raspberries.
Robson, T. A., Minden, Ont.	Apple scions.
Royal Gardens, Kew, London, Eng.	Collection of seeds.
Smith, E. D., Winona, Ont.	1 tree Emerald plum.
Sivers, Max von, Roemershof, Russia.	Seeds and plants.
Simpson, W., P.E.I.	Clover roots.
Smallwood, A., Middleton, P.E.I.	Plants of *Achillea Ptarmica*.
Sole, Thos., Sarnia, Ont.	Scions of unknown apple.
Spramotor, Co.	London, Ont., Spray pump.
Starr, R. W., Wolfville, N.S.	Hardy roses, native spiræas, plum tree, Scions of Gravenstein and Red Gravenstein apples.
Trotter, Miss L. A., Owen Sound, Ont.	Scions, seedling pear.
Tolmie, J., Victoria, B.C.	Perennials.
Thonger, Prof. C. G. Freer, F.R.S., Colonial College, Hollesley Bay, Suffolk, Eng.	Apple scions, Collection of 24 varieties.
Woodward, J. S., Lockport, N.Y., U.S.	Scions, Milwaukee apple.
Wilson, Fred, Stouffville, Ont.	Plum scions.

I have the honour to be, sir,

Your obedient servant,

W. T. MACOUN,

Horticulturist.

APPLES.

Most of the apple trees came through the winter of 1898-9 in good condition. The trees suffered most on a sandy hill, on which the snow did not lie very well and where even the cover crop failed to afford the required protection. Several of the trees were root killed and a few others had their roots injured considerably. The number of trees which died or were destroyed by storms during the year was fifty-five. Most of the trees made good growth during the past season, notwithstanding the fact that many of them are affected with what is known as "black heart." The gaps caused by the heavy losses from winter-killing during the winter of 1895-6 are fast being filled up by the young trees which were planted since that time, and the apple orchard, on the whole, looked well. The crop of apples was light this year; there were, however, 175 varieties which fruited, although only a few of the trees were well loaded. Insects were not very troublesome, although if the tent caterpillars had not been taken in time they would have caused much injury. The trees were given two sprayings to destroy the oyster shell bark-louse, which was first found running on May 29. The trees were sprayed on June 1, with tobacco water and whale oil soap, made by using 10 pounds tobacco and 2 pounds whale oil soap to 40 gallons of water. On June 6, the trees were sprayed a second time with whale oil soap at the rate of 8 pounds to 40 gallons of water. This destroyed many of the insects.

The regular sprayings were made with sulphate of copper and Bordeaux mixture; once with sulphate of copper and four times with Bordeaux mixture. There was practically no scab on the fruit this season, and the codling moth did not affect it so much as last year. The dry rot, of which mention is made elsewhere, affected a number of varieties but did not appear any worse than last year.

DESCRIPTION OF VARIETIES.

A few varieties of apples not hitherto described in the reports of the horticulturist are worthy of special mention this year.

Shiawassee Beauty.—Medium size, oblate or flat, regular; skin yellow, washed over nearly the whole surface with deep red; dots few, pale, distinct, but not prominent; cavity, medium depth, open; stem, medium length, slender; basin, medium depth and width, smooth; calyx partly open. Flesh white, crisp, very tender, juicy, mild subacid, pleasant flavour, core small; skin thick and tough. Quality very good. Season, November, December. Tree a medium, spreading grower, fruiting heavily every other year. Originated in Michigan.

Milwaukee—Large, oblate; skin pale yellow, well splashed and washed with bright red and crimson; dots moderately numerous, small, white, distinct; cavity, deep, medium width, slightly russetted; stem short, slender; basin deep, open, slightly wrinkled; calyx, large, open. Flesh yellowish, crisp, tender, melting, juicy, acid; core medium size; skin moderately thick and moderately tough. Quality above medium, almost good. Season December to February. A handsome apple, excellent for cooking. A tree planted in 1895 bore heavily this year. It is a seedling of Duchess originating with Mr. Geo. Jeffery, Milwaukee, Wisconsin.

Walter—Very large, roundish, rather irregularly ribbed; skin pale yellowish green streaked and splashed with red, heavier on sunny side; dots few, small, white, distinct; cavity deep, medium width; stem short; moderately stout; basin deep and medium width; calyx closed. Flesh yellow, tender, melting, juicy, brisk subacid; core small, skin moderately thick, fairly tender. Quality above medium, almost good. Season October. Tree an upright moderate grower, bearing heavily every other year. Originated by the late P. C. Dempsey, Trenton, Ont. A cross between Northern Spy and Golden Russet, the former being the female parent. The original tree fruited for the first time in 1891. A very handsome apple.

Lawver (Delaware Red Winter).—Above medium size, roundish, broadly ribbed. Skin yellow, nearly all or all, washed with bright red; dots few, pale, distinct; cavity medium in depth, narrow; stem long, slender; basin very shallow, narrow, wrinkled; calyx closed. Flesh yellow, sometimes faintly tinged with pink, tender, crisp, juicy, sprightly subacid, aromatic; core small; skin thick and tough. Quality above medium. Season, January to June, but will keep for more than a year. An annual, but a shy bearer at the Experimental Farm. Tree a medium, spreading grower. In 1898 there was so marked a difference between the fruit of the Lawver and the apple we have under the name of Delaware Red Winter, that they were thought to be quite distinct, but this year no difference can be detected. The description made of the Delaware Red Winter last year differed from the one given above in these particulars:—Brighter in colour than Lawver; cavity a little broader, basin deeper, calyx larger; flesh not tender as in Lawver; sub-acid, not sprightly; skin tenderer than Lawver. Why this difference should have occurred is still a mystery. The difference was not confined to a few specimens, all being the same. The fruit was picked about the same time. Others who saw the two apples in 1898 thought them distinct varieties. We are now quite confident that Delaware Red Winter is a synonym of Lawver.

RUSSIAN APPLES.

There were not so many of the Russian varieties of apples fruited this year as last, but those that did were carefully compared in order to continue the work of eliminating synonyms; descriptions were made of most of the kinds which ripened, and notes taken on the growth of the trees. Each year adds convincing proof of how little value most of these varieties are in all but the extreme limits of successful apple culture. While a large number of the trees are suffering from 'black heart,' which has affected them for several years, many of those which were badly affected with blight in 1893, and were severly pruned in consequence, are regaining symmetrical proportions. Last winter and during the past summer 23 trees died or were blown down; all of which were rotten at the root.

The following are the varieties which have this year been found fruiting under different names, or found to be different varieties under the same name. As we are not yet sure of the proper names for these varieties, it is impossible to say which are the synonyms:—

Green Sweet. Lebonkey Sweet. Described, August 8. Fruit large, roundish, sometimes oblate; skin pale yellow, a considerable number of pale yellow dots; cavity medium in depth, narrow, stem short, stout; basin medium depth and width, considerably wrinkled. Flesh white, firm, moderately juicy, acid, astringent; core small, skin moderately thick, tender. Poor quality. Not promising.

Herrin. Osimoe 7 M., 57 M., Good Peasant, Beautiful Arcade. Described August 19. Fruit large, roundish, pale-green, with a purplish pink blush on sunny side, dots few, white, obscure; cavity medium in depth, narrow, stem short, moderately stout; basin medium depth and width, slightly to considerably wrinkled, calyx open. Flesh white, juicy, sweet, fair flavour, core small, skin thick and tough. Medium quality. A pleasant flavoured sweet apple.

Antonovka. Cinnamon, German Calville, Yellow Arcade. Described October 5. Fruit large, irregular, oblong, roundish or slightly conical, ribbed; skin yellow, a few pale-green obscure dots which, being raised, make the skin rough to the touch; cavity deep, moderately open, russetted; stem short, stout; basin deep, narrow, slightly wrinkled; calyx closed. Flesh yellow, firm, moderately juicy, tender, brisk sub-acid, with a peculiar, pleasant, spicy flavour; core small; skin thick, tender. Quality, almost good. Season, October. Better than most of the Russian varieties.

Bogdanoff. Repka Winter, Tested December 14. Fruit above medium size, oblate, ribbed though not prominently; skin yellowish-green, well streaked and splashed with purplish red; dots few, obscure; cavity deep, of medium width, russetted; stem short, moderately stout; basin deep, medium width, slightly wrinkled; calyx open; flesh white, crisp, moderately juicy, mild sub-acid; core, small; skin, thick, rather tough. Medium quality. Season, December, January.

Grandmother. Bogdanoff, Bogdanoff Steklianka, Red Reinette. Described November 28. Fruit large, conical; skin greenish-yellow with a pink blush on sunny side; dots few, gray, not prominent; cavity deep, narrow, much russetted; stem short, moderately stout; basin medium depth and width, slightly wrinkled; calyx large, open; flesh yellow, crisp, tender, moderately juicy, pleasant flavour, brisk sub-acid; core, medium size; skin, thick, moderately tender. Good quality. Season, November. One of the best of the Russian varieties.

Three varieties have been found under the name of Melonen. First, that described as a synonym of Liveland Raspberry in the report for 1898, and two others, quite distinct.

RUSSIAN APPLE SEEDLINGS.

It was reported last year that 1,016 of the Russian apple seedlings were still living. This year 118 of the poorest shaped and least vigorous trees were removed to give more space to those remaining. A number of those which have fruited and have been found to be of little value will be cut out before spring. The number now remaining is 898.

It is surprising how vigorous and healthy the seedlings are, growing in apparently almost pure sand and not receiving any fertilizers; but the fruit which is produced on them partakes of most of the characteristics of the named Russian varieties, and although 133 have fruited during the past three years, 43 of which fruited this year, none of them are of sufficient merit to deserve special mention. A large proportion of them, however, seem just as good as most of the named Russian sorts which have been disseminated in this country. No late-keeping winter apples have yet been found among them.

TOP-GRAFTING.

Many of the best varieties of apples do not succeed at Ottawa; they are either subject to sun-scald, root-killing, or killing of the terminal branches. There are, however, other kinds of apples, possessing less commercial value, which are quite hardy and do not suffer from sun-scald. In 1896, four of these varieties, McMahan White, Gideon, Haas and Romna, were planted as stocks on which to top-graft some of the tenderer sorts, it being thought that some of them, at least, would succeed at Ottawa if grown in this manner. Top-grafting was begun on these stocks in the spring of 1898, and continued this year; the following varieties being successfully grafted:—Baldwin, Belle de Boskoop, Benoni, Dominie, Early Harvest, Esopus Spitzenburg, Fallawater, Keswick Codlin, King of Tompkins Co., Mother, Newtown Pippin, Northern Spy, Ontario, Rhode Island Greening, Rome Beauty, Sutton Beauty, Wagener, Winesap and York Imperial.

This work will be continued until all the best varieties of apples which are likely to grow here have been tested. The results of this work will be watched with much interest from year to year. To show the possibilities in this direction, it may be said that in 1891 a tree of Duchess and two trees of Wealthy were top-grafted with Northern Spy, which will not live on its own roots at Ottawa. All of these fruited in 1897. The grafts on Duchess produced fruit in 1897 and 1899, and those on Wealthy in 1897 and 1898. The wood of the Northern Spy appears quite hardy, and if the Duchess and Wealthy had been stronger growing stocks it is probable that good crops would have been produced for many years, but the Northern Spy is out-growing the stocks and soon the trees will be so top heavy that they will likely break off in a severe storm. It is, then, not wise to top-graft a strong-growing variety on a weak-growing stock.

There are so many apple trees of little value growing in Canada, which could be successfully top-grafted with better varieties, that it would well repay any one possessing an orchard to go carefully over his trees and top-graft those which do not produce paying crops. A circular on top-grafting was published by the Experimental Farm a few years ago which can be had on application, in which the methods employed in top-grafting are clearly set forth. The chief points to take into consideration in top-grafting may be briefly summarized from the circular, thus :—

1. Old trees, if healthy, may be grafted with success.
2. The top should not be all cut away the first year, but should be removed gradually, the time required to change the top of a large tree successfully being from three to five years.
3. Early spring, before growth begins, is the best time to graft.
4. The branches to be grafted should not be more than from 2 to 3 inches in diameter where the grafts are to be inserted.
5. After the branch is carefully sawn in two, the stub is split with a mallet, held open with a wedge, and the scions inserted ; two being used, one on each side, if the branch is more than an inch in diameter.
6. The scion is made from a twig of the previous year's growth, about 4 or 5 inches long and having three or four buds. It is prepared by making a wedge of the lower end, beginning near the base of a bud. The scion is inserted in the stock as far as the upper edge of the wedge.
7. In inserting the scion, great care should be taken that the inner bark of both scion and stock should come in contact with each other. This is very important, as the healing begins from this point and if the scion is inserted carelessly there is almost certain to be a failure.
8. After the scion has been set, the cut surface is covered over with grafting wax to exclude air, and strips of cotton may be wrapped over this.
9. A good grafting wax for outdoor use is made by melting together resin and beeswax in the proportion of five parts resin and two parts beeswax ; to this is added one and one-half to two parts linseed oil.
10. In top-grafting a tree, always have in view the production of a symmetrical top after the old one has been removed.

PEARS.

The pear trees were very little injured last winter, and during the past summer they made good growth. A few varieties fruited, but none of these were of special merit, being, most of them, inferior sorts of Russian origin. No blight appeared in the orchard. The Russian pears have proved the hardiest at the Experimental Farm, and advantage has been taken of this fact to top-graft them with some varieties of better quality. This work was begun last spring, and the following kinds were successfully grafted :—

Angouleme, Bartlett, Clairgeau, Clapp's Favourite, Gansel's Bergamot, Dr. Jules Guyot, Duhamel du Monceau, Emile d'Heyst, Madame Treyve, Knight's Monarch, Pitmaston Duchess, St. Swithin, Seckel, Smith's Hybrid, and Vicar of Winkfield. As there are no pears of first class quality which are hardy at Ottawa on ordinary pear stocks, it is hoped that by top-grafting them on Russian stocks a few may succeed here, but as the Russian pears sometimes kill out here, they are also liable to be lost at any time. It is proposed this winter and next summer to use European mountain ash and a wild pear from China called *Pyrus betulaefolia* as stocks, as these are hardy at Ottawa, and tender varieties grafted or budded on them may succeed. Any plan that will be likely to cause the best pears to fruit at Ottawa will be tried, in the hope that sometime success will crown our efforts.

PLUMS.

It is only a few years since nearly all the trees in the plum orchard were winter-killed, but the dead trees have all been replaced and the orchard now looks well.

Very few trees were injured last winter, and most of them made strong growth during the past summer. There was only a light crop of fruit, but forty varieties bore this year. These were, however, nearly all American sorts. The aphides were not troublesome this year, but the shot-hole fungus riddled the leaves very badly, notwithstanding the thorough sprayings which the trees received. It is supposed by some that spraying increases the disease, but it was bad on trees that were not sprayed.

Of the varieties of American plums which fruited this year, the following, given in their order of ripening, were the most promising:—

Bixby, ripe Aug. 31; Cheney, ripe Sept. 2; New Ulm, ripe Sept. 6; Ocheeda, Wolf, City, Cottrell, ripe Sept. 14; Stoddard, Wyant, ripe Sept. 19; Comfort, DeSoto, ripe Sept. 25.

The Aitkin plum, which ripened on August 22, is a fine large red plum, but is only of medium quality. It may be planted with advantage on account of its earliness.

CHERRIES.

A few more of the old trees died this year, and there are now not many of them left. The trees of the Koslov Morello cherries were not as vigorous as usual, and had evidently been injured more or less last winter. All the young trees available in the nursery were utilized this year to fill up the blanks which still remained after the destructive winter of 1895–96. There were 133 trees planted, comprising twenty-one varieties. Nearly all of these are grafted or budded on bird cherry (*Prunus pennsylvanica*) stock. There was practically no fruit this year.

GRAPES.

This was a very unfavourable season for grapes. A wet July seemed to favour the growth of Anthracnose and many varieties were more or less affected by it. The whole summer was unfavourable to the rapid maturing of the fruit, and September was particularly so, being cold, cloudy and wet. A frost which occurred on September 23 did considerable damage, while another much more severe on October 2 killed the leaves on the vines and ruined a large quantity of fruit which was not sufficiently mature to harvest. While 130 varieties ripened in 1898, only sixty were fully matured this year. It was very interesting to note the date of ripening of the different sorts this year, as some which matured early last season did not ripen this year until late, thus showing which varieties would ripen early, even though the season were unfavourable, and those which require a greater amount of heat. In the report for 1898, a list was given of twenty-five of the earliest varieties for that year, in the order of their ripening. The following list of the twenty-five earliest this year will be interesting for comparison:—

Twenty-five earliest ripening varieties of Grapes 1899:

Florence, Sept. 7; Champion, Golden Drop, Sept. 17; Moore's Early, Sept. 21; Brant, Sept. 22; Moyer, Peabody, Canada, Pattison, Janesville, Telegraph, Sept. 23; Eumelan, Sept. 25; Belvidere, Hartford, Sept. 26; Early Victor, Cottage, Rogers No. 5, Northern Muscadine, Sept. 27; Marion, Requa, Maxatawney, Dracut Amber, Rogers No. 24, Sept. 29; Clevener, Sept. 30; Potter, Oct. 2. Of these, Florence, Northern Muscadine, Maxatawney and Dracut Amber are not desirable.

The cover crop of clover which was in the vineyard last winter was ploughed under on May 15, and the soil kept cultivated throughout the early part of the season. A large amount of old wood was removed from the vines this autumn and where possible new arms were obtained. It will take several seasons to renew all the vines, as it is difficult to get the required amount of wood in the proper place, and many of the vines do not sucker readily. The vineyard received a dressing of wood ashes and kainit last spring, part of the vines receiving the former at 100 bushels per acre, and part of the latter at 1000 pounds per acre.

CURRANTS.

There was a good crop of currants this year and all the bushes grew well. Some of the newer varieties began to fruit and a few of them give promise of being valuable, but it is too soon yet to pass judgment upon them. Cuttings were taken of all the varieties this autumn, looking forward to the making of a new plantation in 1901.

In the following tables will be found the yields of the different varieties during the past season, and other notes regarding them.

CURRANTS—RED.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Yield.		Average Yield Per Bush.	
			1899.		Lbs.	Oz.	Lbs.	Oz.
Red Dutch	1893	July 6..	Small to medium..	6	73	15	12	5
Red Grape	1893	" 6..	Above medium....	6	64	15	10	13
Raby Castle	1893	" 6..	Medium	6	62	7	10	6
Greenfield	1893	" 6..	Medium to large..	6	43	3	7	3
La Conde	1893	" 6..	Medium	4	25	4	6	7
London Red	1893	" 6 ..	Large	6	37	..	6	3
Early Scarlet	1893	" 4..	Medium	6	29	11	4	15
Cumberland Red	1896	" 6..	Large	3	12	8	4	3
Cherry	1893	" 6..	Small to medium..	6	24	8	4	1
Ribes striatum	1893	" 8..	Small	6	24	4	4	1
North Star	1893	" 6..	Medium to above medium	6	21	8	3	9
Victoria	1893	" 6.	" " ..	6	17	3	2	14
Fay's Prolific	1893	" 6..	Very large	6	15	13	2	10
Wilder	1893	" 6..	Large	6	14	14	2	8
Prince Albert	1893	" 12..	"	6	6	12	1	2
Simcoe King	1896	" 6..	"	6	4	12	..	13
Versaillaise	1893	" 6.	Very large	6	1	9	..	4
Fertile d'Angers	1893	" 6..	"	6	1	3	..	3
Moore's Ruby	1893	" 6.	Large	4	..	8½	..	2
							..	

WHITE.

Climax	1893	July 6..	Large	6	21	14	3	10
White Dutch	1893	" 6..	Medium	6	12	9	2	1
White Grape	1893	" 6..	Large	6	8	13	1	7

BLACK.

Ontario	1893	July 6..	Medium to large..	6	55	6	9	4
Eagle	1893	" 8..	Medium to above medium	6	51	5	8	9
Beauty	1893	" 7..	Medium	6	45	5	7	9
Kerry	1893	" 6..	Above medium to large	6	45	6	7	9
Climax	1893	" 10..	" " ..	6	38	7	6	6
Success	1893	" 4..	Large	6	35	3	5	14
Perry	1893	" 10..	Small to medium..	6	35	3	5	14
Clipper	1893	" 6..	Medium to large..	6	33	10	5	10
Black Champion	1893	" 16..	Medium to above medium	6	33	13	5	10
Lee's Prolific	1893	" 8..	Medium	6	31	..	5	3
Winona	1893	" 6..	Above medium....	6	29	13	4	15
Monarch	1893	" 7..	Medium to large..	6	28	..	4	11

CURRANTS—BLACK—*Concluded.*

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Yield.		Average Yield per Bush.	
			1899.		Lbs.	Ozs.	Lbs.	Ozs.
Orton	1893	July 6	Large	6	28	1	4	11
Ethel	1893	" 8	Medium to above medium	6	26	..	4	5
Stewart	1893	" 14	Small to medium	6	23	10	3	15
Beauty	1893	" 8	Medium to large	6	22	8	3	12
Eclipse	1893	" 6	Above medium to large	6	22	1	3	11
Victoria Black	1893	" 12	Very large	6	19	15	3	5
Charmer	1893	" 12	Small to medium	6	18	½	3	..
Black English	1893	" 10	Large	6	17	2	2	14
Prince of Wales	1893	" 16	Small to medium	6	14	13	2	7
Black Naples	1893	" 16	Medium to large	3	7	1½	2	6
Standard	1893	" 6	Large	6	13	6	2	4
Ogden	1893	" 7	Medium	6	12	3½	2	1
Dominion	1893	" 8	"	6	12	3	2	..
Stirling	1893	" 7	"	6	11	5	1	14
Star	1893	" 7	"	6	9	7	1	9
Mattie	1893	" 8	Medium to large	6	6	10	1	2
Perth	1893	" 7	"	6	4	13		13
Madoc	1893	" 4	Small to medium	6	3	15		10
Oxford	1893	" 6	Above medium	6	3	..		8
Lewis	1893	" 7	Medium	6	1	1		3

The following varieties have been planted within the last two years :—

CURRANTS—RED.

Knight's Large	1897	July 6	Large	6	1	12	..	5
Moore's Seedling	1898	" 9	Very large	6	..	13½	..	2
Goliath	1898	" 6	Medium	6	..	11½	..	2
La Fertile	1898	" 6	Large	6	..	3	..	¼
Houghton Castle	1898	" 6	Medium	6	..	2	..	¾
Benwell	1898			6	..	2	..	¾
Victoria	1898			6	..	2	..	¾
Defiance	1898			6	..	1½	..	¼
Wentworth Seedling	1898		Medium	6				
Comet	1899			6				
Pomona	1897			4				
Large Bunch Holland	1897			6				

WHITE.

White Imperial	1897	July 6	Large	6	8	12	1	7
Transparent	1898	" 6	Medium	6		6		1
Wentworth Leviathan	1898			6		1½		¼

BLACK.

Victoria Black	1898	July 12	Very large	6	6	5	1	1
Ismay's Prolific	1898	" 15	Medium to above medium	6	4	4		11
Black Grape	1898	" 10	Large	6	2	5½		6
Buddenborg's Black	1898	" 13	Very large	6	1	6½		4
Black Prince	1898	" 14	Large	6	1	½		3
Baldwin	1898	" 9	Above medium	6	1	2½		3
Collin's Prolific	1899			6				

RASPBERRIES.

It was reported last year that the raspberry plantation was not in a condition to make reliable comparisons of the different varieties being tested. It has improved somewhat in this respect this season, though there are still quite a number of varieties where the plants are not yet all in full bearing. As many as possible of the vacancies were filled this year, though the work is not yet complete. In a collection of so many varieties, it is very difficult to have them all in the right condition for accurate comparisons of yields. Most of the plants came through last winter well.

In 1895 a bulletin was published on raspberries, in which the results obtained with the different varieties up to that time were given, with information also as to the best methods of growing this fruit. This bulletin may be obtained on application by those who desire to know which are the best varieties to plant. Few good varieties have been introduced since that time. The Loudon raspberry, which is one of the best of the newer red varieties, will probably not prove superior to the Cuthbert. The Columbian, a purple variety, is very promising and may take the place of Shaffer's Colossal.

GOOSEBERRIES.

Only the American varieties of gooseberries have hitherto succeeded at the Experimental Farm. The European sorts are always so badly mildewed that what little fruit remains on the bushes is practically useless. In order to see if change of soil would have any effect on them, all the varieties, both American and European, were layered in 1898, the object being to start a new plantation on heavier and moister soil. Last spring the plants were set out. The American varieties which were layered had made good roots, but the European, as was expected, had in many cases only a few fibres. The old bushes, however, were divided where the layers were not sufficiently rooted, and a plantation was made consisting of twenty-nine American and ninety-five European varieties. The former made good growth, but the latter, though well sprayed, made very little; they will, however, be given a thorough test under these new conditions, and better results may be expected from some of them. Owing to the layering of so many of the bushes it is not possible to give yields of the different varieties. Downing, Pearl, and Red Jacket are still the leading American sorts, though some of Dr. Wm. Saunders' newer seedlings are very promising.

STRAWBERRIES.

This has been a very good season for strawberries in the Ottawa Valley, the crop being good and the prices high. It has given a great impetus to the growing of this fruit here, and a much increased acreage will be planted next spring.

A new strawberry plantation was made at the Farm this year, consisting of 350 varieties. Many of these will be discarded after one year's fruiting, as they have already been tested here, but we are not yet familiar with all of them, and it is desired that they may be studied and notes taken of them before they are no longer available. The soil used for this plantation is a good sandy loam which had been planted with potatoes in 1898 and ploughed shallow in the autumn of that year. In the spring of 1899 well rotted manure was applied at the rate of 30 tons per acre, the land was then ploughed just deep enough to cover the manure, and then disc harrowed twice, once lengthwise and once crosswise, in order to get the manure well incorporated with the soil. It was then rolled with a heavy land roller. The rows were marked off $3\frac{1}{2}$ feet apart with a corn marker and twenty-four plants of each variety planted with a trowel, 15 inches apart in the rows, each variety occupying two rows of twelve plants each. No fruit was allowed to ripen this year, and no runners were permitted to grow until July. The soil was kept thoroughly cultivated and hoed throughout the season. Owing to about six weeks of dry weather during the month of August and the first half of September there were not as many runners formed as one would have liked, but there

are enough to promise a good crop of fruit next season. A light covering of straw was spread over the plants on December 16.

It is the intention to make a new plantation at least every two years hereafter. For commercial purposes it is the best practice to only take off one full crop and then plough the plants under.

As the old plantations had been bearing for several seasons, the varieties this year could not be fairly compared, and hence no table of yields is given.

Some of the best berries now on the market are Clyde, Glen Mary, Wm. Belt, Bubach, Greenville, Haverland, Lovett, Brandywine. The Sample, from all accounts, is a very promising new berry, but this has not fruited here yet.

A NORTHERN EXPERIMENTAL ORCHARD.

(SECOND REPORT.)

In the report of the Horticulturist for 1895, there was published, under the heading 'A Northern Orchard,' the results obtained by Mr. J. C. Chapais, St. Denis, Que., in testing large and small fruits at his place. As it is believed that the information given at that time has proven very useful to intending planters along the lower St. Lawrence, it has been thought wise to again publish a list of the trees tested by Mr. Chapais, as, after the last list appeared, many of the varieties, then doing well, succumbed to the severe winter of 1895-6, and it is important that fruit growers should know which were killed and which survived.

We are very grateful to Mr. Chapais for furnishing us with these notes, which, we know, will be appreciated by those whose climatic conditions are similar to his own.

Owner.—J. C. Chapais.

Locality.—St. Denis, County of Kamouraska, Province of Quebec, Canada.

Latitude.—47° 30'.

Lowest Temperature.—30° below zero Fahrenheit, experienced only twice in thirty six years.

Highest Temperature.—94° Fahrenheit.

Rainfall.—Average for twenty years, 29½ inches per year, including snow fall; 10 inches of snow estimated to equal 1 inch of rain. The average thickness of snow is 3 feet in open country.

Exposure.—Ground gently sloping to the north.

Soil.—Sandy clay, well drained.

Predominant Wind.—North-eastern damp wind, with salt emanations from the Gulf of St. Lawrence.

Reference Nos.	Varieties Planted.	When Planted.	Growth and Present Condition.	Blooming in 1899. First Flowers	Full Bloom.	Last Flowers
	Apples.					
1	Alexander	1891	Very good; fruiting	June 3	June 10	June 16
2	Antonovka	1889	Winter-killed, 1895-6			
3	Arabka (Ell. & B.)	1889	" "			
4	" Summer	1889	" "			
5	Ben Davis	1898	Very good			
6	Blushed Calville	1889	Winter-killed, 1895-6			
7	Bode	1892	Very good			
8	Canada Baldwin	1898	"			
9	Canada Red	1898	Good			
10	Charlottenthaler	1889	Winter-killed, 1895-6			
11	Duchess of Oldenburg	1889	Good; fruiting	June 6	June 10	June 16
12	English Golden Russet	1891	Very good; fruiting	May 31	" 5	" 11
13	Fameuse	1889	" "	June 3	" 5	" 12
14	General Grant	1897	" " winter-killed, 1895-6; re-planted, 1897	" 2	" 7	" 13
15	Gipsy Girl	1892	Winter-killed, 1895-6			
16	Golden White	1891	" "			
17	Grand Duke Constantine	1889	" "			
18	Grandmother	1889	Very good; fruiting	June 6	June 12	June 15
19	Grimes' Golden	1899	Good			
20	Hare Pipka	1892	" fruiting	June 4	June 11	June 14
21	Hyslop	1889	Bad "	" 3	" 8	" 13
22	Longfield	1898	Good; winter-killed, 1895-6; re-planted, 1898			
23	Louis' Favourite	1891	Winter-killed, 1895-6			
24	McIntosh Red	1891	Very good; fruiting	June 2	June 10	June 15
25	Mann	1898	Good			
26	Montreal Beauty	1898	"			
27	Ontario	1899	"			
28	Orel No. 1	1894	Very good; fruiting	June 7	June 13	June 18
29	Peach of Montreal	1891	" "	" 1	" 7	" 12
30	Pewaukee	1899	Good			
31	Princess Louise	1891	Very good; fruiting	June 6	June 11	June 16
32	Red Astrachan	1889	Good "	" 3	" 9	" 14
33	Red Beitigheimer	1898	Very good; winter-killed, 1895-6; re-planted			
34	Red King	1898	Very good			
35	Red Queen	1893	"			
36	Salome	1898	Good			
37	Saint Lawrence	1891	Very good; fruiting	June 2	June 7	June 14
38	Summer Strawberry	1891	" "	May 30	" 5	" 10
39	Titovka	1889	Good "	June 3	" 9	" 14
40	Transcendent	1889	Very good "	" 1	" 7	" 12
41	Wealthy	1889	Good "	May 28	" 6	" 11
42	Whitney	1891	Very good "	June 1	" 7	" 14
43	Winter Arabka	1898	"			
44	Winter St. Lawrence	1898	Good; winter-killed, 1895-6; re-planted			
45	Wismer Desert	1898	Very good			
46	Wolf River	1898	Good			
47	Yellow Transparent	1898	"			
	Plums.					
48	Blue Damson	1889	Very good; fruiting			
49	Blue Imperial	1897	"			
50	Bradshaw	1898	Bad; winter-killed, 1895-6; re-planted			
51	Canada Orleans	1898	Good			
52	Coe's Golden Drop	1898	Good; winter-killed, 1895-6; re-planted			
53	Early Yellow	1889	Very good; fruiting	June 2	June 6	June 11

Reference Nos.	Varieties Planted.	When Planted.	Growth and Present Condition.	Blooming in 1899. First Flowers	Full Bloom.	Last Flowers
	Plums—Concluded.					
54	Grand Duke	1899	Good			
55	Gueii	1898	"			
56	Home Seedling	1892	"			
57	Imperial Gage	1898	Good; winter-killed, 1895-6; re-planted			
58	John Trotter	1892	Good			
59	Lombard	1898	Good; winter-killed, 1895-6; re-planted			
60	Moore's Arctic	1898	Very good; winter-killed, 1895-6; re-planted			
61	Niagara	1899	Good			
62	Pond's Seedling	1898	"			
63	Reine Claude de Bavay	1898	"			
64	Reine Claude de Montmorency	1889	Very good; fruiting	May 30	June 5	June 12
65	Saunders	1898	Good			
66	Shropshire Damson	1889	Winter-killed, 1895-6			
67	Smith's Orleans	1898	Good; winter-killed, 1895-6; re-planted			
68	St. Cloud	1898	Good			
69	Trabische	1891	Very good; fruiting	May 29	June 4	June 10
70	Washington	1899	Good			
71	Western Seedling	1899	Bad			
72	White Damson	1898	Good			
	Cherries.					
73	Bessarabian	1898	Very good; winter-killed, 1895-6; fruiting	June 1	June 7	June 12
74	Dyehouse	1899	Bad			
75	Early Richmond (Not grafted) or	1889	Very good; fruiting	June 3	June 10	June 15
76	French Cherry (Grafted)	1889	" "	" 1	" 6	" 11
77	Empress Eugenie	1898	Good " "	" 3	" 9	" 15
78	Lutovka	1898	Very good; fruiting; winter-killed, 1895-6; re-planted	" 2	" 7	" 14
79	Montmorency	1889	Very good; fruiting	" 3	" 8	" 13
80	Ostheïm	1898	Bad			
81	Vladimir	1891	Winter-killed, 1895-6			
82	Windsor	1898	Good			
	Pears.					
83	Baba	1892	Winter-killed, 1895-6			
84	Bessemianka	1898	Bad; " "			
85	Flemish Beauty	1898	Good; " " re-planted			
	Apricot.					
86	Alexander	1898	Good; winter-killed, 1895-6			
	Strawberries.					
87	Sharpless	1889	Very good; fruiting	June 4	June 20	July 12
88	White Alpine	1889	" "	May 30	Blooms and bears fruit all summer	
	Blackberries.					
89	Lucretia Dewberry	1899	Good; winter-killed, 1895-6; re-planted			
90	Taylor	1899	Good			

Reference Nos.	Varieties Planted.	Colour.	Growth and Present Condition.	Remarks.
	Currants.			
91	White Grape	White	Very good; fruiting	The best to eat
92	Black Naples	Black	" "	
93	Champion	"	" "	The best for liquor
94	Victoria	"	"	
95	Fay's Prolific	Red	" fruiting	The nicest
96	North Star	"	" "	
97	Versaillaise	"	" "	The best bearer
	Gooseberries.			
98	Chautauqua	White	Very good; fruiting	Very large fruit
99	College	"	Good	
100	Columbus	"	Very good; fruiting	Very large fruit
101	Downing	"	" "	The best to eat
102	Golden Prolific	"	" "	
103	Keepsake	"	" "	
104	Pearl	"	" "	Very prolific
105	Smith Improved	"	" "	Very good to eat
106	Whitesmith	"	" "	Very large fruit
107	Houghton Seedling	Red	" "	The most prolific
108	Industry	"	" "	Hairy and largest fruit
109	Lancashire Lad	"	Good; fruiting	
110	Red Jacket	"	"	
	Raspberries.			
111	Golden Queen	Yellow	Very good; fruiting	
112	White Raspberry (French)	"	" "	The best to eat
113	Gregg	Black	Bad	
114	Antwerp	Red	Very good; fruiting	The best to eat
115	Marlboro'	"	" "	Largest and nicest

After the severe winter of 1895–6, which killed so many fruit trees, it was decided not to re-plant the following varieties of fruit as they were not promising.

Apples.—Antonovka, Blushed Calville, Charlottenthaler, Gipsy Girl, Golden White, Grand Duke Constantine, Louis' Favorite, Summer Arabka.

Pear.—Baba.

Plum.—Shropshire Damson.

Raspberries.—Japanese Wineberry, Stone's Hardy.

On the other hand, there are in the present list a number of varieties which had not yet been planted in 1895 and which are now being tested. The following is a list of these :—

Apples.—Ben Davis, Canada Baldwin, Canada Red, Grimes' Golden, Mann, Montreal Beauty, Ontario, Pewaukee, Red King, Salome, Wismer Desert, Wolf River, Yellow Transparent.

Plums.—Blue Imperial, Grand Duke, Gueii, Niagara, Pond's Seedling, Reine Claude de Bavay, Saunders, St. Cloud, Washington, Western Seedling, White Damson.

Cherries.—Dyehouse, Empress Eugénie, Ostheim, Windsor.

Currants.—Champion, North Star, Victoria.

Gooseberries.—College, Columbus, Golden Prolific, Keepsake, Lancashire Lad.

Blackberries.—Taylor.

Raspberries.—Golden Queen.

In this orchard, now planted for ten years, experience has shown, through many very bad seasons that the following varieties are *iron clad*, that is, most hardy and to be recommended in every respect for the north-eastern region of the Province of Quebec, such are :

Apples.—Alexander, Duchess of Oldenburg, English Golden Russet, Fameuse, Grandmother, Hare Pipka, McIntosh Red, Peach of Montreal, Red Astrachan, St. Lawrence, Titovka, Transcendent and Whitney.

Plums.—Blue Damson, Early Yellow, Reine Claude de Montmorency and Trabische.

Cherries.—Early Richmond, or French Cherry, on their own roots.

Small Fruits.—Almost all those mentioned in the general list given above.

ANOTHER NORTHERN ORCHARD.

The following is a report of another northern orchard, namely, that of Mr. W. Tremblay, Chicoutimi, Que. This report was read before the Quebec Pomological Society at its meeting in Montreal last winter. Mr. Tremblay lives in a very rigorous climate, where the temperature frequently falls to 38° F. below zero, and the information he gives of the success which he has had in growing and fruiting apples there should be of great value to those in his latitude in the Province of Quebec who may be contemplating the planting of fruit trees.

Latitude of Chicoutimi	48° 26′ Fahr.
Lowest temperature	38° Fahr, below zero.
Highest "	104° Fahr, above zero.
Climate	Very moist.
Snowfall	2 to 3 feet.
Situation of orchard	Surrounded by rocks, covered with trees, except on east side.
Soil	Sandy loam with clay subsoil, well drained.

'CHICOUTIMI, January 5, 1899.

'My first work dates from 1893. In that year I planted a Duchess apple tree and a Bradshaw plum ; the latter perished the following winter, but as the apple tree wintered well, I planted in the spring of 1894 three dozen apple and crab trees, comprising the following varieties :—Hyslop, Duchess, Yellow Transparent, Russian Transparent, Peach of Montreal, Red Astrachan, St. Lawrence, Golden Reinette, and Grimes' Golden, the two last named varieties not wintering well. I am testing some other varieties and to-day, notwithstanding a temperature every year nearly as low as 40° F. below zero, there are not less than twenty varieties succeeding in my orchard. Duchess, Yellow Transparent, Irish Peach, Winter Calville, Tetofsky, Hyslop, and Queen's Choice produced fine fruit in 1898.

'The winter of 1896–7 was exceptionally hard on fruit trees in this part of the province. Notwithstanding this fact, I did not loose a single tree during that winter, the growth of the previous year and the fruit buds, only, perishing. I have proven that a good number of varieties can stand a temperature of 40° F. below zero if the roots of the trees are well protected. It is first necessary, however, to let the ground

freeze to a depth of four or five inches. It sometimes happens, however, as was the case this year and last, that the snow falls before the ground freezes. It is then necessary to shovel the snow away and permit the ground to freeze to the required depth. Some snow and straw should then be placed about the base of the tree which will prevent alternate thawing and freezing before the fine weather comes in the spring. If the ground is thus kept frozen there is no danger of winter-killing. It is true that I have lost some trees, but this was more due to my neglect in not taking the proper precautions than to lack of hardiness of the trees.

'The following are the names of the varieties which are at present growing in my orchard:—Duchess, Yellow Transparent, Russian Transparent, Peach of Montreal, Irish Peach, Wealthy, Tetofsky, Scott's Winter, McIntosh Red, Wolf River, Winter Calville, Red Astrachan, McMahan White, Gideon, Lawver, Pewaukee, Ben Davis, Fameuse, Longfield, and Hyslop.

'I have lost the following varieties:—Northern Spy, Twenty Ounce, Canada Baldwin, and Golden Reinette.

'In conclusion, I think that it is possible to cultivate fruits very far north in our province, providing the roots of the trees are well protected, and that the soil remains frozen hard until after the first thaws in spring.

'I am now beginning to test some plum trees, in the hope of having similar success.

'W. TREMBLAY.'

SEEDLING FRUITS.

Owing, probably, to the fact that there were light crops of large fruits in most of the fruit-growing districts in Canada this year, the number of specimens received for examination was much less than last season. There has, however, come under our notice a few which are quite promising, descriptions of which will be found below. It is always gratifying to receive specimens from those who think they have a good variety of fruit, as by describing the best of them in this report it makes their existence known to fruit-growers and they can then be tested on a larger scale and their true value determined.

Record Number	Province.	Address of Sender.	Description of Fruit.
		APPLES.	
176	N.S.	Mrs. H. K. E. E. P. Baker, Kentville	Promising. See description of Beauty of Norton.
177	"	P. J. Potier, Belleville	Splashed with purplish red; medium quality; late winter.
178	P.Q.	Asa Johnston, Cowansville	No. 1. Promising. See description.
179	"	" "	No. 2. " "
180	"	" "	No. 3. Unknown; greenish yellow, splashed with dull purplish red; season, late winter.
181	"	C. P. Newmann, Lachine Locks, P.Q.	Promising; see description.
182	"	A. A. Evans, Kingsey	A small striped apple of inferior quality.
183	"	L. Roy, Camille	A large yellow winter apple with a pink blush; inferior quality.
184	"	R. Hamilton, Grenville	De la Salle apple. See description.
185	Ont	S. P. Morse, Lowville	No. 17. Seedling; above medium size; streaked with bright red; poor quality.
186	"	W. Grady, Annan	A sweet apple of good quality; late winter.
187	"	J. P. Cockburn, Gravenhurst	'Minto.' See description.
188	"	Wm. Mowbray, Sarnia	Splashed and streaked with red; medium quality; season, winter.
		PEARS.	
189	"	Miss Lilian A. Trotter, Owen Sound	Promising seedling pear. See description.
		PEACHES.	
190	"	E. D. Smith, Winona	'Millionaire.' See description.

Record No. 176. Apple seedling 'Beauty of Norton': Tested Nov. 18, 1899:—from Mrs. H. K. E. E. P. Baker, Kentville, N.S.

Description.—Very large, roundish, conical; skin pale yellow, splashed and washed with red, mostly on sunny side; dots few, pale, obscure; cavity deep, open; stem short stout; basin deep and narrow; calyx open. Flesh yellow, tender, juicy, melting, mild sub-acid. Core, medium size; skin moderately thick, tender. Quality good; season November. Probably a seedling of Gravenstein. Mrs. Baker says that the tree was found growing near the railroad when about 4 feet high, and transplanted to its present position about fifteen years ago. It bears a good crop every year and is not subject to disease. It is good either for dessert or culinary purposes. The specimen received weighed 9½ ounces and measured 3½ by 3 inches in diameter. A specimen sent, but which was not received, was said to measure 14 inches in circumference.

Record No. 178. Apple seedling (No. 1.) Tested Feb. 4, 1899. From Asa Johnston, Cowansville, Que.

Description.—Medium size, roundish, slightly elongated, regular, smooth; skin yellow, almost covered with bright red; dots few, yellow, distinct; cavity shallow, narrow; stem short, stout; basin narrow, medium depth, smooth; calyx open. Flesh yellow, juicy, mild sub-acid, peculiar but not unpleasant flavour. Core small; skin moderately thick, tender; quality above medium. A very handsome apple and a good keeper.

Record No. 179. Apple seedling (No. 2.) Tested Feb. 4, 1899. From Asa Johnston, Cowansville, Que.

Description.—Medium size, oblate, slightly conical; skin yellow, nearly covered with bright red; dots fairly numerous, yellow, distinct; cavity deep, open; stalk short, moderately stout; basin narrow, shallow, smooth; calyx partly open. Flesh yellowish, tender, juicy, sub-acid; core small, stem moderately thick, tough, quality good. A good keeper. Promising, Scions received 1899.

Record No. 181. Apple seedling. Tested Nov. 15, 1899. From R. Hamilton, Grenville, Que. Specimens taken from orchard of C. P. Newmann, Lachine Locks, Que.

Description.—Medium to large, oblate to slightly conical, ribbed; skin pale green, almost, and sometimes covered with dark red; dots numerous, small, yellow; cavity deep, moderately open, slightly russetted; stem short, moderately stout; basin medium depth and width; calyx closed. Flesh white, tinged with red near skin, moderately juicy, sub-acid, slightly astringent, pleasant but not high flavoured. Core medium size. Skin thick and tough. Quality above medium. Season, December and January. Scions asked for. From an old seedling tree in the orchard of C. P. Newmann, Lachine Locks, Que.

Record No. 184. Apple seedling 'de La Salle.' Tested Dec. 20, 1899. From R. Hamilton, Grenville, Que.

Description.—Above medium size, roundish, skin pale yellowish-green, splashed and washed with bright red and carmine, mostly on sunny side; dots few, gray, obscure; cavity deep, medium width, russetted; stem medium length, moderately stout; basin deep, wide, slightly wrinkled; calyx open. Flesh yellow, firm, crisp, juicy, sub-acid, pleasant flavour. Core medium size. Skin thick and moderately tough. Quality good. Season, January to May. Promising. Original tree stood on the farm of John Fraser near Lachine, Que. Scions asked for.

Record No. 187. Apple seedling 'Minto.' Tested Nov. 14, 1899. From J. P. Cockburn, Gravenhurst, Ont. Grown by Rev. Wm. Reeve, Gravenhurst, Ont.

Description.—Medium size, roundish, broadly ribbed; skin pale green, splashed and washed with dull dark red, mostly on sunny side; dots few, green, distinct, but

not prominent; stem short, moderately stout; cavity deep, narrow; basin medium depth and width, slightly wrinkled; calyx closed. Flesh white, crisp, tender, juicy, mild sub-acid, pleasant but not high flavoured: core medium size; skin moderately thick. Quality good. Probably season of Fameuse. Tree said to be about 10 years' old, very hardy, and an annual bearer. Not desirable where Fameuse and McIntosh Red will succeed, but if hardier than these trees it may prove valuable.

Record No. 189. Pear seedling. Tested Sept. 11, 1899. From Miss Lilian A. Trotter, Owen Sound, Ont.

Description.—Below medium size, obovate, obtuse pyriform; skin yellow with a pink blush on sunny side; dots numerous, small, brown; cavity broad and very shallow; stem medium length, stout; basin narrow, shallow. Calyx open. Flesh yellowish, moderately juicy, buttery, sweet, high flavour. Quality very good. A little over ripe at this date. Tree grown from seed by the late Richard Trotter, Owen Sound, Ont.; said to be a healthy, rapid grower. Fruited for the first time in 1898, when there was one pear. Fair crop in 1899. Promising. Scions received 1899.

Record No. 190. Peach 'Millionaire.' Tested Sept. 12, 1899. From E. D. Smith, Winona, Ont.

Description.—Large, roundish, skin rich yellow, with a purplish red blush on sunny side; suture shallow, obscure except near cavity, where it is distinct. Flesh yellow, very juicy, sweet, rich; stone medium size. Freestone. Quality very good. Season, immediately after Early Crawford. Promising.

SPRAYING.

The trees, shrubs, and plants were thoroughly sprayed this year as in previous years, as a result of which comparatively little injury was done by fungous diseases or insects. The Tent caterpillars and Forest Tent caterpillars which did so much damage to fruit trees in Ontario and Quebec this year, were killed here by spraying the trees with Paris green shortly after they were hatched and before they had done much damage.

EXPERIMENTS IN WHITEWASHING TREES.

In a bulletin prepared by Mr. John Craig, late Horticulturist of this farm, on 'Peach Culture in Canada' (Central Experimental Farm, Bulletin No. 1, Second Series, September, 1898), he quotes from a bulletin published by Prof. J. C. Whitten, Horticulturist at the Missouri Agricultural Experiment Station, some interesting results which were obtained at that station in preventing the swelling of peach buds by whitewashing the trees. As no experiments had yet been conducted here to corroborate the results obtained in Missouri, and as the winter-killing of the fruit buds of the peach is a matter which interests many of our own fruit growers, it was thought desirable that we should be in a position to state whether the results obtained by Prof. Whitten could be had here or not. To make the matter as clear and concise as possible, I cannot do better before giving the results of our experiments here, than quote Prof. Whitten's summary of his work from Bulletin No. 38, Missouri Agricultural Experiment Station:

'I....In this latitude, winter-killing of the fruit buds of the peach is usually due to the unfavourable effects of freezing after they have been stimulated into growth by warm weather, during winter or early spring.

'II....The early swelling and growth of the buds is due to the warmth they receive, is practically independent of root action, and may take place on warm sunny days in winter, when the roots are frozen and dormant.

'III....Peach fruit buds may safely endure a temperature of ten or twenty degrees below zero, providing they mature well in autumn, are entirely dormant, and the cold comes on gradually.

'IV....Zero weather may kill fruit buds that have swollen during previous warm weather, or that were not properly ripened in the autumn.

'V....Shading and whitening peach trees to prevent their absorbing heat on sunny days opposes growth of the buds and is, consequently, a protective measure.

'VI....Shading the trees with board sheds enabled peach buds to survive the winter uninjured, when eighty per cent of unprotected buds were killed.

Trees protected in this way blossomed later, remained in bloom longer, set more fruit in proportion to the number of apparently perfect flowers, and held their fruit better than any other trees on the station grounds. This is the most effective means of winter protection tried at the Station, but it is probably too expensive for commercial orchards.

'VII....Whitening the twigs and buds by spraying them with whitewash is, on account of its cheapness and beneficial effects, the most promising method of winter protection tried at this station.

'VIII....Whitened buds remained practically dormant until April, when unprotected buds swelled preceptibly during warm days late in February and early in March.

Whitened buds blossomed three to six days later than unprotected buds. Eighty per cent of whitened buds passed the winter safely, when only twenty per cent of the unwhitened buds passed the winter unharmed.

'IX....Thermometers covered with purple material registered, during bright sunny weather, from ten to over twenty degrees higher than thermometers covered with white material of similar texture, thus indicating that whitened peach twigs might be expected to absorb much less heat than those which were not whitened.'

Not having any peach trees at Ottawa on which to try the experiment, the test was confined to plums, cherries and apples, the number of trees used being: plums five, cherries three, apples six.

The whitewash was made by using unslaked lime, skim milk, and water in the proportion of:

Skim milk	6 gallons.
Water	24 "
Lime	60 lbs.

The lime was slaked in warm water and the remainder of the liquid added and the whole thoroughly stirred. It was then strained through an one-twelfth inch mesh and was ready for use. As the experiment was not on a very large scale, a hand pump was used with a Bordeaux nozzle, which worked very satisfactorily. The first spraying was given on February 16, and successive sprayings were made on February 21 and 25, March 1, 10, 13, and April 1, six in all, the object being to keep the trees pure white from top to bottom until warm weather came in the spring.

The following notes were taken at intervals from the latter part of the winter until warm weather:

Plums: April 5.—No apparent swelling of the buds on either sprayed or unsprayed trees.

April 15.—No apparent swelling of the buds on sprayed or unsprayed trees.

April 20.—Buds on unsprayed trees very slightly swollen; buds on sprayed trees still apparently dormant.

April 24—Buds on unsprayed trees of *Americana* class slightly swollen; on sprayed trees just perceptibly. Buds still apparently dormant on sprayed and unsprayed trees of *domestica* class.

April 28.—Flower buds on American plums now showing quite generally on unsprayed trees, a few flower buds showing on sprayed trees, but difference very decidedly marked; not so much swollen. Buds on unsprayed European plums just starting perceptibly; on sprayed trees, still apparently dormant.

May 2.—Flower buds now exposed in both sprayed and unsprayed trees, but difference more marked than before. Greater contrast in buds on unsprayed and sprayed trees of European plums. Buds on sprayed trees have only swelled slightly.

Temperature was above 80° F. on April 30 and May 1 and 2, causing rapid swelling of buds. Impossible now to keep buds covered with lime unless sprayed every day. Last spraying was given on April 30.

The dates of blooming of the plums sprayed and unsprayed were :

Jessie (American) unsprayed	May 22
" sprayed	" 24
Early Red (European) unsprayed	" 13
" sprayed	" 22

A considerable number of blossom buds on the Jessie plum were killed by the whitewash, but the plums on the sprayed trees were larger than on the unsprayed, and there was the same quantity of fruit on it as on the unsprayed tree. The two trees were about the same size.

There were only a few blossoms on both sprayed and unsprayed trees of the Early Red plum. There were about the same number of blossoms on both trees.

A tree of a hybrid between the Sand Cherry and the American plum in the Director's garden was sprayed with the whitewash and a considerable number of buds were killed by the wash.

Cherries : April 5.—Buds on unsprayed trees swollen very slightly ; on sprayed trees still apparently dormant.

April 15.—Buds on unsprayed trees swollen slightly ; on sprayed trees, still apparently dormant.

April 20.—Buds more swollen on unsprayed trees ; on sprayed trees, starting to swell. A tree, part of which was sprayed and part unsprayed, has buds more swollen on unsprayed part than on sprayed part.

April 24.—Difference between sprayed and unsprayed cherry buds very apparent now.

April 28.—Still greater difference between sprayed and unsprayed buds, though sprayed have swollen considerably.

May 2.—Still a marked difference between sprayed and unsprayed.

There were no flowers on either sprayed or unsprayed trees. There was no apparent injury from the use of the whitewash on the trees.

Apples : April 5.—Buds apparently still dormant on sprayed and unsprayed trees.

April 15.—Buds apparently still dormant on sprayed and unsprayed trees.

April 20.—Buds on unsprayed trees very slightly swollen ; on sprayed trees, still apparently dormant.

April 24.—Although buds were thought to be slightly swollen on the 20th, on unsprayed trees, no perceptible swelling is noticed to-day. Buds on sprayed trees still apparently dormant.

April 28.—Buds swollen slightly on both sprayed and unsprayed trees.

May 2.—Buds are still only slightly swollen on sprayed and unsprayed trees ; no apparent difference.

The results here given are sufficient evidence of the fact that the retarding of the swelling of the buds was quite marked on trees of plums and cherries, but the difference in the dates of blossoming was very slight. A considerable number of the blossom buds of the plums were killed by the whitewash. As the buds on apple trees do not swell until late, the whitewash appeared to have little effect in retarding the swelling of them. I am not yet prepared to say whether it would be practical, beneficial, or advisable to spray peach trees to prevent the winter-killing of the buds.

EFFECT OF LIME ON THE OYSTER-SHELL BARK-LOUSE.

Notwithstanding the thorough sprayings which the trees in the orchard at the Experimental Farm receive, the oyster-shell bark-louse, which has infested the apple trees for several years, has never been entirely destroyed.

Last summer when the whitewash came off the trees which had been sprayed in the experiment to determine what effect whitewashing trees would have in preventing the swelling of the buds, we were surprised to find that the trees were practically free of the oyster-shell bark-louse. All the old scales had disappeared, the bark of the trees was brighter and cleaner, and they had all a healthier apperance than those under the same conditions but which had not been sprayed with whitewash. None of the whitewashed trees, however, had been examined for bark lice before they were sprayed, but considering the fact that the remaining seventy-two trees of Wealthy, thirty-one of Duchess, twenty-six of Tetofsky are all from slightly to badly infested with old scales there is, I think, ample evidence of the wonderful effect of the whitewash on this insect.

EXPERIMENTS WITH LIME IN PROGRESS.

Experiments are now in progress at the Farm with trees infested with oyster-shell bark-louse, and at Niagara on trees affected with San José and New York scales, to determine, if possible, the best time to whitewash the trees to get the best results, the number of applications necessary, how long before the whitewash takes effect, and any other points which may come up. It will be interesting to learn what effect lime will have on the San José scale.

The formula used this winter is:

6 gallons skim milk,
30 " water,
60 lbs. lime,
10 lbs. salt.

It may be found that a much thinner wash will be as effective; made by the present formula, it is very thick and has to be kept thoroughly stirred.

The use of lime in whitewashing the trunks and large limbs of trees is an old custom and still adopted by a few. It was supposed to have a generally beneficial effect on the tree, but I have not yet been able to learn just what effects it really had.

Lime was recommended by Forsyth in 1802 for the destruction of aphis and red spider. His formula was:

Unslaked lime..... ½ peck
Water..... 32 gallons

It was applied by means of a syringe.

Air-slaked lime is used successfully in destroying slugs on the foliage of trees.

Lime was recommended in 1850 against the Curculio of plums by Lawrence Young, Louisville, Ky., and it was said to have been used successfully by him. 'It consists simply in covering the young fruit as soon as danger is apprehended with a coating of thin lime wash, considerably more dilute than the mixture used in whitewashing.'

In Bailey's Horticulturist's Rule Book, we find lime spray recommended to prevent the attacks of the rose chafer. The formula reads: 'Slake ½ peck, or a peck, of lime in a barrel of water, straining the lime as it enters the barrel, to prevent its clogging the pump. Apply in a spray until the tree appears as if whitewashed.'

Messrs. H. Lutts & Son, Youngstown, N.Y., U.S., have been very successful in destroying the pear tree psylla by means of lime. I quote from a letter received from Mr. H. Lutts, dated December 29, 1899:

'Replying to your inquiry regarding our using whitewash for pear tree psylla, would say that we commenced using it on this principle, to destroy the brood that wintered over, believing that every adult that we destroyed we were gaining a great point, and after three years experimenting we believe we were right.

'Our plan has been to scrape off all rough bark any time in December when it is freezing, and the colder the better. We spread a canvas under the trees and save all the scrapings and insects and immediately burn all up.

'We then give the trees, as far up as we can, a good thorough coating of thin slushy whitewash, made of freshly slaked lime that has been run off in a putty state as masons usually hold it for plastering purposes, thin with skim milk. This we put on with a

brush; for the balance of the tree not reached with a brush we thin this same wash with milk, and spray the tree completely. We believe by this process to have accomplished two things: first, we have destroyed a larger proportion of the hibernating psyllas and many of those not destroyed are so well sealed up that they cannot escape to lay their eggs during the first few warm days of April. We spray again in March to coat the wood and buds over so thoroughly that when the few that are alive attempt to lay their eggs they will not find many favourable places. The orchard in which we have been thorough in has no signs of psylla in it now. We are confident that it is more effectual than kerosene or kerosene emulsion, both of which we have tried thoroughly. The orchard where we experimented contained 1,000 trees and was virtually ruined with psylla. Since we began using lime it has steadily regained its vigour, and to-day it will be hard to find its equal for brightness or apparent vigour. We do not like to recommend this to everyone as we believe much depends on the thoroughness of the scraping and the thorough whitewashing. Many that attempt to fight the psylla on those lines will fail, no doubt, but our trees tell us that the plan is all right, and we have given you the principal points and hope if you experiment you will favour us with your reports.

'Yours truly,

'(Signed.) HENRY LUTTS.'

Prof. J. C. Whitten, Horticulturist, Missouri Agricultural Experiment Station, informs me that limewash prevents peach curl.

No where have I found that trees have been whitewashed for the sole purpose of killing scale insects.

While the results obtained seemed to prove the value of lime as an insecticide, we do not advise using it extensively until further experiments furnish more data.

SPRAYING TO DESTROY OYSTER-SHELL BARK-LOUSE.

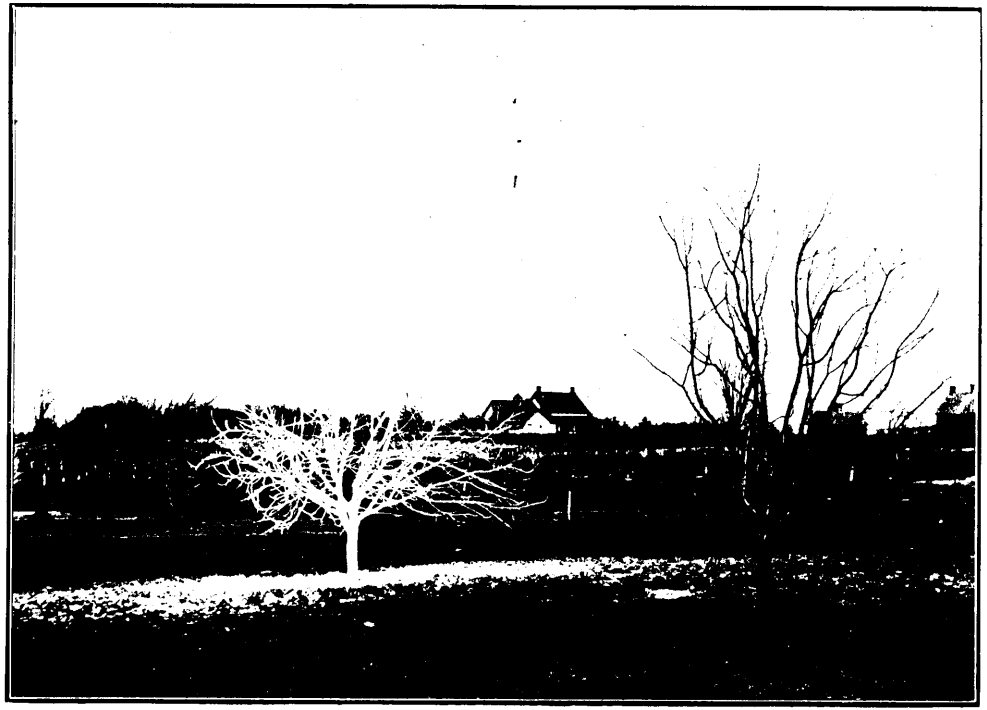
Last spring all the apple orchard with the exception of the trees which had been whitewashed, received two sprayings for the purpose of, if possible, destroying this pest. Careful watch was kept for the day when the young lice made their appearance, which was on May 29. On June 1, the trees received a spraying of tobacco water and whale oil soap, made by using 10 pounds tobacco and 2 pounds whale oil soap to 40 gallons of water. Specimens of the young insects were examined under the microscope and were found to be dead within an hour of the time they were sprayed. On June 6, the trees were sprayed a second time with whale oil soap, 8 pounds to 40 gallons of water. This was to kill all that were left. Although their numbers were greatly reduced, there must have been a considerable number escaped, as healthy scales were found in the orchard later in the summer.

'DRY ROT,' 'BROWN SPOT,' OR 'BALDWIN SPOT' OF THE APPLE.

In the report of the Horticulturist for 1896 some notes were published on 'A Dry Rot of Apples.' This apparent disease of the apple had been first brought under the notice of the Horticulturist in 1895, when it affected the fruit in the orchards at the Central Experimental Farm, and when specimens of diseased fruit were received from various parts of the Dominion.

As this dry rot was well described in the report for 1896, the same description may be used with advantage here:

'The disease was manifested exteriorly by small circular depressions on the surface or skin of the apple. These depressions were $\frac{1}{8}$ to $\frac{1}{4}$ of an inch deep and $\frac{1}{4}$ to $\frac{3}{8}$ of an inch in diameter. On removing the skin of the apple it was found that each depression was the centre of a small area of dryish brown tissue. In some varieties, badly attacked, this brown and pithy tissue extended in a more or less complete network over the whole



Apple Tree Sprayed with Lime Mixture, Central Experimental Farm, Ottawa.

Plantation of Tobacco, Central Experimental Farm, Ottawa.

surface of the apple. Its texture was dry and tough enough to prevent it from being cut into easily with anything but a keen edged blade. The flesh of the apple was rarely affected to a depth of more than $\frac{3}{8}$ or $\frac{1}{2}$ an inch. The affected flesh was dry and flavourless, but not bitter. While the apple was not rendered wholly unfit for use, its appearance and salability were totally destroyed.'

During 1897 and 1898 this dry rot has affected nineteen varieties of apples at the Experimental Farm, and some crops have been so badly injured that the fruit was almost all worthless. Although the trees have been thoroughly sprayed, the fungicides appeared to have no effect.

In order to get information which might lead to learning the cause of this rot—for up to this time no germs of disease which seemed to have caused this rot have been found by any bacteriologist, to our knowledge—a circular was prepared and sent out on October 25, 1899, to prominent fruit growers in many parts of Canada, and to the horticulturists of all the agricultural experimental stations in the United States. The following is a copy of the circular:—

EXPERIMENTAL FARM,
OTTAWA, October 25, 1899.

DEAR SIR,—I desire to obtain as much information as possible regarding a dry rot of apples (the same as is described in the report of the horticulturist for 1896, page 171), and should be much obliged if you would assist me by answering the questions enumerated below, if the disease has come under your notice.

The disease is indicated by small depressions on the surface of the fruit, under which the flesh is of a brownish colour. It frequently spreads throughout the apple, rendering it almost, or quite, worthless. It does not taste bitter (and in that respect there is a marked difference between it and the Bitter Rot), but the flesh becomes dry and flavourless.

1. For how many years have you observed this disease?..... 2. What varieties has it affected? ..... 3. Are the trees in a healthy condition?..... 4. Have you sprayed your trees thoroughly with Bordeaux mixture, and, if so, with what results as regards this disease?..... 5. What kind of soil are the affected trees grown in? Surface and subsoil?..... 6. How frequently do you fertilize your trees, and what fertilizer do you use?..... 7. What is your system of cultivation?..... 8. Do you think the soil contains all the necessary elements of plant food in a form made easily available?..... 9. What is your opinion of the cause of this disease? .....

I shall be pleased to receive samples of affected fruit.

Yours very truly,

W. T. MACOUN,
Horticulturist.

In response to these inquiries, 63 replies were received, and a synopsis of the information obtained is given herewith:—

Number who have observed the rot, thirty-five.

Number who have not observed the rot, twenty-eight.

Length of time rot has been observed, twenty-eight years.

Number of varieties affected, sixty.

Provinces in Canada where rot has been observed: Nova Scotia, Quebec, Ontario, British Columbia.

Provinces in Canada where rot has not been observed: Prince Edward Island, New Brunswick.

States in the United States where rot has been observed: New York, Vermont, New Jersey, Maryland, Massachusetts, North Carolina, West Virginia, Pennsylvania, Michigan, Minnesota, Maine.

States in the United States where rot has not been observed: Alabama, Louisiana, New Mexico, Arkansas, Arizona, Oklahoma, Indiana, Missouri, Iowa, Wyoming, Montana, California and Oregon.

Provinces in Canada where disease appears to be most prevalent: Ontario (Eastern), Quebec, British Columbia.

States in the United States where disease appears to be most prevalent: New York, Vermont, New Jersey, Maryland.

Causes assigned by growers:—

1st.—Want of vigour of tree.

2nd.—Want of moisture in soil.

3rd.—Fungous disease.

4th.—Want of potash and lime in soil.

Causes assigned by bacteriologists:—Physiological.

Samples of affected fruit have been submitted to Dr. Connell, Queen's University, Kingston, Ont., who has given this rot considerable study. He could not find any fungus which appeared to cause this rot.

Prof. L. R. Jones, Botanist of the Vermont Agricultural Experiment Station, who has given more attention to this subject than, perhaps, any other man in America, and who published some information regarding it in 1891, has recently published the results of his latest investigations which, while seeming to prove that the trouble is physiological, do not yet make it clear as to why the rot should occur.

The following are some quotations from his report, which give some information not found in the report for 1896 of the Horticulturist of this Farm:—

Re-examination of these brown spots has been made by us on various occasions since our earlier publication. In most cases, especially in the autumn and early winter, no fungus has been detected in the browned tissues, and it has, therefore, become evident to us that the spotting was not primarily a fungous disease.

Having opportunity at this stage of the study to confer with the officers of the Division of vegetable physiology and pathology of the United States department of agriculture it was learned that Mr. M. B. Waite and Dr. E. F. Smith had made observations upon a similar spotting of apples which they were satisfied was a non-parasitic disease and which Dr. Smith considered identical with a dry spot disease described by Wortmann as occurring in Europe.

The examination of Wortmann's paper[1] leaves no doubt that the disease discussed by him under the name "Stippen" or "Stippich-werden" is identical with the brown spot of the Baldwin, although the Baldwin did not chance to be among the varieties included in his studies.

Wortmann's work has been recently critically reviewed and his conclusions re-affirmed and somewhat extended by Bschokke.[2] Numerous experiments were devised and conducted by Wortmann and others by Bschokke in connection with their studies which satisfied them of the correctness of their conclusions.

1 Wortmann, Ueber die sogenannte, "Stippen" der Aepfel. Landw. Jahrb., 21, pp. 663-675 (1892).

2 Bschokke, Landw. Jahrb. d. Schweiz, 11. pp. 192, (1897). This author gives a very complete bibliography of the German literature of the disease.

Occurrence.—The trouble is of widespread occurrence both in Europe and America. It is worse on some kinds of apples than on others; and upon the same kind its occurrence varies with climatic or cultural conditions, and probably with those of storage. Wortmann states that large, sappy varieties and specimens are most liable to spot.

The variety pre-eminently subject to it in the Northern United States is the Baldwin. It has already been stated that it is of frequent occurrence on Northern Spy, in Vermont, and not rare on Greenings. Selby records the occurrence of the Baldwin spot in Ohio and also that of a brown spot on Northern Spy and other varieties.

Wortmann records the trouble as occurring in varying degrees upon numerous varieties in Europe as follows: Red Reinette, Golderling, Woltman's Reinette, Hawthornden, Winter Pearmain, Landsburger Reinette, Stettin, Dantziger.

Cause.—Neither fungi nor bacteria are to be found in the earlier stages of the spot formation nor is there a constant occurrence of any such organism in the latter stages. It is therefore a non-parasitic disease

Wortmann's observations and experiments lead him to conclude that the death of the cells in these spots is a result of the concentration of the sap following the loss of water. This water may be lost by direct transpiration in the case of the superficial cells, or in case of the deeper cells by excessive conduction of the water to the transpiring surface layers. The acidity of the concentrated sap is considered to be the direct cause of the injury, this injury being followed by the browning through oxydization.

Several factors may therefore enter into the problem of spot formation.

1. The amount and rapidity of transpiration. This is dependent upon the character of the epidermis, conditions of storage, etc. The fact is emphasized that *gradual* loss of sap is essential to the formation of typical spots. Thus a specimen of a variety which is subject to spot will shrivel without the appearance of spots if kept in a warm dry room. Wortmann suggests that in case of such very rapid loss of water the acid of the concentrated sap has insufficient time to act.

2. The kind and relative amount of substances in solution in the cell sap. The same degree of concentration of different solutions may not be equally injurious, hence the actual per cent of water lost in spotting and non-spotting varieties may not stand in a direct relation to their susceptibility to the disease.

3. The conductivity of the tissues of the fruit. The original loss of water must always occur at the surface. The death of these surface cells may ultimately follow unless this loss is made good by the conduction to them of water from the underlying tissues. In some varieties this conduction occurs more rapidly than in others. Wortmann found that in varieties subject to spot there was relatively slow water conduction.

Bschokke considers this relative rate of water conduction to be the most important factor in deciding the susceptibility of a given variety to the spot disease.

4. The specific resistance of the protoplasm of the cells to the injurious action of the concentrated sap. This is probably greater in some varieties than in others, and it may vary also with climatic and other cultural conditions.

Remedies.—Wortmann concludes that the spotting of susceptible varieties cannot be prevented entirely, but that, since trees which are improperly cared for produce fruit of less resistance toward unfavorable influences of every sort, proper attention to fertilization and general cultural conditions is called for. He believes that moist cloudy weather, which decreases starch formation, favors the disease and that in seasons where such weather predominates an excess of nitrogenous fertilizer is especially unfavorable. He recommends a dry sunny exposure and pruning so as to admit sunlight. On theoretical grounds he believes that storage in a moist atmosphere with uniformly low temperature will lessen the development of the spots He also suggests the probable protection which would come from wrapping the apples separately in paper to check transpiration.

Bschokke revives a suggestion from the older literature that, since apples which have lost a considerable moisture from their superficial tissues by rapid evaporation do not spot, some treatment involving this method might be employed in bad cases. It is doubtful if this will commend itself in actual practice, although it has some theoretical interest.

Lamson finds that spraying Baldwins with bordeaux mixture—about as recommended for the scab fungus—reduces the amount of spotted fruit to a remarkable degree.

*The following is a summary of his results :

Prevention of brown spot of Baldwin by spraying with bordeaux mixture.		Per cent of spotted fruit	
		Sprayed	Unsprayed.
1895	Sprayed once before and twice after blossoming	3	55
1896	Sprayed once before and once after blossoming	10	68
	Sprayed once after blossoming	18	68
1898	Sprayed once before and twice after blossoming	22	52

These results are certainly very striking. In view of the above explanations of the cause of this disease the question of why spraying should check the tendency to spot becomes a matter of a considerable practical as well as theoretical interest.

CONCLUSIONS REACHED THUS FAR.

1. The Dry Rot, "Brown Spot," or "Baldwin Spot" affects at least 60 varieties of apples, and is thus not confined to only a few sorts. The Baldwin appears to be worse affected, but this may be due to the fact that it is grown more extensively than any other variety in those parts where the rot is most prevalent.

2. Its range extends from the Atlantic to the Pacific; it appears, however, from data received, not to be found in Prince Edward Island, New Brunswick, and the southern and south-western States, although it may be there also.

3. It appears to be most prevalent in Eastern Ontario, Quebec, British Columbia and the Eastern States.

4. Opinions of growers differ very much as to the cause of the rot.

5. The results of the investigations of Jones, Wortmann and Bschokke seem to throw most light on the cause of the rot.

6. No remedy has yet been found for this trouble.

Acknowledgments :—In addition to all the fruit growers who have been good enough to furnish me with information regarding the dry rot, I am much indebted for valuable information to Dr. Connell, Kingston, Ont.; Prof. L. R. Jones, Burlington, Vt., US.; Prof. C. O. Townsend, College Park, Md., U.S., and to Mr. F. C. Stewart, Geneva, N.Y., U.S., who have made microscopical examinations of this rot.

*N. H. Exp. Sta. Buls. 45, (1897) and 65 (1899).

COVER CROPS.

Since 1895, orchard cover crops have received much attention at the Central Experimental Farm, and in the reports of the Horticulturist for 1896, 1897 and 1898, considerable space has been devoted to this subject; but the importance of cover crops in the orchard cannot be too often nor too strongly impressed upon the fruit growers of Canada. After the disastrous effects of last winter on fruit trees in some parts of Ontario, the fruit growers living in those districts must realize more than ever before, perhaps, how necessary it is to have some protection for the roots of their trees.

It is now quite generally conceded that cultivation should cease in orchards in Eastern Canada about the middle of July. At this time the season's growth is well advanced and the ripening of the wood soon begins. The seed which is to produce the future cover crop should now be sown. In Eastern Ontario, the common red or mammoth red clover, sown broadcast at the rate of 12 pounds to the acre, will probably make the most satisfactory cover crop. It will reach a height of from 10 to 12 inches by winter, and will form a dense mat of foliage which will make a thick mulch, thus preventing the alternate freezing and thawing of the ground which occurs in late winter or early spring, and which often proves so disastrous to trees. After the seed is sown, the soil should be rolled with a heavy land roller, which will cause the moisture to rise to the surface of the soil and assist the germination of the seed. This rolling is very important, as should the seed lie in the ground for any length of time without germinating, there will not be time for a good cover crop to be formed before winter. No nurse crop is, as a rule, necessary. In places where the soil is very dry, lucerne or alfalfa might be sown with advantage, as the seed of this clover appears to germinate more readily than that of the common red clover. Cow peas and crimson clover may be used in the warmer parts of the country.

Another advantage of clover growing in an orchard in autumn, is that much of the plant food in the soil which has been liberated and made more easily available by the constant cultivation during the early part of the summer, is prevented from leaching by being used by the growing plants, the clover thus becoming a 'catch crop,' as well as a cover crop.

Where soils suffer from lack of moisture in a dry time, the clover should be ploughed under as early in the spring as the land can be worked, and cultivation begun at once. This will conserve much of the moisture which would otherwise be transpired through the leaves of the growing plants until they were ploughed under towards the end of May, which is the usual time. If the soil, however, always contains plenty of moisture, it would be better to let the clover grow until about the third week of May, as there would be additional humus and nitrogen obtained by this method.

The great improvement made in the soil by the annual ploughing under of clover crops is clearly shown in figures given by Mr. G. T. Powell, Ghent, N.Y., U.S., at the last annual meeting of the Ontario Fruit Growers' Association. After crimson clover, which had been used as a cover crop—had been ploughed under in an orchard for three years, the soil was analyzed and the following differences were found between that where the clover had and had not been ploughed in :—

	Clover ploughed under for three years. Per cent.	No clover ploughed under for three years. Per cent.
Water	15·00	8·75
Nitrogen	·21	·12
Humus	2·94	1·91
Phos. acid	·015	·008

The gain per acre would be :—

Water	6·25 per cent	=46,875 tons.
Nitrogen	·09 "	= 1,350 lbs.
Phos. acid	·007 "	= .105 lbs.

Although such good results might possibly not be secured by the use of red clover, still the improvement in the land by such treatment would be very great.

For the reasons mentioned in my report for 1898, the methods which are recommended above have not been adopted at the Central Experimental Farm since the spring of that year. Clover is used for a cover crop, but it is only ploughed under every two years. As the soil here is light and lacking in humus, but apparently contains plenty of moisture, a system of cutting the clover with a field mower and leaving it to rot in the orchard, has been followed. In 1898 five cuttings were obtained, the clover being from eighteen to twenty inches high at each cutting and just coming into bloom. It was estimated that from the first four cuttings 25 tons per acre of green crop were left lying on the field. Clover sown in 1898 was cut four times this year, and the crop from each cutting appeared fully as good as that of last year. It can easily be imagined that this is improving the soil rapidly.

Common Red Clover was sown in the orchards this year on May 10, 17, 25 and 31; July 4, 11, 18 and 25. There was a good cover crop obtained from all of these sowings, with the exception of that on May 31, which did not germinate well, and from those of August 2, 9 and 16 at which time the weather was very dry and the seed did not germinate until September, and then but thinly. Clover sown on May 17 and 25, was nearly smothered by purslane, but eventually overtopped it and came on well and formed a good cover crop by autumn.

In a part of the apple orchard where the soil is very poor, two green crops were ploughed under this summer. On June 10, clover which had formed a cover crop the previous winter was ploughed under and the land was then re-sown with buckwheat, soja beans, English horse beans and field pease, with the following results:—

Buckwheat sown broadcast on June 17, at the rate of 2 bushels per acre; came up June 23. Ploughed under on July 25. Average height 27 inches. Estimated yield per acre of green crop: 8 tons 335 pounds.

Soja Beans:—sown in drills 6 inches apart on June 17, at the rate of 3 bushels per acre, came up June 24. Ploughed under on August 7. Average height 14 inches. Estimated yeield per acre of green crop: 3 tons 466 pounds.

English Horse Beans:—Sown in drills 6 inches apart on June 17, at the rate of 4 bushels per acre, came up on June 27. Ploughed under on August 7. Average height 18 inches. Estimated yield per acre of green crop: 6 tons 592 pounds.

Field Pease:—Sown in drills 6 inches apart on June 17, at the rate of 3 bushels per acre, came up on June 24. Ploughed under on July 29. Average height 26 inches. Estimated yield per acre of green crop: 5 tons 1,191 pounds.

After these crops were ploughed under the land was re-seeded with clover on August 2, 9 and 16, in the hope of getting a cover crop by winter, but owing to nearly six weeks of very dry weather about that time the seed did not germinate until September and a cover crop was not formed. The trees in this part of the orchard have been mulched with manure.

On July 6, English horse beans were sown in a part of the orchard where the soil was light and where the snow does not lie well in winter. On July 16, after the beans were up, common red clover was sown among them at the rate of 12 pounds per acre. The beans reached a height of 18 inches by autumn and helped very much to hold the snow while they must have gathered much nitrogen during the growing season. There is also a good stand of common red clover.

On July 25, Lucerne clover was sown in a part of the orchard where the soil was very light. It reached a height of from 7 to 12 inches by autumn, and although there was a large number of plants destroyed by a storm carrying away the surface soil, there is a fairly good cover crop.

RELATIVE DATES OF BLOSSOMING OF DIFFERENT VARIETIES OF APPLES.

During the past five years the dates of blossoming of large and small fruits have been recorded by a large number of observers in different parts of Canada for this

Division. In 1895, Mr. John Craig, then Horticulturist of the Central Experimental Farm, inaugurated this work. The following circular, which was sent out by Mr. Craig to those whom he asked to assist him states clearly the reasons why the information he desired to get should prove of much value to fruit growers throughout Canada :—

"Dear Sir :—The cause of the unfruitfulness of some varieties of large and small fruits when planted in large blocks by themselves is now understood to be due to self-sterility, complete or partial, causing imperfect pollination and fertilization. The remedy is the intermingling of varieties in the orchard for the purpose of securing cross-fertilization. To obtain the best results, the varieties adjacent to each other should blossom at or about the same time.

Accurate information with regard to time of the blossoming of the different varieties of fruit is much needed. Will you assist in securing data on this important subject?

Please observe and record dates as follows :—The time of the opening of the first blossoms ; when the tree is in full bloom ; also, the date of the fall of the blossoms ; and forward your records to me at the close of the season.

In his Report for 1895, Mr. Craig gives some of the data obtained that year, and makes some useful comparisons of the time of blooming of different varieties.

It was thought desirable that five years' records should be obtained, so that a fair average of the relative dates of blooming of the different kinds of fruit could be had. Five years' records have now been taken, but the data accumulated are so great that it is impossible to publish it all in this Report; hence, it has been found necessary to publish only what is thought to be of greatest value to the intending planter, namely, the relative time of blooming of the different varieties. As all the kinds of fruit of which the dates of blossoming have been recorded cannot be treated of this year, it has been thought advisable to publish only the conclusions reached regarding apples. If information is desired about other fruits before the results are published, or if more information is wanted about apples, it may be obtained by correspondence.

EARLY GROUP.

Antonovka, Duchess of Oldenburg, Early Harvest, Fameuse, Gravenstein, Gideon, Haas, Hurlbut, Longfield, Patten's Greening, Red Astrachan, Scott's Winter, Shiawassee Beauty. Tetofsky, Wagener, Scarlet Pippin.—16 varieties.

MEDIUM GROUP.

Alexander, Baldwin, Baxter, Ben Davis, Blenheim Orange, Canada Baldwin, Esopus Spitzenburg, Fallawater, Fall Jenetting, Gano, Golden Russet (American), Hubbardson's Nonsuch, Jonathan, Keswick Codlin, King of Tompkins Co., McIntosh Red, McMahan White, Magog Red Streak, Maiden's Blush, Malinda, Mann, Newtown Pippin, Peach, Pewaukee, Pomme Grise, Primate, Princess Louise, Rhode Island Greening, Roxbury Russet, St. Lawrence, Salome, Stark, Swaar, Swayzie Pomme Grise, Wealthy, Winter St. Lawrence, Wolf River, Yellow Transparent, Ontario, Ribston Pippin, Colvert, Brockville Beauty.—42 varieties.

LATE GROUP.

Blue Pearmain, Cranberry Pippin, Grimes' Golden, Lawver, Northern Spy, Red Canada, Talman Sweet, Walbridge, Westfield Seek no Further, Yellow Bellflower.—10 varieties.

The following is a list of those who have recorded the blossoming dates of fruits during the past five years:—

Recorders of blossoming periods.

1. Theodore Tragé, Salt Spring Island, B.C.
2. Thos. G. Earl, Lytton, B.C.
3. W. B. Anderson, Comox, B.C.
4. Richard Layritz, near Victoria, B.C.
5. Henry Kipp, Chilliwack, B.C.
6. Tom Wilson, Vernon, B.C.
6a. T. A. Sharpe, Agassiz, B.C.
7. C. E. F., Ottawa.
8. Geo. E. Fisher, Freeman, Ont.
9. A. W. Peart, Freeman, Ont.
10. Richard Trotter, Owen Sound, Ont.
11. Thos. Beall, Lindsay, Ont.
12. E. B. Edwards, Peterborough, Ont.
13. G. Nicol, Cataraqui, Ont.
14. W. H. Pettit, Grimsby, Ont.
15. J. P. Cockburn, Gravenhurst, Ont.
16. E. Morden, Niagara South, Ont.
17. B. Gott, Strathroy, Ont.
18. G. C. Caston, Craighurst, Ont.
19. N. J. Clinton, Windsor, Ont.
20. Allen Bros., Winona, Ont.
21. Capt. Jas. Shepherd, Queenston, Ont.
22. Robt. Brodie, St. Henri de Montreal, Que.
23. Hon. S. Fisher, Knowlton, Que.
24. J. C. Chapais, St. Denis, Qe.
25. C. P. Newmann, Lachine Locks, Que.
26. Mrs. S. Foster, Knowlton, Que.
27. J. M. Fisk, Abbotsford, Que.
28. W. M. Pattison, Clarenceville, Que.
29. Asa Johnston, East Farnham, Que.
30. W. Hawker, St. John, N.B.
31. G. U. Hay, St. John N.B.
32. A. H. Fairweather, Hampton, N.B.
33. W. W. Hubbard, Sussex, N.B.
34. C. E. Brown, Yarmouth, N.S.
35. W. S. Blair, Nappan, N.S.
36. T. M. Ryerson, Carleton, N.S.
37. W. C. Archibald, Wolfville, N.S.
38. R. W. Starr, Wolfville, N.S.
39. Geo. Thompson, Wolfville, N.S.
40. Rev. H. How, Annapolis, N.S.
41. S. C. Parker, Berwick, N S.
42. D. J. Stewart, Aitkens' Ferry, P.E.I.
43. John Robertson, New Perth, P.E.I.
44. Hon. David Laird, Charlottetown, P.E.I.
45. T. J. Weeks, Alberton, P.E.I.
46. F. W. McRae, Pownal, P.E.I.
47. J. Johnstone, Long River, P.E.I.
48. Wm. Heard, Charlottetown, P.E.I.

LIST OF BEST VEGETABLES FOR FARMERS.

As all the experiments which are conducted with vegetables cannot be published every year on account of want of space; a list of the varieties of all the principal kinds which have proved the most satisfactory after several years tests was published in the report for 1898 under the heading "List of best Vegetables for Farmers." This gave in a concise form much valuable information as to the best varieties to plant and must have proved very helpful to those who studied it. As the annual reports are very liable to be mislaid during the year, and as one is apt to forget the name of a variety, it has been thought advisable to again publish this list with what changes another year's experience warrants making.

Asparagus.—Connover's Colossal is the best all round variety.

Beans.—Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee, for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Southern Crease-back and Asparagus, (early) and Golden Andalusia, (late), are the best pole varieties.

Beets.—Egytian Turnip, Eclipse, and Bastian's Blood Turnip are three of the best varieties.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium); Late Flat Dutch, Drumhead Savoy, (late), Red Dutch, (red), is a select list of the best varieties of cabbage.

Cauliflowers.—Extra Early Dwarf Erfurt and Early Snowball, (early); Kronk's Perfection, (medium) and Large Late Algiers are among the best.

Carrots.—Chantenay and Guerande or Oxheart are two of the best carrots, but if a good extra early sort is required the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching, Paris Golden Yellow, Improved White Plume, White Walnut (early); London Red, Perfection Heartwell, White Triumph, (late), are among the best.

Corn.—Early White Cory, Crosby's Early, Henderson's Metropolitan, (early); Perry's Hybrid, Stabler's Early, Early Evergreen (medium); Stowell's Evergreen, Country Gentleman (late.) In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably, and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plants.—New York Improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, New York, (curled), Tennis Ball, Salamander, and Golden Queen, (cabbage); Trianon and Paris White Cos lettuce make a good list.

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type, and Surprise, Bayview, Paul Rose and Christiana, of the other types, are all good.

Melons, Water.—Cole's Early, New Imperial, Ice Cream, and Phinney's Early, are early water melons of excellent quality.

Onions.—Yellow Globe Danvers, and Large Red Wethersfield, are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Double Curled is as good as any.

Peppers.—Cayenne, Cardinal, Squash, and Golden Dawn are four of the best.

Pease.—Gregory's Surprise, Gradus, Nott's Excelsior and American Wonder, (early); Heroine, Improved Stratagem, and McLean's Advancer, (medium). None of these are tall growing varieties. Juno (dwarf), Telephone, Veitch's Perfection (tall), (late).

Potatoes.—Extra Early: Early Ohio (pink), Earliest of all, Bovee and Burpee's Extra Early (pink and white). Early: Everett and Rochester Rose, (pink), Early Puritan, (white). Medium: Carman No. 1, (white), Empire State, (white). Late: Late Puritan (white), American Wonder (white), Rural Blush (pink).

Radishes.—Early: Rosy Gem, French Breakfast, Red Rocket. Late: White Strasburg, Long White Vienna. Winter: Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnæus and Victoria are the most satisfactory.

Salsify.—Long White is the best.

Spinach.—Victoria and Thick-leaved are the best.

Squash.—Early: White Bush Scalloped and Summer Crook Neck. Late: Hubbard.

Tomatoes.—Early: Conqueror, Dwarf Champion, Canada Victor and Early Ruby. Main crop: Brinton's Best, Livingston's Favorite, Matchless, and Baltimore Prize Taker. There are many varieties of this vegetable which are almost equal in excellence and productiveness.

Turnips.—Early: Extra Early Milan and Red Top Strap Leaf. Swedes: Champion Purple Top, Skirvings Improved.

EXPERIMENTS WITH POTATOES.

The yields from the 143 varieties of potatoes grown for comparison in uniform test plots were very good this year, the best yielding variety, American Wonder, producing at the rate of 640 bush. 12 pounds per acre; while the poorest gave 204 bush. 36 pounds per acre. The average yield per acre from the 143 varieties was 410 bush. 47 pounds, which is 291 bush. 47 pounds more than the average for Ontario this year, the average for Ontario being 119 bush. Had these varieties been grown in acre plots, the yields would not have been so large, but considering the fact that the poorest variety of the 143 tested, yielded 85 bush. 36 pounds more than the average for Ontario, it seems remarkable that larger crops are not produced throughout the country. The soil in which the potatoes were grown was a sandy loam, and, while in a good state of cultivation, it was not what would be called rich, although it was given a good dressing of barnyard manure in the spring of 1898. A crop of tobacco was taken off the same land in 1898. The soil was ploughed in the autumn of 1898, and again in the spring of 1899, when it was also disc harrowed and harrowed twice with the smoothing harrow before planting. The drills were made about 6 inches deep and 2½ feet apart, and the sets, which had at least three eyes, were of good size and were dropped 1 foot apart, each variety occupying one row 66 feet long. The potatoes were covered with the hand hoe to insure the most uniform conditions. The potatoes were cultivated when required throughout the summer, but were not hilled up. They were sprayed with Paris green and Bordeaux mixture to destroy the potato beetle and prevent blight. The potatoes were planted on May 22, and 23, and were dug on October 5, 6 and 7. There was no scab or rot this year.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
American Wonder	Good	640	12	587	24	52	48	White.
Holborn Abundance	Medium	609	24	530	12	79	12	"
Sabean's Elephant	Good	600	36	567	36	33	..	"
Everett	"	574	12	512	36	61	36	Pink.
Canadian Beauty	"	572	..	481	48	90	12	Pink and white.
Gem of Aroostook	"	567	36	479	36	88	..	"
Carman No. 1	"	541	12	484	..	57	12	White.
Maggie Murphy	Medium	541	12	517	..	24	12	Bright pink.
White Beauty	Good	534	36	444	24	90	12	White.
Hale's Champion	Poor	532	24	455	24	77	..	"
Vanier	"	530	12	479	36	50	36	Red.
Seattle	"	528	..	446	36	81	24	White.
New Queen	Good	521	24	433	24	88	..	Pink and white.
Prolific Rose		517	..	424	36	92	24	Pink.
Peachblow		514	48	424	36	90	12	White.
Wonder of the World	Good	514	48	433	24	81	24	Pink and white.
Swiss Snowflake	"	506	..	433	24	72	36	White.
Lizzie's Pride	"	506	..	453	12	52	48	Pink, red eye.
Rose of the North		501	36	444	24	57	12	Pink.
Empire State	Good	500	30	454	18	46	12	White.
Beauty of Hebron	Medium	500	24	449	48	50	36	Pink and white.
Mill's Prize		499	24	470	48	28	36	White.
White Elephant		499	24	413	36	85	48	Pink and white.
Seedling No. 230	Medium	495	..	468	36	26	24	White.
Early Sunrise	Good	492	48	409	12	83	36	Pink.
Champion		490	36	413	36	77	..	White.
Vigorosa		490	36	435	36	55	..	Pink and white.
State of Maine	Good	488	24	418	..	70	24	White.
Early Rose	"	484	..	385	..	99	..	Pink.
Ideal		481	48	431	12	50	36	"
Lightning Express		479	36	418	..	61	36	Pale pink, bright pink in eyes.
Early St. George		479	36	411	24	68	12	Pink and white.

POTATOES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Early White Prize	Good	475	12	400	24	74	48	White.
Brown's Rot Proof	Medium	473	..	396	..	77	..	Pink.
Monroe County	"	473	..	400	24	72	36	"
Rawdon Rose	Good	471	54	419	6	52	48	Pink and white.
Burnaby Seedling	"	468	36	433	24	35	12	"
Polaris	"	464	12	409	12	55	..	White.
Early Andes		464	12	407	..	57	12	Pink.
Chicago Market	Good	459	48	385	..	74	48	"
Early Dawn		457	36	409	12	48	24	Pink, brighter at seed end.
Vick's Extra Early	Good	457	36	376	12	81	24	Pink and white.
Burbank's Seedling		455	24	409	12	46	12	White.
Earliest of All	Good	455	24	369	36	85	48	Pink and white.
Seedling No. 7	Medium	453	12	426	48	26	24	Bright pink.
Penn. Manor		453	12	398	12	55	..	Pink and white.
Good News	Good	453	12	413	36	39	36	Pink.
American Giant	Medium	453	12	426	48	26	24	White.
Early Norther	"	453	12	387	12	66	..	Pink.
Columbus		451	..	400	24	50	36	Pink and white.
Ohio Junior		451	..	415	48	35	12	Pink.
Northern Spy	Poor	448	48	424	36	24	12	Bright pink.
Sir Walter Raleigh		448	48	407	..	41	48	White.
Burnaby Mammoth		448	48	400	24	48	24	Pink and white.
Thorburn	Good	448	48	352	..	96	48	"
Great Divide	"	442	12	349	48	92	24	White.
Sharpe's Seedling	"	441	6	409	12	31	54	Pink and white.
Satisfaction	"	440	..	396	..	44	..	White.
Early Harvest	"	437	48	393	48	44	..	Pink.
Peerless Junior	"	437	48	391	36	46	12	White.
Orphans	Medium	437	48	413	36	24	12	"
Honeoye Rose	Good	437	48	363	..	74	48	Pink.
General Gordon	"	433	24	380	36	52	48	"
Burpee's Extra Early	"	431	12	374	..	57	12	Pink and white.
King of the Roses		431	12	323	24	107	48	"
Rochester Rose	Good	431	12	360	48	70	24	Pink.
Jubilee		429	..	380	36	48	24	Pink and white.
Clay Rose	Poor	429	..	365	12	63	48	Pink.
Hopeful	Medium	426	48	347	36	79	12	White.
Early Ohio	Good	426	48	301	24	125	24	Pink.
Light Red Seedling		426	48	334	24	92	24	Pink.
Dreer's Standard	Good	424	36	382	48	41	48	White.
Maule's Thoroughbred		422	24	347	36	74	48	Pink.
Pride of the Table	Poor	418	..	310	12	107	48	"
Green Mountain	Good	418	..	367	24	50	36	White.
Dakota Red	Medium	415	48	312	24	103	24	Red.
Uncle Sam		411	24	356	24	55	..	White.
Delaware	Good	411	24	338	48	72	36	"
London	Medium	409	12	332	12	77	..	Pink.
Rose of Erin		409	12	363	..	46	12	Pale pink, bright pink eye.
Stourbridge Glory	Good	409	12	343	12	66	..	White.
Rural Blush	"	409	12	272	48	136	24	Pink.
Prize Taker	"	407	..	360	48	46	12	"
I. X. L.	"	404	48	334	24	70	24	Pink and white.
Reeves' Rose		404	48	334	24	70	24	Pink.
Bliss Triumph		402	36	330	..	72	36	Red.
Freeman	Good	400	24	308	..	92	24	White.
New Variety No. 1	Poor	396	..	360	48	35	12	White.
Troy Seedling	Medium	396	..	301	24	94	36	"
Napoleon	Good	396	..	277	12	118	48	Pink.
Crown Jewel	"	393	48	281	36	112	12	Pink and white.
Clarke's No. 1	"	391	36	314	36	77	..	Pink.
Rose No. 9	Medium	391	36	321	12	70	24	"
Flemish Beauty Seedling	Poor	391	36	316	48	74	48	Bright pink.

POTATOES—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Pearce's Extra Early	Good	389	24	330	..	59	24	Pink.
Money Maker	"	389	24	314	36	74	48	White.
Late Puritan	"	389	24	323	24	66	..	"
Rural No. 2	"	387	12	345	24	41	48	"
Bovee	"	385	..	288	12	96	48	Pink and white.
Early Gem	Medium	382	48	332	12	50	36	Pink.
Irish Cobbler		382	48	279	24	103	24	White.
Carman No. 3	Good	380	36	352	..	28	36	"
Pearce's Prize Winner	"	377	18	297	..	80	18	Pink.
Early Puritan	"	369	36	332	12	37	24	White.
Blue Cup	"	367	24	305	48	61	36	Blue and white.
Daisy	"	365	12	268	24	96	48	Pink and white.
White Giant		363	..	310	12	52	48	White.
McKenzie	Good	358	36	303	36	55	..	"
Cambridge Russet	"	358	36	312	24	46	12	"
World's Fair	"	343	12	294	48	48	24	"
Early Fortune		336	36	244	12	92	24	Pink.
Irish Daisy	Good	334	24	228	48	105	36	White.
Doherty's Seedling		332	12	299	12	33	..	"
Livingston		332	12	292	36	39	36	White, pink eye.
Early Pride		330	..	242	..	88	..	Pink.
Early Six Weeks	Good	327	48	277	12	50	36	"
Charles Downing	"	327	48	261	48	66	..	White.
Enormous		323	24	261	48	61	36	"
Harbinger	Good	319	..	231	..	88	..	Pale pink.
Reading Giant	Poor	316	48	180	24	136	24	Pink.
Lee's Favourite	Good	316	48	253	..	63	48	"
Country Gentleman		314	36	270	36	44	..	Pink and white.
Bill Nye		310	12	235	24	74	48	White.
Table King	Poor	292	36	242	..	50	36	"
Oregon Beauty	Medium	292	36	242	..	50	36	"
Queen of the Valley	"	290	24	259	36	30	48	Bright pink.
Pink Eye		286	..	235	24	50	36	
Quaker City		283	48	231	..	52	48	White.
Algoma No. 1	Good	283	48	226	36	57	12	Pink.
Harvest King		266	12	253	..	13	12	White.
Sutton's Abundance	Good	266	12	231	..	35	12	"
Seneca Queen	Very good	261	48	193	36	68	12	Pink and white, bright pink eye.
Victor Rose	Medium	259	36	187	..	72	36	Pink.
Fillbasket		246	24	195	48	50	36	Bright pink.
20th Century		235	24	176	..	59	24	White.
Pride of the Market	Good	235	24	187	..	48	24	"
Early Market		224	24	158	24	66	..	Pink, brighter at seed end.
Brownell's Winner	Good	220	..	187	..	33	..	Red.
Livingston's Banner	"	211	12	189	12	22	..	White.
Seedling No. 214	"	209	..	149	36	59	24	"
Dark Red Seedling		206	48	154	..	52	48	Deep pink.
Houlton Rose		204	36	173	48	30	48	Pink.
Egg		204	36	118	48	85	48	White.

For many years, experimenters, both in Europe and America, have given the potato much attention, but the results obtained by them have, in many cases, been very different. Varieties of potatoes differ so much in their season, habit of growth, manner of producing their crop, number and vigour of the eyes on the tubers, and other characteristics, that one variety may give one result if the sets are cut or planted in a certain way, while another may give another result. However, there are certain general principles which have been established by the work which has been done.

The following experiments include some of the most popular of those tried by experimenters, and while the results obtained are by no means conclusive, they may lead others to try experiments with their own varieties.

Potatoes—Planting at Different Distances Apart.

During the past four years an experiment has been tried in planting the sets at different distances apart in the rows; the rows in each case being 2½ feet apart. The best results have been obtained so far by planting the sets 12 inches apart, although it will require several years before accurate conclusions can be drawn. There was very little difference in the proportion of marketable and unmarketable tubers in this experiment.

Distance apart of Sets.	Seed required per acre.		Yield per acre, 1896.		Yield per acre, 1897.		Yield per acre, 1898.		Yield per acre, 1899.		Average yield per acre, 4 years.		Average yield per acre after deducting seed.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
10 inches apart	34	50	355	18	331		268	24	392	2	336	41	301	51
12 "	29	2	336	36	278	47	347	36	406	34	342	23	313	21
14 "	24	53	323	24	268	50	290	24	454	58	334	24	309	31
16 "	21	46	335	30	226	1	233	12	392	3	296	41	274	55
18 "	19	21	289	18	226	31	253		234	34	250	51	231	30

Potatoes—Planting at Different Depths.

An experiment has been conducted during the past two years in planting potatoes at different depths in rows 2½ feet apart and 12 inches apart in the rows. Each set had at least three eyes. The soil was sandy loam, both years. Level cultivation was adopted, and thus very little soil was thrown on the potatoes after they were covered at the time of planting. The following table shows that the best yields were obtained from planting the sets only 1 inch deep. As the relative yields from the different depths of planting have not been the same in both years, it will be necessary to continue this test for some time before accurate conclusions can be drawn. Notes were taken on the depths at which tubers were formed, and it was found that most of them were within 4 inches of the surface of the soil, even where the set had been planted 6, 7 and 8 inches deep. Where the sets were planted less than 4 inches deep nearly all the tubers were formed between that and the surface of the soil.

Depth of Planting.	Yield per acre, 1898.		Yield per acre, 1899.		Average yield per acre, 1898-9.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
1 inch	347	36	532	24	440	
2 "	244	12	469	28	306	50
3 "	281	36	493	41	387	38
4 "	277	12	520	18	398	45
5 "	290	24	474	19	382	21
6 "	264		421	5	342	32
7 "	290	24	392	3	341	13
8 "	266	12	353	19	309	45

Potatoes—Planting at Different Dates.

In 1898 an experiment was begun in planting potatoes at different dates, beginning when the main crop was put in and continuing at intervals of two weeks until August 23, 1898 and July 23, 1899. An early and a late variety were used in each case. Early Norther (early) and Irish Daisy (late) in 1898, and Early Norther and Rural Blush in 1899. It will be seen that there was a regular decrease in the yield from each planting.

Date of Planting.	Total Yield per Acre, 1898.		Yield per Acre Marketable, 1898.		Yield per Acre Unmarketable, 1898.		Total Yield per Acre, 1899.		Yield per Acre Marketable, 1899.		Yield per Acre Unmarketable, 1899.		Total Average Yield per Acre, 1898-9.		Average Yield per Acre, Marketable, 1898-9.		Average Yield per Acre, Unmarketable, 1898-9.	
Early Variety.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1st planting, May 26, 1898; May 26, 1899	277	12	215	36	61	36	505	47	445	17	60	30	391	29	330	26	61	3
2nd planting, June 10, 1898; June 9, 1899	160	36	105	36	55	..	459	48	401	43	58	5	310	12	253	39	56	33
3rd planting, June 24, 1898; June 23, 1899	125	24	74	48	50	36	237	10	203	17	33	53	181	17	139	2	42	15
4th planting, July 8, 1898; July 7, 1899	30	48	..	...	30	48	9	41	.....		9	41	20	14	.....		20	14
5th planting, July 23, 1898; July 21, 1899	1	6	.....		1	6	.....		.....		.....		.....		.....		..	33
6th planting, Aug. 9, 1898	.....		.....		.....		.....		.....		.....		.....		.....		.....	
7th " " 23, 1898	.....		.....		.....		.....		.....		.....		.....		.....		.....	
Late Variety.																		
1st planting, May 27, 1898; May 26, 1899	259	36	158	24	101	12	338	48	300	5	38	43	299	12	229	14	69	58
2nd planting, June 10, 1898; June 9, 1899	173	48	127	36	46	12	164	34	82	17	82	17	169	11	104	56	64	15
3rd planting, June 24, 1898; June 23, 1899	68	12	.....	...	.....	...	157	18	128	16	29	2	112	45	.....		.....	
4th planting, July 8, 1898; July 7, 1899	8	48	.....		8	48	19	22	.....		19	22	14	5	.....		14	5
5th planting, July 23, 1898; July 21, 1899	1	6	.....	...	1	6	.....		.....		.....		.....		.....		.....	33
6th planting, Aug. 9, 1898	.....		.....		.....		.....		.....		.....		.....		.....		.....	
7th " " 23, 1898	.....		.....		.....		.....		.....		.....		.....		.....		.....	

Note.—The yield from the third planting in 1898 was not divided into marketable and unmarketable, hence an average cannot be made of them for that planting.

EXPERIMENTS WITH TOMATOES.

This year 144 varieties were grown for comparison. As lack of space would not permit of a table being published of all the varieties tested, only twenty-five of the best yielding sorts, with data regarding the yields from early and late pickings, are given. In addition to these, are tables in which may be found the names of the six wrinkled varieties which have given the best average yields of ripe fruit during the past four years, and also twelve of the best yielding smooth varieties for the same time.

The seeds were sown this year in hot beds on March 29; the young plants pricked out into strawberry boxes on April 28, and planted in the open ground on June 6, 4 feet apart each way, five plants of each variety being used. The soil was a light sandy loam, which had not received any fertilizers since 1897. The plants grew well, not one having to be replaced. The soil was kept cultivated with the horse cultivator and hoed until the plants became too large to permit of further hoeing.

The season was unfavourable for ripening a heavy crop of tomatoes, and the yields were much less than last year.

TWENTY-FIVE BEST YIELDING VARIETIES OF TOMATOES, 1899.

Variety.	Seedsman.	Date of First Ripe Fruit.	Yield of Ripe Fruit. — First three pickings		Yield of Ripe Fruit. — Last three pickings		Total Yield of Ripe Fruit. — All pickings		Remarks.
			Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	
Dominion Day	Bruce	Aug. 4	1	9	79	12	98	11	Above medium size, moderately regular, wrinkled, scarlet.
Bright and Early	Dreer	" 4	5	5	69	..	89	12	Below medium size, regular, smooth, scarlet.
Early Bermuda	Landreth	" 4	4	11	74	4	89	11	Medium size, regular, wrinkled, scarlet.
Money Maker	"	" 3	1	14	50	8	82	2	" "
Alpha	Gregory	" 3	7	1	43	4	80	9	Medium size, regular, smooth, scarlet.
Bond's Early Minnesota	"	July 28	5	3	51	12	70	12	Medium size, regular, smooth, purple.
Canada Victor	Graham	" 31	7	2	30	..	66	14	Medium size, regular, smooth, scarlet.
Early Bird	Johnson & Stoke.	Aug. 3	4	2	54	8	66	12	Medium size, regular, smooth, purple.
Comrade	Gregory	" 1	3	3	52	4	65	12	Medium size, regular, smooth, scarlet.
Conqueror	Steele	July 28	6	3	41	4	64	11	Medium size, moderately regular, wrinkled, scarlet.
Faultless Early	Farquhar	" 29	4	4	45	8	64	8	Below medium size, regular, smooth, scarlet
Essex Early Market	"	Aug. 2	5	10	47	..	64	3	Medium size, regular, smooth, purple.
Earliest of All	Steele	July 29	7	8	40	4	62	13	Medium size, moderately regular, almost smooth, scarlet.
Maule's Earliest	Maule	" 28	5	.	36	.	62	12	Above medium size, irregular, wrinkled, scarlet.
Atlantic Prize	Steele	" 26	6	10	33	4	60	14	Medium size, regular, smooth, scarlet.
Best of All Forcing	Graham	" 26	3	13	49	8	60	7	Above medium size, regular, smooth, scarlet.
Creekside Glory	Simmers	Aug. 4	..	10	54	4	59	15	Above medium size, moderately regular, smooth, scarlet.
Early Richmond	Landreth	July 31	3	8	47	12	59	1	Medium size, irregular, wrinkled, scarlet.
Early Ruby	Steele	Aug. 2	7	15	30	4	58	2	Medium size, regular, smooth, scarlet.
Extra Early Jersey	Landreth	July 31	3	14	41	4	56	13	Medium size, regular, wrinkled, scarlet.
Essex Hybrid	Henderson	Aug. 2	5	1	41	8	56	2	Medium size, regular, smooth, purple.
Freedom	"	July 30	3	13	43	8	56	1	Medium size, regular, smooth, scarlet.
Democrat	Thorburn	Aug. 7	1	9	39	8	54	3	Large, irregular, smooth, purple.
Livingston's Perfection	Graham	" 4	3	2	42	..	54	2	Large, regular, smooth, scarlet.
Trophy	"	" 4	..	5	47	12	53	..	" "

SIX BEST YIELDING WRINKLED VARIETIES—AVERAGE FOR FOUR YEARS.

Name.	Average date of First Ripe Fruit.	Average Yield per Plant.		Remarks.
		Lbs.	Ozs.	
Early Bermuda	Aug. 5	17	13	Medium size, regular, wrinkled, scarlet.
Money Maker	" 1	16	15	" "
Early Richmond	" 3	16		Medium size, irregular, wrinkled, scarlet.
Extra Early Jersey	" 1	16		Medium size, regular, wrinkled, scarlet.
Conqueror	July 30	15	11	Medium size, moderately regular, wrinkled, scarlet.
Democrat	Aug. 3	15	3	Large, irregular, smooth, purple.

TWELVE BEST YIELDING SMOOTH VARIETIES—AVERAGE FOR FOUR YEARS.

Canada Victor	July 31	15	14	Medium size, regular, smooth, scarlet.
Comrade	Aug. 3	15	10	" "
Brinton's Best	" 10	15	7	Large, regular, smooth, scarlet.
Extra Early Advance	" 2	15	4	Below medium size, regular, smooth, scarlet.
Early Ruby	July 31	14	15	Medium size, regular, smooth, scarlet.
Baltimore Prize Taker	Aug. 5	14	14	Medium size, regular, smooth, purple.
Atlantic Prize	" 3	14	10	Medium size, regular, smooth, scarlet.
Bond's Early Minnesota	July 30	14	7	Medium size, regular, smooth, purple.
Horsford's Prelude	Aug. 2	14	7	Small, regular, smooth, scarlet.
Mayflower	" 3	14	5	Large, regular, smooth, scarlet.
Essex Hybrid	" 2	14		Medium size, regular, smooth, purple.
Livingston's Favourite	" 11	13	8	Large, regular, smooth, scarlet.

Of the twelve best smooth varieties, Brinton's Best, Baltimore Prize Taker and Livingston's Favourite are the best for a main crop, but others have the advantage of earliness and should be planted where early tomatoes are desired.

CELERY—TEST OF VARIETIES.

Experiments were conducted this year with forty varieties of celery, nearly all of which were grown in duplicate. The soil was a good sandy loam which retained the moisture very well throughout the season. The land was prepared by ploughing it about 8 inches deep and then harrowing it into good tilth with a smoothing harrow. Drills were made with a drill plough from 10 to 12 inches deep, and 4 feet apart. Well rotted barn-yard manure was then put in the drills to a depth of about 3 inches and thoroughly incorporated with the soil by means of a digging fork. The soil was now ready for the plants. The celery seed was sown in hot-beds on April 5, and the young plants transplanted to a cold frame on May 26. They were planted out 8 inches apart in the drills, which were now almost level with the rest of the ground, on July 12. The soil was hoed on August 15, and on the 30th the soil was cultivated and the plants packed by hand and hilled up with the hoe. The soil was again cultivated on September 16, and the plants packed by hand and finally hilled up with the spade. During the growing season the foliage was kept covered with Bordeaux mixture, and there was very little disease, although other celery in the neighbourhood of Ottawa suffered. The celery was dug on October 20.

The blanching of early varieties by means of boards gives very satisfactory results, and this method is being more generally adopted by growers. The later kinds are kept best while bleaching, and before being sold, by standing the plants close together in a cool, dark place on moist sand, or by burying the roots in the sand. To have it keep well, the tops should be kept dry and the roots moist.

In the following table a list is given of the varieties which have been tested during the past two years, with notes on their yields, season and quality :—

Name of Variety.	Seedsman.	Yield from 24 plants, 1898.	Yield from 30 plants, 1899.	Yield from 30 plants. 1899.	Total yield from 104 plants. 1898 9.	Remarks.
	1899.	Lbs.	Lbs.	Lbs.	Lbs.	
Perfection Heartwell	Bruce	42½	57	43	142½	Late ; very good quality.
Simmers' Imperial	Simmers.	17½	60	53	130½	Late ; medium quality.
Seymour's White Giant	"	24½	54	50	129	" "
Pascal White Solid	Bruce	40½	39	46½	126	Late ; good quality.
Large Ribbed Kalamazoo	Thorburn	35½	32	45	112½	Late ; above medium quality.
Crawford's Half Dwarf	Rennie	25½	27½	57	110	Late ; medium quality.
Triumph	Evans	21	41	45½	107½	Late ; above medium quality.
Simmers' Special Dwarf, White Winter	Simmers.	22¾	32	51½	106¼	Late ; below medium in quality.
Prize London Red	Steele	19½	33½	51½	104½	Late ; good quality.
Giant Pascal	Simmers.	26	30	47½	103½	Late ; medium quality.
Improved White Plume	Thorburn.	20¼	46	36	102¼	Early ; good quality.
Cooper's Improved Cutting	Landreth.	35½	13½	52	101	Late ; poor quality.
Red Ribbed Self Blanching	Thorburn.	22	39½	37	98¼	Early ; good quality.
Dobbie's Invincible White	Ewing	27	26	45	98	Late ; above medium quality.
Large Ribbed Dwarf White	Simmers.	16	31½	46½	94	Late ; medium quality.
New Rose	"	13¾	28	51	92¾	" "
Paris Golden Yellow	Bruce	24½	25½	36½	86½	Early ; good quality.
Hamilton Red	"	17	27	39	83	Late ; medium quality.
Sandringham Dwarf White Solid	Simmers.	18¼	22½	37½	78¼	" "
Pink Plume	"	12¼	31	34	77¼	Early ; good quality.
Golden Self Blanching	"	22¾	21½	32½	76¾	" "
Golden Rose	Henders'n	17½	23	25½	66	" "

In addition to the foregoing the following varieties were tested in 1899 :—

Name of Variety.	Seedsman.	Yield from 30 plants, 1899.	Yield from 30 plants, duplicate, 1899.	Total yield from 60 plants, 1899.	Remarks.
		Lbs.	Lbs.	Lbs.	
Kalamazoo	Pearce	62	53	115	Late ; medium quality.
Giant White Solid	Henderson.	50	61½	111½	Late ; poor quality.
Rennie's Giant White	Rennie	47	57½	104½	Late ; below medium in quality.
New Winter Queen	Johnston & Stoke	57	46½	103½	Late ; medium quality.
Large White Solid	Rennie	46	47	93½	
Perle le Grande	Thorburn	37	53	90	" "
Golden Dwarf	Henderson.	32½	52½	85	" "
Dobbie's Selected Red	Ewing	31	47½	78½	
Large Ribbed Red	Bruce	39½	39	78½	" "
Henderson's Half Dwarf	Henderson.	33	45	78	" "
Golden Heartwell	Simmers	34½	43	77½	" "
Shumacher	Thorburn	35	40½	75½	" "
Rose Ribbed Golden Self Blanching	Simmers	31	42	73	Early ; good quality.
Major Clark's Solid	Bruce	27	43½	70½	Late ; good quality.
White Walnut	Rennie	36½	31½	68	Early ; very good quality.
Thorburn Fin de Siecle	Thorburn	27½	46	67½	Late ; above medium quality.
White Plume	Simmers	27½	34	61½	Early ; good quality.

EXPERIMENTS WITH CORN.

During the past two years a large number of varieties of sweet corn have been tested, in order to determine their relative standing as regards time of being ready for use, quality, size of ear, yield and height of plant, and in the following table particulars will be found regarding these points. In 1898, thirty-six varieties were tested, and in 1899, seventy-six varieties. The soil in which the corn was grown in 1899 was sandy loam. Clover was ploughed under in the spring, the land disc-harrowed and harrowed twice with the smoothing harrow. The corn was planted on May 30 in hills three feet apart each way, about six kernels being planted in each hill. After the seed had germinated and there was no longer danger from cut worms, the number of plants in a hill was reduced to four. Twelve hills of each variety were used for comparison. The corn was kept thoroughly cultivated during the summer, and when growth had ceased in the autumn it was cut and the ears removed and counted.

EARLY VARIETIES.

Name.	Seedsman.	Kind.	Fit for use, 1898.	Fit for use, 1899.	Height, 1899.	Length of ears, 1898.	Length of ears, 1899.	Average length of ears for two years.	Marketable ears from 12 hills, 1898.	Marketable ears from 12 hills, 1899.
					ft. in.	in.	in.	in.		
Extra Early Beverly	Landreth	Hybrid	.....	Aug. 12	5 4	....	7	...	....	31
Extra Early Cory	Steele	Sweet	Aug. 7	" 15	6 0	7	6½	6¾	43	60
Mitchell's Extra Early	Pearce	Flint	.....	" 15	6 3	....	8	...	...	59
Early Marblehead	Steele	Sweet	Aug. 8	" 15	6 4	7	7	7	38	52
Telephone Sweet	Salzer	"	.....	" 15	5 6	....	6	....	....	49
Early Cory	Bruce	"	.....	" 15	6 0	....	7	....	....	42
Mammoth White Cory	Gregory	"	Aug. 7	" 15	4 6	6	5	5½	25	35
Burbank's Early Maine	J. & Stoke	"	.....	" 16	6 0	....	6	....	....	59
Early La Crosse	Salzer	"	.....	" 16	6 4	....	7	...	....	51
Lackey's Early Sweet	Gregory	"	.....	" 17	5 6	....	7	....	...	56
Early Fordhook	Burpee	"	.....	" 17	5 6	....	6	....	....	52
Quincy Market	Gregory	"	.....	" 17	6 4	....	6½	....	...	51
Ford's Early	Ewing	"	Aug. 8	" 17	5 8	7	7	7	40	49
First of All	Salzer	"	.....	" 17	5 0	....	6	....	....	34
Early Landreth Market	Landreth	"	.....	" 18	7 6	....	7	....	....	38
Burpee's Earliest Sheffield	Burpee	Hybrid	.....	" 19	7 2	....	6	....	....	57
Adam's Extra Early	Rennie	Flint	.....	" 19	6 9	....	7	....	...	42
First of All	Pearce	Sweet	.....	" 19	5 7	....	7½	....	...	66
Henderson's Metropolitan	Henderson	"	Aug. 12	" 19	6 4	8	7½	7¾	43	48
White Cory	Thorburn	"	" 7	" 21	7 3	7	7	7	35	49

SECOND EARLY VARIETIES.

Kendall's Early Giant	Pearce	Sweet	Aug. 12	Aug. 21	6 6	6	7½	6¾	31	43
Maule's XX Sugar	Maule	"	.....	" 22	6 6	....	8	....	....	42
Champion Sweet	Pearce	"	.....	" 22	6 0	....	7	....	....	28
Harvey's Early	Vick	"	.....	" 23	7 5	....	7½	...	...	51
New Early Dawn	J. & Stoke	"	.....	" 23	7 0	....	8	....	....	50
Crosby's Extra Early	Steele	"	Aug. 12	" 23	6 1	7	6	....	38	50
Early Minnesota	"	"	" 8	" 23	6 0	7½	7	7¼	58	31
Early Market	Rennie	"	" 8	" 24	6 6	8	7	7½	55	59
Early Giant Sweet	Steele	"	" 12	" 24	6 4	7	7½	7¼	25	52
Low's Perfection	Rennie	"	.....	" 25	8 6	....	7½	...	....	59
Child's Honey Dew	Childs	"	.....	" 25	6 10	....	7	...	....	54
Melrose	Thorburn	"	.....	" 25	6 6	...	7	...	....	46

SECOND EARLY VARIETIES—*Concluded.*

Name.	Seedsman.	Kind.	Fit for use, 1898.	Fit for use, 1899.	Height, 1899.	Length of ears, 1898.	Length of ears, 1899.	Average length of ears for two years.	Marketable ears from 12 hills, 1898.	Marketable ears from 12 hills, 1899.
					ft. in.	in.	in.			
Boston Market	Pearce	Sweet		Aug. 25	6 4	....	7	....	....	44
New Champion	Salzer	"	Aug. 12	" 25	6 9	8	7	7½	42	33
Pee & Kay	Pearce	"		" 26	6 10	....	7½	....	....	52
Shaker's Early	"	"	Aug. 20	" 26	7 0	7	8	7½	41	50

INTERMEDIATE VARIETIES.

Black Mexican	Ewing	Sweet	Aug. 27	Aug. 28	6 9	8	7	7½	49	71
Burlington Hybrid	J. & Stoke	"		" 28	7 8	....	8	....	....	53
Stabler's Early	Henderson	"	Aug. 22	" 29	7 7	8	8	8	39	39
Nonsuch	Bruce	"	" 24	" 30	7 0	7	8	7½	32	30
Asylum Sweet	Thorburn	"		" 30	7 0	....	8	....	....	27
Tuscarora	Rennie	"		" 30	6 9	....	8½	....	....	21
Moore's Early Concord	Rennie	"	Aug. 22	" 31	7 6	8	8	8	32	44
Perry's Hybrid	Steele	"	" 19	" 31	6 6	9	7½	8¼	58	31
Russell's Prolific	Vick	"		" 31	8 2	....	9	....	....	27
Amber Cream Sugar	Burpee	"		" 31	7 8	....	8	....	....	22
Early Bonanza	J. & Stoke	"		Sept 1	6 4	....	7	....	....	39
New Early Evergreen	"	"		" 1	7 6	....	7	....	....	38
New Honey Sweet	"	"	Aug. 27	" 1	6 2	7	7	7	31	33
Roslyn Hybrid	Thorburn	"		" 1	8 3	....	8	....	....	38
Stabler's Nonpareil	Dreer	"		" 1	7 2	....	8	....	....	33
Landreth's Sugar	Landreth	"		" 1	7 3	....	6½	....	....	29
Early Mammoth Sugar	Bruce	"		" 1	6 8	....	9	....	....	27
Hickox Sugar	"	"	Aug. 30	" 1	7 2	9	7	8	46	26
Potter's Excelsior	Thorburn	"		" 1	6 4	....	6	....	....	18
The Henderson	Henderson	"		" 1	6 4	....	7	....	....	14
Guarantee Sweet	J. & Stoke	"		" 2	7 4	....	7½	....	....	59
Early Eight-rowed Sugar	Thorburn	"		" 2	7 0	....	8	....	....	39
Ziz-Zag Evergreen	Ewing	"	Sept. 5	" 2	7 5	7	7	7	29	35
Evergreen Sugar	"	"		" 2	8 3	....	8½	....	....	31
Old Colony	"	"		" 2	6 3	....	6	....	....	24
Squantum	Henderson	"		" 2	6 4	....	7½	....	....	29
Triumph Sugar	Thorburn	"		" 2	7 6	....	8	....	....	23

LATE VARIETIES.

New Columbus	Vick	Sweet		Sept. 4	8 4	....	7	....	....	41
Columbus Market	Livingston	"		" 4	8 6	....	10	....	....	36
Bonanza Sweet	Gregory	"		" 4	8 0	....	7	....	....	35
Shoe Peg	Ewing	"	Sept. 10	" 4	6 6	6	6	6	38	30
Improved Ruby	Burpee	"		" 4	6 0	....	6	....	....	13
Extra Early Concord	Landreth	"		" 6	7 9	....	9	....	....	32
Red Cob Evergreen	Steele	Dent	Sept. 10	" 6	6 4	8	6	7	22	17
Egyptian Sweet	Rennie	Sweet		" 7	7 7	....	8	....	....	31
Ne Plus Ultra	"	"		" 11	7 6	....	8	....	....	24
Country Gentleman	Ewing	"	Sept. 10	" 12	6 6	7	7	7	39	44
Stowell's Evergreen	Pearce	"	" 3	" 12	7 0	9	7	8	29	16
Mammoth Sweet	"	"	" 1	" 12	6 10	10	6	8	28	14
Old Colony	Burpee	"	Aug. 31	" 14	7 0	8	6½	7¼	36	24

Of the varieties tested in 1899, the following were the most promising, given in the order in which they were ready for market :—

EARLY.—Extra Early Beverly (not a very sweet corn but the earliest yet tested), Extra Early Cory, Early Marblehead, Lackey's Early Sweet, Burpee's Earliest Sheffield (not a very sweet variety, but productive and with uniform ears), First of All (Pearce), Henderson's Metropolitan.

SECOND EARLY.—Crosby's Extra Early, Early Market, Early Giant Sweet, Low's Perfection, Child's Honey Dew, Boston Market.

INTERMEDIATE.—Black Mexican, Stabler's Early, Perry's Hybrid, New Early Evergreen, New Honey Sweet, Guarantee Sweet.

LATE.—Ne Plus Ultra, Country Gentleman.

TOBACCO.

This year forty-eight varieties of tobacco were grown for comparison as to time of ripening and productiveness; notes were also taken on other characteristics regarding them. The seed was sown in a hot bed on April 4, the young plants transplanted into a cold frame on May 20, and planted in the field on June 15. The soil where the tobacco was grown was a light sandy loam, which received a dressing of well rotted barnyard manure at the rate of twenty tons per acre before it was ploughed in the spring of 1899. The soil was ploughed on June 7, disc harrowed once, and harrowed twice with the smoothing harrow before planting. The plants were set 3 by 3½ feet apart, the land being previously marked with a corn marker, and the plants set at the intersections of the marks. Fifteen plants of each variety were used. The soil was cultivated frequently, four times in all, until the plants were too large to admit of the passage of a horse between the rows without injury to the leaves. The plantation was hoed twice in order to kill the weeds not destroyed by the cultivator, and to loosen the soil close to the plants. The tobacco was cut on September 13, and taken to the curing house where, after it was cured, the plants were stripped and the weights of the leaves taken.

The season was not very favourable to tobacco, the weather being cool or wet at the time when it should have been hot. The yields, however, from the different varieties, were large. It must be pointed out, however, that it would be difficult to obtain such yields on large areas.

In the following table particulars are given of the date of topping, total weight of first grade dry leaves, weight of second grade dry leaves, weight of third grade dry leaves, estimated total weight per acre of dried leaves, and stage of maturity at time of cutting :—

TOBACCO—TEST OF VARIETIES.

Name of Variety.	Seedsman.	Date of Topping.	Yield per acre, 1st grade dry leaves.	Yield per acre, 2nd grade dry leaves.	Yield per acre, 3rd grade dry leaves.	Total yield per acre, dry leaves.	Condition of leaves when cut.
			Lbs.	Lbs.	Lbs.	Lbs.	
Pennsylvania Seed Leaf.	Thorburn ..	Aug. 5..	1,521	449	1,832	3,802	Spots beginning to appear.
Improved White Burley.	Burpee.....	" 16..	2,613	319	319	3,251	Yellow and spotted with yellow.
Small Havana	Ewing.....	July 26..	1,521	657	847	3,025	Spots beginning to appear.
Maryland.....	"	Aug. 8..	2,092	398	346	2,836	" "
Brazilian American.....	Thorburn ..	" 8..	1,573	622	536	2,731	Still green.
Big Havana	Evans.....	July 29..	933	1,037	709	2,679	Spots beginning to appear.
Comstock Spanish.....	Burpee.....	" 28..	1,262	691	657	2,610	" "
Gouch.....	Evans.....	Aug. 3..	1,521	311	415	2,247	Spotted, spots almost yellow.
White Stem	Henderson..	" 16..	1,521	277	432	2,230	Still green.
Kentucky Yellow.....	Thorburn ..	" 4..	1,677	380	173	2,230	Spots beginning to appear.
Zimmer's Spanish.....	Henderson.	" 1..	864	743	527	2,134	" "
East Hartford	Evans.....	" 6..	1,516	359	219	2,094	Spotted, but spots not yet yellow.
Primus.....	Henderson..	" 3..	1,296	459	319	2,074	" "
Tennessee Red.....	Thorburn ..	" 23..	1,516	279	259	2,054	Still green.
Kentucky Burley,.....	"	" 23..	1,259	426	296	1,981	Some yellow, others almost.
Cuban Seed Leaf.....	Evans.....	July 26..	899	743	311	1,953	Spotted, but spots not yet yellow.
White Burley.....	"	Aug. 4..	1,593	204	93	1,890	Leaves yellow.
Yellow Mammoth	Thorburn ..	" 23..	1,210	324	281	1,815	Still green.
Latakia	Evans.....	" 2..	1,111	519	185	1,815	Spotted, but spots not yet yellow.
Big Oronoka.....	"	" 2..	1,504	190	104	1,798	Spots beginning to appear.
Sterling	Thorburn ..	" 8..	1,148	444	185	1,777	" "
Virginia Oak Hill Yellow	" ..	" 8..	605	929	238	1,772	" "
Connecticut Seed Leaf ..	" ..	" 8..	1,111	315	315	1,741	" "
Safrano	" ..	" 16..	1,185	315	204	1,704	" "
Gold Leaf	Henderson..	" 8..	1,089	311	294	1,694	" "
Conqueror.....	Thorburn ..	" 3..	1,124	311	225	1,660	" "
Oronoka Yellow	" ..	July 31..	1,141	311	138	1,590	Spotted, but spots not yet yellow.
Hyco	Henderson.	Aug. 1..	1,089	277	156	1,522	Spots beginning to appear.
Blue Pryor,.....	Thorburn ..	" 8..	1,175	225	121	1,521	" "
Sumatra.....	" ..	" 1..	994	302	194	1,490	" "
Turkish Aromatic.....	" ..	" 8..	982	222	241	1,445	" "
Climax	" ..	" 2 .	957	259	199	1,415	" "
Yellow Pryor.....	" ..	" 2..	982	315	111	1,408	" "
Bonanza	Burpee.....	" 8..	834	241	333	1,408	Green, except tips of some leaves.
Famous	Ewing.....	" 16..	1,124	173	86	1,383	Spots beginning to appear.
Tuckahoe.....	Thorburn ..	3 3..	1,019	204	148	1,371	" "
Honduras....	"	July 31..	1,003	277	69	1,349	" "
Hester.....	Henderson..	" 30..	574	500	130	1,204	" "
Granville Co. Yellow....	" ..	Aug. 2..	611	426	148	1,185	Spotted, but spots not yet yellow.
Lancaster Co. Broad Leaf	Burpee.....	July 28..	570	311	259	1,140	Still green.
Oronoka White Stem....	Thorburn ..	Aug. 2..	691	216	108	1,015	Spots beginning to appear.
Florida	Henderson..	" 2..	588	311	86	985	Distinctly spotted with yellow.
Canelle.....	Ewing.....	July 14..	363	173	173	709	" "
Harby.....	Evans.. ...	" 22..	406	204	93	703	" "
Persian Muscatelle	Childs.....	" 20..	333	148	222	703	" "
Persian Rose.....	Thorburn ..	" 29..	359	160	180	699	Spots beginning to appear.
Havana	" ..	" 21..	311	69	277	657	Distinctly spotted with yellow.

In addition to the varieties grown in small plots, three kinds, White Burley, Havana Seed Leaf, and Little Oronoka, were grown on a larger scale, one and one-half acres in all being devoted to these varieties. Part of the land was manured at the rate of 20 tons per acre with well rotted barnyard manure, and otherwise received the same treatment as described for the smaller plots.

As the seed was not received until late, the plants were not set out until June 27, which was not as early as desirable, and on this account the Havana Seed Leaf and Little Oronoka were not as far advanced at the time of cutting as they should have been. The yield of White Burley was also much reduced on this account. The proportion of third grade is large owing to sand blowing and injuring the leaves badly.

The tobacco was cut on September 13 and 14, and taken to the new curing house, where the plants were hung on laths and cured, after which the leaves were stripped off and made into hands, and the tobacco is now ready for fermentation.

The following table gives the results obtained from the three varieties tested:—

TOBACCO—LARGER PLOTS.

Variety.	Yield per acre, first grade, dry leaves.	Yield per acre, second grade dry leaves.	Yield per acre, third grade, dry leaves.	Total Yield per acre, dry leaves.	Condition when cut.
	Lbs.	Lbs.	Lbs.	Lbs.	
White Burley	768½	140	403½	1,312	Leaves yellow.
Havana Seed Leaf	711	171¼	539	1,421¼	Yellow spots beginning to appear.
Little Oronoka	859	152	183½	1,194½	" "

FOREST BELTS.

In the Report for 1897 a table was published giving the measurements of trees in the forest belts at the Central Experimental Farm. This table is again published this year with the additional measurements which have been taken in the meantime.

In addition to the measurements hitherto taken, the diameter of the trees at a height of 4 feet 6 inches from the ground was recorded this year. It is intended that the measurement taken at this height will take the place of that, one foot from the ground, as it will be more valuable. As many who now receive the Annual Report did not do so in 1897, it has been thought wise to repeat the matter published that year, in which the forest belts are described and the objects for which they were planted, explained, making such changes as are necessary after the two years which have elapsed since then.

The forest belts at the Central Experimental Farm extend along its northern and western boundaries; the belt on the western boundary is 165 feet wide, and that on the northern boundary, 65 feet; their total length being nearly 1¾ miles. The number of trees growing in these belts, including those in an evergreen clump, is about 20,500. The objects, for which these forest belts were planted, are well expressed in the report of the Director for 1893 as follows:—

"There were several objects in view in planting the belts of forest trees which line the west and north sides of the farm. One was to test by actual experiment with a number of different species, the comparative results in growth and development to be had by planting at different distances apart. Five feet by five, five feet by ten and ten feet by ten were the distances chosen for these tests. Another question on which information was desired was the relative growth to which trees would attain when planted

in blocks of single species as compared with those planted in mixed clumps where they are associated with a number of other sorts. Further information was sought as to how far the crops on the farm located near these tree belts will be influenced by the shelter they would afford as growth progressed. In the planting, the grouping was also designed with the object of producing pleasing effects on the landscape by the intermingling and blending of varieties. The main purpose, however, was to get all the useful data possible with regard to the more important timber trees of economic value so that object lessons in tree growth might be available to any who in future might desire to study this subject or to engage in the enterprise of timber growing."

Although it is but eleven years since the first trees were planted in the belts referred to, the growth already made is a useful object lesson and should encourage the more extensive planting of timber trees. The soil in which the trees were planted was in many instances poor, and while a number of species appear to succeed almost as well on poor as on good land, yet some kinds require good soil in order to grow them successfully. As to the distance apart at which it is desirable that trees should be planted, those which were put five by five feet apart are making, in most cases, the best trees for timber purposes, as the lower limbs are dying, leaving the trunks clean which will make the wood freer from knots than where planted ten by ten, or ten by five feet apart, as at those distances there are, as yet, few instances where the lower limbs have died. The trees planted five by five feet apart, also, make more growth in height than where wider planting was adopted, but the diameter of the trunk is not so great. The closely planted trees are more protected from storms and there are fewer broken tops and crooked stems. The desirability of close planting was also very apparent until quite recently in the condition of the surface of the ground where the trees are ten feet apart, which, in a number of cases, still required cultivation although the trees had been planted for eight years; as it was necessary, in order to keep sod from forming and checking the growth of the trees, to cultivate the soil, whereas, in most instances, where the trees are planted five by five feet apart, the surface soil was kept shaded and moist, and sod did not form. As the conditions of soil are different in the belts where the trees are planted in clumps of a single species and where the several kinds are mixed together, a fair comparison of these two methods of planting cannot yet be made, but the advantages derived from mixing the leafier sorts of trees with those which are not very leafy, are already apparent. Where thin foliaged trees had been planted five by five feet apart and had had eight years' growth, the sod still formed very readily unless the soil was kept cultivated, thus showing that sufficient shade was not afforded to prevent the growth of grass and weeds.

None of the trees in the forest belts were cultivated in 1899.

Owing to the unsuitability of soil and climate, the following kinds of trees have not succeeded in the forest belts along the Western boundary, and in consequence most of them were removed this autumn and part of the land replanted with other species:

Species removed:—Red Maple, Norway Maple, European Mountain Ash, Buttonwood, Horse Chestnut, Kentucky Coffee Tree.

Trees Planted in the Forest Belts in 1899:—As the experience of the past eleven years had proven that in many cases trees planted 5 by 5 feet apart had required a great amount of cultivation, in order to give them favourable conditions for making good growth, and in consequence had proven rather expensive, it was decided, when replanting the vacant places this year, to plant the trees closer together. The method adopted was to plant both trees and shrubs, the latter, which were in the majority, being used for the purpose of getting the ground shaded in as short a time as possible, so that weeds would be smothered, moisture conserved, and the soil kept from baking, which would obviate the necessity of cultivating.

Two blocks of trees were planted, in one of which the following species were planted for permanent trees:—White Pine, 10 by 12 feet apart; Hard Maple, 10 by 12 feet apart. Spaces have been left in this block for White Ash, which when planted in the spring of 1900 will be 10 by 5 feet apart. The remainder of the block is made up of

Box Elder, Rosemary Willow (Salix rosmarinifolia), Ninebark (Neillia opulifolia) and Alder buckthorn (Rhamnus Frangula), all of which were planted for the purpose of filling in the spaces between the permanent trees. When all the trees in this block are planted every tree and shrub will be just 2½ feet apart each way.

In the other block, the following trees have been used as permanent trees :—Black Walnut, 10 by 10 feet apart ; Hard Maple, 10 by 10 feet apart ; and European Larch, 10 by 10 feet apart, while Box Elder, Sand Cherry and Alder Buckthorn have been used for filling in.

The total number of trees and shrubs planted, with height of same, was :—

Name.	Number planted.	Height when planted.
White Pine *(Pinus Strobus)*	186	9 to 12 inches.
Black Walnut *(Juglans nigra)*	137	3 ft. (2 yrs. old.)
Hard Maple *(Acer saccharinum)*	304	18 to 24 inches.
European Larch *(Larix europea)*	99	8 "
Box Elder *(Acer Negundo)*	918	4 to 6 "
Ninebark *(Neillia opulifolia)*	461	4 to 6 "
Sand Cherry *(Prunus pumila)*	420	4 "
Alder Buckthorn *(Rhamnus Frangula)*	480	4 to 6 "
Norway Spruce *(Picea excelsa)*	75	12 to 15 "
Rosemary Willow *(Salix rosmarinifolia)*	1819	unrooted cuttings.
Total	4899	

GROWTH of Trees in the Forest Belts

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average 1895.		Average 1896.	
			feet.	years.	ft.	in.	ft.	in.
Black Walnut—Juglans nigra	Low sandy loam	1888	5 × 5	1	9	11½	10	6
" "	"	1888	10 × 10	1	5	5	5	8½
" "	Sandy loam with small stones.	1889	5 × 5	2	12	8	13	9
" "	" "	1889	10 × 10	2	8	4½	8	7½
" "	Clay loam	1888	10 × 5	1	12	5	13	2
Butternut—Juglans cinerea	Low sandy loam	1889	5 × 5	1	9	11	10	7
" "	"	1888	10 × 10	1	6	2½	6	9
Silver-leaved Maple—Acer dasycarpum.	Light sandy loam	1889	5 × 5	3	23	2	24	4
" "	"	1889	10 × 10	3	22	6	23	1
European White Birch—Betula alba	"	1889	5 × 5	3	23	1	25	4
" "	"	1889	10 × 10	3	24	11	26	7
Canoe Birch—Betula papyrifera	"	1889	5 × 5	3	21	9	23	7
" "	"	1889	10 × 10	3	21	2	23	5
Yellow Birch—Betula lutea	"	1889	5 × 5	3	16	6	17	1
" "	"	1889	10 × 10	3	16	1	16	7
White Elm—Ulmus americana	Sandy loam	1889	5 × 5	3	14	5	14	4
" "	"	1889	10 × 10	3	13	9	14	..
Black Ash—Fraxinus sambucifolia	Black muck	1889	5 × 5	2	12	..	12	11
" "	Low sandy loam	1889	10 × 10	2	8	4	9	3
Green Ash—Fraxinus viridis	Black muck	1889	5 × 5	3	15	..	15	11
" "	Low sandy loam	1889	10 × 10	3	14	3	15	5
Red Ash—Fraxinus pubescens	Black muck	1889	5 × 5	2	15	5	16	11
" "	Light sandy loam	1889	10 × 10	2	12	5	13	8
White Ash—Fraxinus americana	Black muck	1889	5 × 5	3	18	5	20	8
" "	Light sandy loam	1889	10 × 10	3	15	9	17	9
Black Cherry—Prunus serotina	Light sandy loam and gravel.	1889	5 × 5	3	16	7	17	4
" "	" "	1889	10 × 10	3	18	2	19	4
Box Elder—Negundo aceroides	Light sandy loam	1889	5 × 5	2	19	1	20	6
Bolle's Poplar—Populus alba Bolleana.	"	1890	5 × 5	1	24	2	26	4
" "	"	1890	10 × 10	1	22	11	25	4
				in.				
Scotch Pine—Pinus sylvestris	Sandy loam with gravel	1888	5 × 5	18	14	4	16	9
" "	" "	1888	10 × 10	18	11	..	13	3
" "	Low sandy loam with gravel.	1888	5 × 5	18	13	4	15	4
" "	Low sandy loam	1888	10 × 10	18	11	6	13	8
" "	Light sandy loam	1888	10 × 5	18	14	10	17	2
" "	Clay loam	1888	10 × 5	18	11	11	14	2
" "	Light sandy loam and gravel.	1888	10 × 5	18	14	11	17	1
" "	" "	1887	3 × 3	9	14	3	16	6
Austrian Pine—Pinus austriaca	Light sandy loam	1889	5 × 5	18	8	1	10	2
" "	"	1889	10 × 10	18	7	9½	9	10½
" "	"	1888	10 × 5	15	8	11	10	11
" "	Clay loam	1888	10 × 5	15	9	2½	10	11½
" "	Light sandy loam and gravel.	1888	10 × 5	15	10	5	12	3
" "	" "	1887	3 × 3	15	10	6	12	1
White Spruce—Picea alba	Light sandy loam	1889	5 × 5	15	8	5	9	10
" "	"	1889	10 × 10	15	7	8	8	11
Norway Spruce—Picea excelsa	"	1889	5 × 5	18	10	8	11	10
" "	"	1889	10 × 10	18	10	1	12	2
" "	"	1888	10 × 5	15	10	10	13	1
" "	Clay loam	1888	10 × 5	15	11	4	13	9
American Arber-vitæ—Thuya occidentalis.	Low sandy loam and black muck.	1889	5 × 5	18	9	1	10	2
" "	Low sandy loam	1889	10 × 10	18	8	..	8	10
				feet.				
European Larch—Larix europæa	"	1888	5 × 5	2	19	3	20	3
" "	"	1888	10 × 10	2	17	9	19	3
White Pine—Pinus Strobus	Light sandy loam with gravel.	1889	5 × 5	8 to 10 in.	10	11	13	4
" "	" "	1889	10 × 10	8 to 10 in.	10	1½	12	7

In the above table the average growth is given of most of the important timber trees growing in the measurements of average trees, and give a fairly accurate idea of the growth these make each year. Until many of them began to spread so much that it was difficult to determine the leader, hence the total height where the main branches are very divergent, or the extremities pendulous, the total height is given as less

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at the Central Experimental Farm.

Height, Autumn of						Average Growth in								Average Circumferance 1 Foot from Ground.						Average Diameter 4' 6" from ground.
1897.		1898.		1899.		1892	1893	1894	1895	1896	1897	1898	1899	1893	1895	1896	1897	1898	1899	1899.
ft.	in.	ft.	in.	ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
10	9	10	5	10	9	26	23	21	18	6	3	0	4	5⅛	7⅜	8 7/16	8½	9⅛	9⅛	1⅝
5	10½	6	1	6	7	12	17½	11	9	3½	2	3	6	3	5	5½	5 11/16	6⅜	7 1/16	1⅜
14	5	14	10	15	4	37½	28	36	19	13	8	5	6	.....	8½	9 13/16	9 15/16	10	10½	2⅜
8	12½	9	11	10	10	15	25	28	15	3	5	7	11	.....	7¾	8⅛	8⅜	9⅜	10 1/16	2 1/16
13	5	13	11	14	3	31	31	31	15½	9	3	5	4	.....	10¾	11 11/16	12 3/8	13 5/16	13 1/16	2 5/8
10	10	10	10	11	3	19	24	18	10½	8	3	0	5	.....	6⅝	7 3/16	7⅝	7 5/16	7⅜	1⅝
7	4	8	2	9	5	18	15	15	16	7	7	10	19	.....	4⅜	6⅜	6 13/16	7½	8⅜	1¼
25	3	25	9	26	9	37	40	33	29	14	11	6	11	.....	9¼	9½	9 13/16	9 15/16	9⅝	2⅜
23	7	23	10	24	2	53	38	33	20½	7	6	3	4	.....	13	13 3/16	14 1/16	14 7/16	14 3/16	3 11/16
28	8	30	4	32	4	58	18	17	14	27	40	21	24	.....	10 1/16	11 1/16	12 5/16	13 1/16	14 1/16	3 13/16
31	1	33	7	36	4	36	32	30	30	20	54	28	33	.....	15 3/16	17 5/16	19 1/16	21	23 1/16	5
25	10	27	7	29	6	46	36	22	14	22	27	21	22	.....	9 3/16	10	10 1/16	11	11 5/16	3 1/16
25	7	27	9	30	..	34	24	33	28	27	26	26	27	.....	13	14¼	15 1/16	16 7/16	17 3/16	4 5/16
18	6	19	11	21	3	47	30	35½	21	7	17	17	17	6 3/16	8¼	9 1/16	9 5/8	10	10 1/16	2 7/16
18	1	19	4	20	5	41	33	26	21	6	18	15	13	8	11 3/16	12 3/16	13 1/16	14 7/16	14 3/16	3 3/16
15	1	15	2	16	5	33	38	27½	23	0	9	1	15	5 3/16	6 3/16	7 1/16	7 5/16	8 7/16	8 3/16	1 11/16
14	9	16	1	18	2	44	31	25	18	3	9	16	25	6	9	9 3/16	10 1/16	11 5/16	13 1/16	3
13	11	16	2	16	11	38	26	32	8	11	12	28	8	5	6 1/16	6 13/16	7 1/16	8 1/16	8 1/16	2 1/16
9	1	9	4	11	3	20	23	19	8	11	0	2	24	3 1/16	5	5 1/16	5 3/16	6 7/16	7 3/16	1 13/16
17	7	18	11	19	8	30	31	29	20	11	20	10	9	6 1/16	7 3/16	8 1/16	9 1/16	10 1/16	10 1/16	2 1/16
15	5	15	7	16	2	28	24	21½	21	14	3	2	7	7 1/16	8 1/16	9 1/16	9 13/16	10 1/16	10 5/16	2 5/16
18	4	19	8	21	1	31	34	39	33	18	17	15	18	5	7	8 7/16	8 13/16	9 1/16	10 1/16	2 5/16
14	5½	14	11	16	.	26	32	27½	21	15	9	5	13	4 3/16	6 1/16	7 1/16	7 5/16	8 1/16	9 1/16	2 1/16
22	3	22	8	23	5	32	41	58	36	27	19	4	9	5 1/16	7	8 1/16	8 1/16	9	9 1/16	2 5/16
19	7	20	4	21	9	38	38	37	25	24	22	10	17	5 1/16	8 3/16	9 1/16	10 1/16	11 1/16	11 3/16	2 3/16
18	4	18	7	19	..	29	21	22	19	9	12	6	4	.....	8 1/16	9 1/16	9 1/16	9 3/16	10	2 1/16
21	2	21	9	22	9	40	39	32	26	22	22	7	12	.....	11 3/16	12 5/16	13 5/16	14 1/16	14 7/16	3 1/16
22	2	23	4	24	2	38	38	39	29	17	20	13	11	8 1/16	10 1/16	11 3/16	11 11/16	12 3/16	12 5/16	3
27	11	...	...	.....		46	68	63	70	26	19	.....	.....	.....	11 1/16	12 1/16	12 5/16	.....	.....	
27	11	...	...	.....		40	55	70	74	29	31	.....	.....	.....	12 1/16	15 3/16	17 1/16	.....	.....	
18	11	20	11	22	..	29	28	35½	31	29	26	24	14	7 1/16	10	11	11 7/16	12 3/16	13 3/16	3 7/16
15	7	17	8	19	3	15	22	28½	29	27	28	25	19	9 1/16	12	13 1/16	13 7/16	13 7/16	13 11/16	4 1/16
17	6	19	3	20	11	26	29	32½	29	24	26	23	19	7 1/16	9 1/16	10 3/16	11 5/16	12 1/16	13	2 13/16
15	8	17	9	19	9	20	23	29	29	26	24	23	24	8 1/16	13 1/16	15 3/16	17 1/16	18 3/16	20 1/16	4 3/16
19	2	21	3	23	1	25	31	35	34	28	24	25	21	.....	15 1/16	18	20 5/16	22 1/16	24 3/16	6 3/16
16	3½	17	6	19	4	20	23	32	31	27	25½	20	21	.....	12 1/16	14 1/16	16 7/16	18	19 1/16	4 5/16
18	8	20	2	21	8	29	30	36	33	26	19	19	18	.....	15	17 7/16	18 1/16	20 13/16	22	5 3/16
18	9	20	9	22	5	22	23	26	28	27	27	24	20	5½	8¼	9 7/16	9 11/16	10 5/16	11	4 1/16
12	..	14	1	15	11	12½	18	23	22½	25	22	22	23	.....	9	11 1/16	12 1/16	13 3/16	14 3/16	3 5/16
11	11	13	7	15	..	12	16	22	24	25	24½	15	17	.....	10 3/16	13 1/16	15 3/16	14 5/16	15 3/16	3 1/16
12	5	13	4	15	6	18	21	24	24	24	18	21	26	.....	9 1/16	10 1/16	12 5/16	13 5/16	15 5/16	3 3/16
12	4½	13	7	15	..	17	19	24½	22	21	17	15	17	.....	9 1/16	11 3/16	12 1/16	14 1/16	15 3/16	3 1/16
13	11	15	9	17	8	22	22	26	25	22	20	22	23	.....	10 3/16	13 5/16	14 1/16	16 1/16	18 1/16	4 1/16
13	4	14	10	16	5	21	19	22	21	19	15	18	18	.....	8 1/16	9 3/16	10 1/16	11 1/16	11 3/16	2 5/16
10	9	11	7	12	4	12	21	21½	21	17	11	10	9	.....	6 1/16	6 5/16	7 1/16	7 5/16	8 1/16	1 13/16
9	11	11	2	12	8	10	18	22	19	15	12	15	19	.....	6 1/16	7 3/16	8 1/16	10 5/16	11 1/16	2
13	..	13	11	14	10	19	29	29	18	14	14	10	11	6	8 1/16	9 1/16	10 3/16	11 1/16	11 1/16	2 1/16
14	5	16	2	18	..	16	23	25	27	25	27	22	22	5	8 1/16	10 1/16	11 1/16	12 5/16	13 3/16	2 5/16
15	9	18	..	20	4	19	25	23	28	27	32	30	28	.....	8	9 1/16	10 5/16	11 5/16	13 1/16	3
16	2	18	11	21	11	18	20	31	32	29	29	32	37	.....	8 1/16	9 13/16	11 11/16	12 3/16	14 1/16	3 7/16
11	6	12	5	13	9	21	23	15	15	13	16	11	16	.....	7 3/16	9 1/16	10 1/16	12	12 3/16	2 1/16
9	10	11	6	12	9	20	18	15	15	10	12	19	16	.....	7 3/16	9 1/16	10 13/16	11 3/16	12 3/16	1 5/16
21	9	23	8	25	4	35	41	45	31	12	18	23	20	8	11	11 1/16	12 1/16	13 1/16	13 3/16	3 1/16
20	5	22	7	25	5	33	37	42	40	18	14	22	34	7 1/16	12	13 5/16	14 3/16	17 1/16	18 1/16	4 1/16
15	8	18	4	20	1	19½	27½	27½	27½	29	28	28	27	4 1/16	8	10	10 13/16	11 5/16	12 3/16	3 5/16
15	2	18	3	20	.	16	24½	24	27	29	31	33	21	5	9 1/16	11 7/16	13 11/16	15 5/16	17 1/16	4 3/16

forest belts at the Central Experimental Farm. The figures published are the average results from the 1897, and in some cases until 1898, the annual growth was taken in measuring the trees, but the crowns of is now taken. This change has lessened the apparent annual growth for those years, and in some cases, than that of the year previous.

ARBORETUM.

Although last winter was severe, and comparatively little snow fell until March, the number of trees and shrubs which were winter-killed was little, if any, above the average. The genus *Prunus* suffered, perhaps, more than any other in this regard: the reason probably being that many of the varieties were grafted on tender stocks, as most of the losses occurred from root-killing. Notwithstanding the losses, however, which occur every winter, the collection is getting larger each year.

This year a catalogue was published of the trees and shrubs which have been tested up to this time, and the introductory matter from that catalogue, which is herewith quoted, will give some idea of the progress which has been made since 1889, when the first planting was begun:—

"When the Central Experimental Farm was established at Ottawa, in 1886, it was decided that a portion of the land purchased, consisting of sixty-five acres out of a total of four hundred and sixty-five, should be devoted to the purposes of an Arboretum and Botanic Garden, where trees, shrubs and plants from all parts of the world could be brought together and tested as to their hardiness and adaptability to this climate.

"Work was begun on the Experimental Farm in the spring of 1887, but the first planting in the Arboretum and Botanic Garden was not done until the autumn of 1889. During that season 200 species of trees and shrubs were planted, two specimens of each, grouped in their natural orders. In planting these they were placed at such distances from each other as was thought would be sufficient to permit of the full growth and development of the individual specimens. Many additions were made from year to year, and in 1894 the collection contained about 600 species and varieties. Up to that time this part of the work had been in charge of Dr. James Fletcher, Botanist and Entomologist of the Dominion Experimental Farms, under whose care great progress had been made. In the spring of 1895, at the request of Dr Fletcher, a change was made, and the Botanic Garden and Arboretum was placed in charge of Mr. W. T. Macoun, who was then the Director's Assistant and Foreman of Forestry. In the spring of 1898 Mr. Macoun was appointed Horticulturist of the Central Experimental Farm and Curator of the Arboretum and Botanic Garden, and under his energetic management, aided by such advice and oversight as the Director has been able to give, this collection has been rapidly increased. The total number of species and varieties which have been, or are now, under test, all of which are referred to in the accompanying catalogue, is 3,071. Of these, 1,465 have been found hardy, 330 half hardy, 229 tender, 307 have been winter-killed, and 740 have not been planted long enough to admit of an opinion being given as to their hardiness. Where they have been tested one or more winters an opinion has been expressed on this point based on the experience had. Those which have passed through one or more winters uninjured, or with very slight injury to the tips only of the branches, have been pronounced hardy; where the new wood has been killed back from one-fourth to one half its growth, such are said to be half hardy, and those which have had their wood killed in winter to the snow line or to the ground have been noted as tender. Where the experience of one winter only has been had, the conclusions reached can only be regarded as tentative, and may require modification in future.

"In the catalogue the botanical names of the trees and shrubs are arranged alphabetically, and where a species or variety has a common name this also is given. The countries are named of which the trees and shrubs are native, also the year in which they were planted. In compiling this work the nomenclature and classification of the "Index Kewensis" and the "Kew Guide" have been adopted. The name of the species or variety is printed in bold faced type, followed by the author's name in small capitals. The term *Hort.* indicates a garden or gardener's variety. Synonyms of the genera and species are printed in italics. The common names given are those found in the leading botanical works of modern authors.

"While a large number of synonyms have been recorded, it is probable that there are still included in this catalogue some which are listed as species or varieties which are really synonyms. In recording the synonyms the names given are only those under

which the species or varieties have been received at the Experimental Farm and do not include all the known synonyms in each case. There has not yet been time to carefully identify every species and variety under test, and it is quite probable that there may be some among them wrongly named. Any botanists who are making a special study of any family or genus would confer a great favour on the authors if they would kindly note any apparent inaccuracies and report them, so that such errors may be rectified.

"The Arboretum at the Central Experimental Farm is now much visited and an increasing interest manifested in the progress of the work by botanists as well as by the general public. It is hoped that this catalogue will be useful to visitors as a hand-book and that its distribution among botanists and others specially interested in the growth of trees and shrubs in this country and abroad will convey much information as to the relative hardiness of species in this part of Canada and at the same time give correct ideas as to the character of the climate in this part of the Dominion."

PROGRESS OF THE WORK.

Little change has been made in the routine work in connection with the Arboretum and Botanic Garden during the past year. The grass is kept cut with a pony lawn mower; circles are kept without grass about each specimen and the surface soil within these kept loose with a hoe; notes are taken of the hardiness, growth and time of blooming of the trees and shrubs, and they are also kept well labelled. An addition of 200 specimens was made to the herbarium of the Arboretum and Botanic Garden, which was begun last year, making a total of 735 species and varieties.

An area of about two acres was seeded down to lawn grass this year, which will improve the appearance of that part of the Arboretum very much. Several acres which had hitherto been in sod were ploughed up this year and planted with Indian corn. After the crop was removed the land was again ploughed, and this will be in good condition for planting next year.

A new label has been adopted for the trees, shrubs and plants, which will prove much cheaper and more serviceable than the enamelled labels hitherto used, and is much more useful than the small zinc labels, which were rather difficult to read. They are 3 by 6 inches, made of galvanized iron, painted white, and are supported by heavy wire bent to form two legs and soldered to the back of the label. The common and the scientific name of the plant and the country of which it is a native, are painted in black letters on each label.

SOME GOOD LOW-GROWING FLOWERING SHRUBS.

It very frequently happens that one's grounds will not permit of having many large shrubs or trees, and a list of some of the best low-growing shrubs of compact habit should prove useful to those who are thus situated. The following shrubs cover a blooming period from early spring until autumn, and with the addition of some good perennials would make a small place very attractive. Although some of the kinds mentioned are not perfectly hardy as far as their wood is concerned, they nearly always produce a fine display of blossoms. Most of them are so low-growing that they are covered with snow nearly every winter and are thus well protected.

In my Report for 1897 a list was published of 100 of the best ornamental trees and shrubs, and the following list may be used as a supplement to that one by those having large grounds:

Berberis Aquifolium:—Oregon Grape: British Columbia. Height, 1 to 2 feet. In bloom third week of May. Flowers bright lemon-yellow. Leaves evergreen, smooth and shiny assuming attractive shades in autumn.

Calluna vulgaris.—Heather: Northern and Central Europe. Height 1 to 3 feet. Bloom July and August. This is too well known for description. In the protection

of an evergreen hedge where the snow covers it in the winter, this pretty little shrub is succeeding admirably.

Caragana grandiflora.—Large flowered Caragana: Caucasus. Height 4 feet. In bloom third week of May. Flowers large, bright yellow, pea-shaped. Very pretty when in full bloom. This somewhat resembles *C. frutescens*, but has larger flowers.

Cassandra calyculata.—Leather Leaf: Canada: United States, Height 1 to 3 feet. Blooms in June. Flowers pure white in terminal racemes. This pretty native shrub has succeeded well here, planted in moist soil.

Ceanothus americanus Marie Simon: Height 2 feet. Begins to bloom in third week of June. Flowers small, pale pink, borne in clusters. This is a profuse bloomer and is very pretty when at its best. It kills back when under the protection of an evergreen hedge, but always is a mass of bloom in summer.

Clethra alnifolia.—Sweet Pepper Bush: United States. Height 3 to 4 feet. In bloom first week of August. Flowers small, white, in long clusters. Almost hardy. This is not a very attractive shrub, but it flowers at a time when few trees or shrubs are in bloom and is, therefore, desirable.

Cytisus hirsutus.—Europe: Height 1 foot. In bloom first week of June. The flowers of this little shrub are bright yellow and pea-shaped. It is quite attractive when in full bloom. Although not perfectly hardy, a good show of bloom is always assured.

Cytisus purpureus.—European Alps: Height 6 to 12 inches. In bloom fourth week of May. Flowers pea-shaped, bright purple, and borne in the axils of the leaves along the branches. One of the prettiest dwarf shrubs tested here and almost hardy.

Daphne Cneorum.—Garland flower: Eastern Europe. Height 1 to 1½ feet. In bloom second week of May. Flowers bright pink, and sweet scented. A very pretty little evergreen, quite suitable for flower borders. It blooms a second time in autumn.

Daphne Mezereum—Common Mezereon: Europe. Height 3 to 4 feet. Blooms early in May. Flowers red, very sweet scented. This is a well known early flowering shrub. It is not quite hardy at Ottawa, but if given some protection it will bloom very well.

Deutzia gracilis.—Japan Snow-flower: Japan. Height 12 to 18 inches. In bloom first week of June. Flowers white, borne profusely in terminal clusters. It is unfortunate that this attractive little shrub is not hardier. Some seasons it is covered with bloom, while again after a very severe winter there is very little. The wood kills back usually to near the ground. It is much used by florists for forcing.

Diervilla Florida (rosea) nana foliis variegatis.—Dwarf Variegated Weigelia: Japan. Height 1 to 2 feet. In bloom first week of June. The flowers are of a delicate shade of pink and the leaves well variegated with green and yellow. Not altogether hardy, but if planted where the snow will cover it well or where it may be artificially protected, it will succeed well.

Genista tinctoria.—Dyer's Greenweed. Europe. Height 1 to 2 feet. Begins to bloom in fourth week of June. Flowers bright yellow, pea-shaped. A very pretty little shrub, continuing in bloom for some time. There is a double-flowered variety, which is also good.

Hedysarum multijugum.—South Mongolia. Height 2 to 5 feet. In bloom 4th. week of June. Flowers bright pink, pea-shaped, borne in racemes. This shrub is of

graceful habit and has attractive foliage, and is a striking object when in full bloom. It is not, however, perfectly hardy.

Hypericum kalmianum.—Kalm's St. John's Wort: Ontario. Height 2 to 4 feet. Begins to bloom second week of July. Flowers large, bright yellow. A very ornamental shrub, continuing in flower until late in the summer.

Jamesia americana.—Rocky Mountains. Height 1 to 2 feet. In bloom 2nd week of June. Flowers white in terminal heads. This is quite a pretty little shrub and when not in bloom the leaves, which have a silvery appearance, make it still ornamental

Lespedeza Sieboldii.—(*Desmodium penduliflorum*). Japan. Height 4 feet. Blooms in September. Although this shrub is killed to the ground every winter, there is usually a profusion of bright purplish-red, pea-shaped blossoms, which are borne on large spikes. This is a very fine autumn flowering shrub.

Lonicera Alberti.—Albert Regel's Honeysuckle. Turkestan. Height 2 to 4 feet. In bloom 4th week of May. Flowers bright pink. This beautiful little honeysuckle with its sweet-scented flowers, pendulous branches, and narrow leaves, is one of the most hardy and desirable shrubs.

Potentilla fruticosa.—Shrubby Cinque-foil, Canada. Height 2 to 4 feet. In bloom 2nd week of June. Flowers large, bright yellow. An attractive shrub when in bloom.

Pyrus (*Cydonia*) *Maulei.*—Maule's Japanese Quince. Japan. Height 1 to 3 feet. In bloom 2nd week of May. Flowers bright red. The flowers of this little shrub are very ornamental, and in the autumn, when the golden coloured, highly perfumed quinces are ripe, it makes a very interesting object. It is much hardier than *P. japonica*, of which some authorities call it a variety.

Rhododendron viscosum.—White Swamp Honeysuckle. United States. Height 2 to 4 feet. Blooms in latter part of June. Flowers white, tinged with pink, sweet scented, with a sticky substance on the tubes of the corollas. This is really an Azalea, though now included with the Rhododendrons. It is one of the few hardy species of this genus, and makes an attractive shrub when in full bloom.

Spiræa arguta.—Europe. Height 3 to 4 feet. In bloom 3rd week of May. Flowers pure white, produced very profusely in compact clusters. This is the earliest flowering spiræa grown here, and is one of the best hardy shrubs of recent introduction. It is a graceful little spiræa with pendulous branches, but its chief beauty lies in the abundance of its pure-white flowers.

Spiræa japonica alba (S. callosa alba).—White-flowered Japanese Spiræa. Japan. Height 1 foot. In bloom 2nd week of July. Flowers white in flat heads. This is a neat little shrub, and although not altogether hardy, blooms profusely every year.

Spiræa japonica Bumalda Anthony Waterer.—Europe. Height 1 foot. Begins to bloom 1st week of July and continues in flower for a long time. Flowers bright, purplish-red, borne in compact heads. This is one of the prettiest dwarf shrubs yet tested at Ottawa.

Zanthorrhiza apiifolia.—Parsley-leaved Yellow-root. United States. Height 1 to 2 feet. In bloom 1st week of May. Flowers dark, brownish-purple. It is pleasant to meet this little shrub in early spring with its peculiar, almost chocolate-coloured flowers, and it makes an interesting and pretty object at that time of the year.

AN ADDITIONAL LIST OF GOOD PERENNIALS.

In my report for 1897 a list was published of 100 of the best perennials tested here, and there is reason to believe that it has proven very useful to persons who were desirous of planting some good varieties of perennial plants. In 1898, short descriptions were published of twelve more good sorts, and this year the following species and varieties are added, all of which are well worth planting :—

Cimicifuga racemosa.—Snakeroot. North America. Height 5 to 6 feet. Blooms during 2nd week of July. Flowers small, pure white, on very long spikes. Owing to its great height and striking appearance when in bloom, this is very desirable for the rear of the border.

Epimedium macranthum.—Large-flowered Barren-Wort. Japan. Height 12 to 15 inches. Blooms during 2nd week of May. Flowers white, borne on racemes having from six to ten flowers. A very graceful and pretty plant, the leaves of which are also ornamental. There are several fine varieties of this species, the commonest, perhaps, being *violaceum* with large lilac purple flowers. All the barren-worts are beautiful and this is one of the best.

Euphorbia corollata.—Flowering Spurge. United States. Height 18 inches. Begins to bloom the 1st week of July and continues until autumn. Flowers small, pure white, with a greenish centre, borne profusely on broad umbels. This is a very graceful plant and the flowers should prove excellent for cutting.

Gypsophila Stevenii.—Steven's Chalk Plant. Caucasus. Height 1 to 2 feet. Begins to bloom in the latter part of June. Flowers small, white, numerous, on loose panicles. A little earlier than *G. paniculata* and with larger flowers.

Linum flavum.—Yellow-flowered Perennial Flax. South Europe. Height 12 inches. Begins to bloom during the 3rd week of June and continues all summer. Flowers, medium size, bright golden yellow, produced in abundance on branching heads. On account of the long season during which this plant is in bloom, the profusion of flowers and their attractive appearance, it is a very desirable perennial.

Lupinus polyphyllus.—Many-leaved Lupine. North-west America. Height 3 to 4 feet. Begins to bloom in 1st week of June. This is a fine, showy, stately plant with long spikes covered with deep blue pea-shaped flowers. There are several good varieties including a white one.

Lysimachia Nummularia.—Creeping Jenny; Moneywort. Europe. Creeping. Begins to bloom in the 3rd week of June and continues throughout the remainder of the summer. Flowers deep yellow. This is a pretty little plant, spreading rapidly and succeeding admirably in shady places.

Lythrum Salicaria.—Common Purple Loosestrife. Europe. Height 4 feet. Begins to bloom in July and remains in flower a long time. Flowers small, bright reddish-purple, borne on long branching spikes. As the flowers of a spike are not all open at the same time, the blooming period is much lengthened. It makes a good show in the rear of the border. There is a fine variety *superbum* with rose-coloured flowers.

Malva moschata alba.—White-flowered Musk Mallow. Europe. Height 2 feet. Begins to bloom in the 3rd week of June and continues for some time. Flowers large, pure white, borne in terminal and axillary clusters. A very showy perennial.

Petalostemon violaceus.—Prairie Clover. Prairies of Canada and United States. Height 1 foot. Begins to bloom during 1st week of July. Flowers small, bright

purplish-pink, borne on short heads. This is a very attractive little plant which continues to bloom for a long time and is quite desirable for the front of the border.

Salvia azurea grandiflora.—(S. Pitcheri) Large Blue-flowered Sage. Texas. Height 4 feet. Blooms in September. Flowers are of a lovely shade of blue, borne on long spikes. This is one of the finest autumn flowering perennials.

Yucca filamentosa.—Adam's Needle; Ghost Plant. East Virginia and Southward. In bloom 2nd week of July. Height 4 to 5 feet when in bloom. Plant 12 to 18 inches high. When not in bloom this is a rather stiff, stemless, evergreen plant with broad leaves on the margins of which are white thread-like filaments. When the flower spike appears the plant assumes a different appearance as the spike shoots up to a height of four feet or more, bearing a large number of drooping bell-shaped flowers which are white with a greenish tinge. It now becomes a very striking and beautiful object. It has proven perfectly hardy here without artificial protection.

REPORT OF THE CHEMIST.

(FRANK T. SHUTT, M.A., F.I.C., F.C.S., F.R.S.C.)

DR. WM. SAUNDERS,
Director, Dominion Experimental Farms,
Ottawa.

OTTAWA, Dec. 1, 1899.

SIR,—I have the honour to submit herewith the thirteenth annual report of the Chemical Division of the Experimental Farms.

The matters that receive attention therein may be briefly referred to as follows:—

Soils.—The analytical data obtained on a representative sample of soil from certain flooded lands in the Dauphin district, Manitoba, are given. Comparing them with those from soils of the Red River Valley, published by us some few years ago, certain differences are to be noted, the chief of which is the smaller percentage of clay. In all the essential elements, this Dauphin soil is considerably above the average, and quite free from sourness and alkali. With drainage and proper culture it would no doubt prove a very fertile soil.

An instructive example of an impoverished soil was also submitted to analysis. We place side by side the results of its analysis with those obtained from a sample of virgin soil, collected in the vicinity of the field that had been cultivated for many years without any adequate return of plant food. The study of these data will prove of more than ordinary interest to all those possessing partially exhausted soils.

Since it would be impossible, and perhaps undesirable, to insert in this report all the analytical figures resulting from the examination of soils sent in by farmers during the past year, a general account or summary of our conclusions has been written. This not only points out wherein soils of reduced productiveness are deficient, but indicates rational and economical means that can be adopted for their improvement. It should prove a valuable contribution to the literature of this very important question, which is one of wide interest throughout many districts of eastern Canada.

Naturally-occurring Fertilizers.—First in importance of these is the investigation into the merits as a fertilizer of marsh mud—a tidal deposit from the Bay of Fundy.

We determined not only the total amount of plant food present—which is by no means large—but also the proportion of such which is, comparatively speaking, ready for immediate crop use. It has been demonstrated that this proportion is much larger than in ordinary fertile soils (to which in many respects these deposits are similar) and thus we have an explanation for the experience of many farmers who have found an immediate but not a lasting benefit from an application of such substances. To obtain the best returns from the use of marsh mud, organic matter and nitrogen—either as barn-yard manure or as a green crop of clover turned under—must also be furnished. In many instances, the value of these tidal deposits as fertilizers would be increased by a slight dressing of lime.

The interest in swamp muck as a cheap source of humus and nitrogen is apparent from the number of samples sent in for analysis. Of these, nineteen have been submitted to chemical examination and are here reported on.

Other fertilizers that have received attention comprise wood ashes, ashes from a tannery, fish pomace and sludge from the purification of sewage.

Foods and Feeding Stuffs.—We are continuing our investigation as to the relative merits of Canadian grown grasses. It may be possible during the coming year to issue a bulletin on this subject, supplementing the one (No. 19) already published.

In the present report are to be found accounts of the following fodders: Broadleaf hay from New Brunswick, Hay extract, Cotton seed meal, and the seed of 'Lamb's Quarters.' The latter is, unfortunately, a prevalent weed in many parts of the North-west, and the seed, obtained in comparatively speaking large quantities from the thresher, has been employed, after grinding or boiling, as a feeding stuff.

Chemistry of Insecticides and Fungicides.—Several questions relating to materials used in spraying mixtures have been referred to us during the past year. Certain investigations in connection therewith were accordingly undertaken, and since the results will be of interest to fruit growers and orchardists, they are here recorded.

Nitragin.—The experiments with this preparation have been continued with results that must be considered as gratifying. Clover was the legume under trial. The crop of the second year's growth from inoculated seed was very much larger than that from the untreated seed. A striking illustration is given, taken from a photograph of the growing clover.

Soft Pork Investigation.—The work in connection with this inquiry has engaged the greater part of the time of the chemical staff for the past four months, and as a consequence a very large amount of data has been amassed. This investigation is still in progress.

The object of this research is to ascertain, if possible, the cause or causes that lead to the development of 'soft' or 'tender' pork. Softness is a quality that very much reduces the price of bacon in the English market, and since England is Canada's chief market in this commodity and the pork packing industry has for some years past assumed very large proportions, the importance of this inquiry is obvious.

The series of experiments now in course constitute a number of feeding trials, employing neaily 200 animals, under the control of the Agriculturist, and includes the analysis and physical examination of the fatty tissue of the pigs. It is confidently hoped that this investigation, when completed, will furnish results which will allow us to draw definite conclusions regarding the cause or causes of the condition referred to, and thus enable us to furnish information of value to pork producers.

The preliminary report herein gives our data that established the fact that this quality of softness is due to the presence of what might be termed an excess of olein. Olein is a normal constituent of pork fat, and it is only when its natural relation to the other fats present (palmitin and stearin) is disturbed in the direction indicated that it becomes a matter for investigation.

Well Waters.—Of the number received, we here report upon 49; others have been sent, but for one reason or another have been disqualified and not analysed. We have every reason to believe that this branch of our work is widely appreciated by farmers and dairymen, and that it has been fruitful of good results.

Correspondence and Meetings Attended.—From November 30, 1898, to December 1, 1899, 1,267 letters were received and 1,595 dispatched. It is scarcely necessary to add that this phase of our work is to be regarded as one of considerable importance and one, as our statistics show, that is constantly increasing in its demand upon our time.

Addresses have been delivered at a number of the more important agricultural conventions in Ontario, New Brunswick and Nova Scotia during the year.

Samples received for Analysis.—The following schedule denotes the number and nature of the samples received for examination since the writing of our last report, and further, gives the approximate number of these, which for want of the necessary time, still await our attention.

SAMPLES received from Farmers for Examination and Report, November 30, 1898, to December 1, 1899.

Samples.	British Columbia	North-west Territories.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Newfoundland.	United States.	Total.	Number still awaiting examination.
Soils	3	9	....	7	13	...	3	....	1	5	41	33
Mucks, muds and marls	1	1	2	7	2	6	6	10	....	....	35	7
Manures and fertilizers	....	....	....	4	6	3	4	....	....	....	17	9
Forage plants and fodders	....	....	1	13	3	3	1	....	....	....	21	15
Well waters	5	5	7	29	7	9	4	2	....	....	68	.....
Miscellaneous, including dairy products, fungicides and insecticides	10	25	14	33	18	4	16	8	....	....	128	85
	19	40	24	93	49	25	34	20	1	5	310	149

Tuberculin.—By direction of the Department of Agriculture, we have prepared and forwarded to veterinary surgeons during the twelve months ending November 30, 1899, 1,030,740 minims of tuberculin, equivalent to 17,179 doses—a quantity practically double that sent out the year previous. This has entailed a very large amount of work, consuming, of necessity, a considerable portion of the time of the division.

Reports on 'Spraying for Mustard,' and the 'Preservation of Eggs,' giving an account of certain experiments conducted by this division, have been handed to the botanist and poultry manager, respectively, for insertion in their reports.

Assistant Chemist.—Mr. A. T. Charron B.A., has continued to do most efficient work, rendering assistance of the greatest value in the prosecution of the many and varied branches of research undertaken by this division. It is very largely due to Mr. Charron's ability and industry that I am enabled to present many of the data contained in this report.

For several years past, as is well known, we have been unable to keep up with the work asked of us, making a further increase to the chemical staff a matter of serious consideration. To meet this demand, and more especially at the present time to enable us to cope successfully with the large amount of analytical work connected with the soft pork investigation, Mr. H. W. Charlton, B.A.Sc., Toronto, was appointed second assistant chemist. Mr. Charlton entered upon his duties on November 1, and, although a month only has passed, I can bear testimony to his faithful and careful work. His application is both assiduous and intelligent, and I feel sure he will prove an efficient and reliable man.

The duties in connection with the clerical work of the division, including stenography, have for a number of years past been very largely discharged by Mr. J. F. Watson, to whom my thanks are due for a continuance of good and careful work during the year just closed.

New Chemical Building.—Since August of the present year we have been occupying the new laboratories, erected to replace those injured by fire in 1896. The building contains two laboratories with offices for the chemist and assistants on the main floor, store rooms for chemicals and apparatus in the basement, and rooms for grinding and the preparation and storage of samples, photographic purposes, &c., on the second floor. The laboratories are commodious and well arranged, and I have no hesitation in saying that the work of the Chemical Division will be much facilitated by the increased accommodation that this building, specially designed for chemical investigations, will afford us.

I have the honour to be, sir,
Your obedient servant,
FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

CANADIAN SOILS.

Of the soils received since the issue of our last report, very few, for want of sufficient time, have been submitted to complete analysis. Such samples as were of virgin soil and represented large areas, have, as a rule, been reserved until opportunity will permit of full investigation. The greater number forwarded, however, have been from cultivated fields, and consequently to be considered as 'worn' or partially exhausted soils. These, for the most part, have received a partial examination, and been reported on to the senders. Of the former class (virgin soils) two notable instances have been analysed. We here present the results obtained, with conclusions drawn therefrom.

From Dauphin, Manitoba.—The correspondent forwarding this soil says: 'It is a sample from about 100 acres which is flooded with water for a considerable time each summer. It is covered with willow scrub and grass tall enough to cut for hay. The land can be drained at a reasonable expense, and I should like to know if it would make good wheat land when drained, as, if not, I would leave it for pasture.'

This soil is probably to be regarded as representative of those lands immediately surrounding the lakes and subject to more or less flooding during the early part of the season.

The soil as received is black loam, showing a few particles of marl. On drying, it cakes into somewhat hard masses.

ANALYSIS OF AIR-DRIED SOIL.

	Per cent.
Moisture	6·90
Clay and sand, &c. (including 54 per cent coarse sand)	64·09
Organic and volatile matter	10·65
Oxide of iron and alumina	12·00
Lime	1·76
Potash	·64
Phosphoric acid	·20
Nitrogen	·338

The following figures represent, approximately, the composition of the soil (air dried) as regards its chief constituents :—

Moisture	10·00
Organic (vegetable matter)	11·00
Clay and fine sand	22·00
Coarse sand	54·00
Carbonate of lime	3·00
	100·00

The soil showed no trace of acidity or sourness. Careful examination was made for 'alkali,' but with negative results. It is free from all soluble saline matter that would be injurious to crops.

It is evident from the above data that this soil is rich in all the essential elements of plant food; indeed, as regards nitrogen, phosphoric acid, potash and lime, it compares very favourably with soils of well recognised fertility. The proportions of clay, sand and organic matter are such, I believe, as would make it a fairly good wheat soil, though the percentage of clay is not as high as in the wheat soils of the Red River Valley. The, comparatively speaking, large amount of lime present would enhance its value for wheat growing. The mechanical condition of the soil is such as to indicate the necessity of thorough drainage. To bring the soil into condition it would, I think, be a wise plan to sow with oats or grasses for a year or two. This would improve the tilth and make the soil more suitable for wheat growing.

From Notre Dame, Kent Co., N. B.—Two soils sent by a correspondent, who writes concerning them as follows: 'I send you to-day samples of virgin and cultivated soils, marked No. 1 and No. 2, respectively. They are are taken according to your instructions and may be considered as representative, not only of the farm, but also of this district. The subsoil is heavy clay. Please advise as to crops and fertilizers.'

These are grayish-red loams in which sand predominates, of fair tilth, and showing some root fibres. There is but little difference in appearance between No. 1 and No. 2. The analytical data are as follows:—

ANALYSIS OF AIR-DRIED SOILS.

—	No. 1. Virgin soil.	No. 2. Cultivated soil.
Moisture	3·91	1·78
Organic and volatile matter	8·04	5·49
Clay and sand	73·17	81·51
Oxide of iron and Alumina	13·80	9·85
Lime	·89	·02
Potash	·51	·35
Phosphoric acid	·24	·12
Nitrogen	·158	·113

The most remarkable feature in the above results is that in all the essential constituents of plant growth—nitrogen, potash, phosphoric acid and lime—the cultivated soil shows percentages much smaller than those in the virgin soil. Since we must suppose, from the information furnished, that the cultivated soil was originally identical, or practically so, with the virgin soil, the analysis of which is here given, it is evident that great exhaustion of fertility has taken place, due, no doubt, to successive cropping without any adequate return of plant food. We have in these soils an important lesson most strikingly illustrated, and we commend the careful study of the above data to those interested in the question of soil impoverishment and improvement.

Again it is to be observed that the organic matter (humus) has also been much reduced by cultivation. This constituent, though not directly used as food by crops, is the natural storehouse and conservator of plant food, as well as the factor that regulates soil moisture and warmth, essential to crop growth. We have here, then, brought before us another way in which soils are seriously impaired by improper and injudicious farming.

The economic improvement of this soil would, necessarily, include, first, the application of organic manures. As in all probability there would not be sufficient barn-yard manure to bring up the land, recourse must be had to green-manuring, that is, the turning under of a growing crop, preferably clover. The crop from 8 to 10 pounds of clover seed (which may be sown with any of the cereals without diminishing the yield of grain) will, on ploughing under late in the autumn, enrich the soil to an extent equal in many respects to an application of 8 to 10 tons of ordinary barn-yard manure.

Secondly, an application of lime is needed, for the soil is deficient in this element. Twenty to forty bushels of lime per acre every fourth or fifth year would undoubtedly give a good return. If wood-ashes could be obtained at a reasonable price, they are to be preferred, since they furnish potash and phosphoric acid in addition to lime. As clover is a plant that more particularly responds to lime and potash, the benefit of such an application would first be to this crop, but as the turned under clover decays, these mineral constituents would be liberated for future use by the cereals, grass or roots, as the case might be.

THE ECONOMICAL IMPROVEMENT OF EXHAUSTED SOILS.

The examination of a, comparatively speaking, large number of cultivated or, more properly speaking, partially exhautsted, soils received from farmers during the past five

years has afforded the writer an excellent opportunity of ascertaining the chief deficiencies of such soils. Considerable experience has also been obtained indirectly regarding the economical renovation of these, for we have received the reports of many agriculturists who have carried out our suggestions respecting the treatment of such lands. It may not, therefore, be altogether uninteresting to our readers—especially to those in districts where it becomes a matter of necessity to clear up new land, in order to procure remunerative crops—if we place on record a brief statement regarding the conditions of these soils and the cheapest and most effective methods for reclaiming them and restoring them to their original virgin fertility.

These soils are of all classes, ranging from heavy plastic clays to light porous soils, and though these two types require somewhat different treatment, the effect of continued cropping without an adequate return of plant food has been found to be much the same in both. It will be in order, therefore, to first consider what the general results of an irrational method of farming have been and then to point out the remedial agencies that are to be used to make the soils once more productive.

Effect of Continuous Cropping Without the Application of Manure.—Every arable soil possesses its stores of plant food in what may be termed two forms—though there may not be any strong line of demarkation dividing them—inert or locked-up and available. The former is practically of no value to the growing crop (though by good culture its conversion into assimilable forms constantly takes place); the latter is in a condition to be immediately made use of by the plant and built up into its tissues, root, stem, leaf, and seed. Soils of low productiveness, but which originally gave paying crops, are those whose stores of available food have been drawn upon until but very small quantities remain. This we have proven by chemical analysis. One of the first mineral elements to show depletion is lime.

Again, on comparing the analyses of such soils, the fact is revealed that the vegetable matter or humus has, in a large measure, been dissipated or destroyed by cropping during a number of years, and that with the humus the nitrogen has also diminished. The importance of a due amount of humus is difficult to over estimate. Not that in itself it nourishes plants, but that it is the natural store-house which conserves plant food from waste, presenting it in compounds particularly acceptable for crop nutrition and use, and that it is the one great regulator of a soil's moisture and temperature.

We have already referred to the fact that the elements necessary for plant nutrition are present in soils in two conditions, as it were; for the most part, in insoluble inert forms, but also, to a small degree in combinations soluble in water or readily dissolved by the slightly acid exudations of rootlets, and hence at once useable by plants. Recent research in the chemistry of soils goes to show that the basic humates, i.e., the mineral elements found in combination or connection with the soil humus, furnish more particularly this available plant food. As the humus decreases we are to understand then that as a general rule not only the percentage of nitrogen decreases, but also that the percentages of available phosphoric acid, potash and lime decrease.

Since the difference between a small yield and a large one is frequently a matter of water supply only, it is apparent that a consideration of that agency which tends to its preservation in proportions best suited for plant growth is worthy of our most serious attention. Neither clays nor sands, unless duly provided with vegetable matter, can withstand seasons of drought; the first has shed the rain as surface water; the latter, has allowed it to drain through and out of the reach of the crop's roots. Semi-decayed vegetable matter, by rendering heavy loams more porous, renders them pervious to the falling rain and melting snow, and then by its absorptive qualities serves to retain this water for crop use. In light soils, this latter property is brought prominently into play, rendering them able to support and nourish a crop otherwise quite impossible in dry seasons.

In addition to its useful function in retaining moisture, humus has a most beneficial effect upon a soil's texture, rendering clay loams more friable and mellow and allowing air (which is as necessary for the life of roots as water or food) to freely per-

meate their mass. It also serves to compact and otherwise improve the physical or mechanical condition of light and sandy soils. Without extensive root development there cannot be an abundant production of stem, foliage and seed; this is only possible in a soil with fair mechanical condition, one in which the roots can freely forage for their food.

Before leaving this brief review of the part that humus plays as a soil constituent, we must refer to the useful purpose it serves in furnishing food for bacteria or germs, microscopic plants, which live in myriads in all fertile, aerated, moist and warm soils, and which among other functions perform a most valuable work in converting nitrogenous organic compounds into nitrates, the only form, as far as we know, in which farm crops, other than legumes, can obtain the nitrogen necessary for their growth. We must also suppose that these germs serve in some degree towards the predigestion of the mineral constituents of humus, thus preparing them for assimilation by plants of a higher order. This seems evident from the fact already mentioned, that the percentages of mineral humates largely indicate a soil's fertility.

To sum up, we shall narrate briefly the features that characterize partially exhausted soils and those of low productive power, and give some of the more important economic means whereby such soils may be improved.

1. *Poor Texture.*—Better and more careful and thorough tillage is required to render them friable, porous and mellow. If a heavy clay loam, drainage will be found necessary, indeed essential. This is the true and only remedy for heavy, wet and sour lands and those underlaid by a hard and impervious subsoil. Drainage deepens the surface soil by lowering the water level, and thus allows the roots an opportunity to seek their nourishment at greater depths than is possible in a water-soaked soil. It allows a soil to become aerated, a condition essential to the welfare of living roots. Drained soils are moister in dry seasons and drier in wet weather than those undrained. Occasional subsoiling, which is simply a loosening of the layer immediately beneath the surface soil, will be found of great value to soils underlaid by hardpan.

Thoroughness in working a soil is also of great value in promoting tilth or good texture. A hard, cloddy soil is an uncongenial medium for the growth of farm crops. Clay soils should not be worked while wet, if possible, for such tends to puddling and plasticity, destroying their porosity and drainage power.

2. *Deficiency of Humus and Nitrogen.*—We may take it for granted that a lack or abundance of the former means a lack or abundance of the latter. Constant working and cropping must diminish the stores of these valuable constituents, making it absolutely necessary that all lands (save, perhaps, those in pasture) should from time to time receive an application of a nitrogenous organic fertilizer, if fertility is to be maintained.

Naturally, the manure from farm animals takes precedence as a source of organic matter and nitrogen. Unfortunately, on many farms, there is not sufficient produced to keep all the land in good heart. A very grave mistake has been made by many farmers in this respect, which must be rectified if the soil is to be brought again to its original productiveness. Dairying and stock raising if more generally practised would soon have their effect upon the soil. It has been the continuous growing of grain crops and potatoes and the selling of these products to the exclusion of other branches of farming that has caused the impoverishment of much of our arable land in the older provinces of the Dominion.

Possibly a worse feature than the deficiency of manure is the waste of it that ensues on so many farms. First, there is the loss by drainage of much of the liquid portion in the stable, cow house, and pig pen, and then follows leaching and excessive fermentation in the barn-yard. We do not hesitate to say that losses from these causes frequently amount to from one-third to one-half, or even more, of the original value of the manure. The solid and liquid portions together, as voided, would contain approximately three-fourths of the plant food present in the feeds used, the liquid part containing practically all the immediately available constituents, and hence by far, the more valuable. It, therefore, behooves every farmer to see that the floors of the buildings in which animals are kept are sound and water-tight and that sufficient bedding is used to soak up and

retain the liquids. In this connection, we would make two suggestions. The first is to cut the straw used for litter, and thus increase its absorbent power; the second is, to use in addition to the straw bedding in the cow house and piggery, a certain quantity of air-dried weathered muck, when such material can be readily obtained, as is frequently the case. Muck not only contains a considerable amount of plant food, especially nitrogen, which is set free by the subsequent fermentation in the manure pile, but by its great absorbent powers retains and saves from loss, as we have pointed out, the most valuable part of the manure. Air-dried muck frequently contains 75 per cent or more of vegetable matter. This by composting is converted into humus-like compounds and hence it is obvious that the employment of this naturally-occurring fertilizer in such a way as we have outlined is particularly valuable for such lands as we are now discussing.

A further important source of humus and nitrogen is green manuring; that is, the turning under of a green crop. For this purpose, we advocate especially the legumes, since they alone have the power (through the agency of certain germs that reside in the nodules on the roots) to assimilate free nitrogen from the air, thus enriching the soil with the most costly of all forms of plant food from a source otherwise unavailable. A good crop of Red or Mammoth clover turned under will furnish as much nitrogen to a soil per acre as a dressing of 8 to 10 tons of ordinary barn-yard manure. The benefits of this method of manuring (which indeed are hard to over-estimate) are stated at length in the report of this Division for 1895. On soils too poor to grow clover, a beginning must be made with buckwheat or rye. These crops ploughed under for a year or two and the soil further enriched with a dressing of wood-ashes (or a fertilizer supplying potash, phosphoric acid and lime) will be all that is necessary to furnish a condition suitable for the growth of clover.

3. *Sourness and Deficiency of Lime*—Since the former is often the result of the latter, it naturally follows that these conditions are frequently found in the same soil. It is also obvious that improving the soil as regards its lime content at the same time corrects sourness. Acidity or sourness is inimical to crop growth; deficiency in lime means not only the lack of an element necessary for plant nutrition, but also an unfavourable condition for nitrification of the humus.

We have in past reports explained at length the many valuable functions—chemical and physical—which lime performs in the soil. It will, therefore, be only necessary to here indicate how the farmer may obtain an indication of the amount of lime in a soil, and enumerate the sources which he can draw upon to furnish this element.

To ascertain if a soil is sour or deficient in lime, put a few ounces of it in a tumbler and add approximately an equal quantity of water; stir well and allow to settle. Place a small piece of blue litmus paper (obtained very cheaply at any druggist) in the supernatant water for a few moments. If, on withdrawing it and allowing it to dry, it is noticed that the blue color has been changed to red, the soil is sour. (The change of colour will be the best noticed if only one-half of the slip of litmus paper has been immersed.) Now add a tablespoonful of strong vinegar to the soil and water in the tumbler. The absence of effervescence or very slight effervescence only will indicate a deficiency of available lime.

To supply lime and at the same time to correct sourness, 20 to 40 bushels of lime per acre may be used. After being allowed to air-slack in small earth-covered heaps upon the field, it should be thoroughly incorporated with the surface soil by shallow ploughing or harrowing, or simply the latter, if the lime has been applied to the ploughed field. Lime has a tendency to work down, so should never be deeply ploughed under.

Marl is a very valuable source of lime for agricultural purposes. It may be frequently found in beds underlying deposits of swamp muck. It is much more 'mild' and slower in its action than lime, and can be applied in quantities much in excess of those given for lime, without injury to the soil.

Wood-ashes, in addition to 5 to 6 per cent of potash and 1 to 3 per cent of phosphoric acid, furnish lime to the extent of 30 to 35 per cent. It is obvious, therefore, that in them we have a very complete fertilizer for supplying mineral plant food. It is

a mistaken policy on the part of the farmer, we have always held, to sell wood-ashes, which really represent fertility from his soil, for such a paltry recompense as he usually obtains from ash collectors. By reason of the potash and lime they contain, wood-ashes are of particular value for encouraging the growth of clover—and a rotted clover sod is an excellent preparation for a crop of corn, roots or cereals. An average dressing of wood-ashes might be placed at 50 bushels per acre, though, if the supply be limited, half that quantity would undoubtedly show good results on such soils as we are now considering, namely, those that are sour or deficient in lime.

FERTILIZERS AND AMENDMENTS.

MARSH MUD.

A sample of this material from the Habitant River, Cornwallis Valley, N.S., has recently been examined at the request of the Hon. F. A. Borden. The data obtained are tabulated as follows :—

Analysis of Marsh Mud (Air-dried.)

Moisture	3·45
Organic and volatile matter	4·14
Clay and sand	75·59
Oxide of iron and alumina	11·71
Lime	1·40
Magnesia	·48
Common salt (sodium chloride)	·86
Total phosphoric acid	·15
Available phosphoric acid	·05
Total potash	·25
Available potash	·06
Nitrogen	·128

In all essential features, this marsh mud or deposit resembles closely many samples from the Bay of Fundy, previously examined in our laboratories. Though doubtless a material that might improve many soils, it cannot be regarded in the same light as a commercial fertilizer, for its percentages of essential elements of fertility—nitrogen, potash and phosphoric acid—are not large; indeed a careful comparison reveals that, as regards composition, this deposit is not richer than many soils of average productiveness.

Important features in the above analysis are the determinations of *available* potash and phosphoric acid. We have for a long time been led to think that the greater part of the benefit accruing from the use of these deposits might be due to a comparatively high availability of the mineral plant food, since, as we have already seen, the total amount of such is by no means large. Accordingly, this sample was examined by the Dyer method (see report of this Division for 1897, page 158), and as a result the percentages of 'available' phosphoric acid and potash above recorded were obtained. Though these percentages, from the ordinary point of view, would be considered small, it is to be remarked that, compared with similar data from good, fertile soils, they are remarkably large. Thus, compared with a rich soil from British Columbia, we have the following :—

—	Soil from British Columbia.	Marsh Mud, Cornwallis, N.S.
Potash	·23	·25
Available potash	·005	·06
Percentage of total potash available for plant use	2·2	24.00
Total phosphoric acid	·19	·15
Available phosphoric acid	·010	·05
Percentage of total phosphoric acid available for plant use	5·66	33·33

There results verify our conjecture and show that a very large proportion of the potash and phosphoric acid is present in a condition at once useable by crops. If an application equivalent to 100 tons of the air-dried material per acre were made, there would be furnished to that area, approximately, 120 pounds potash and 100 pounds phosphoric acid immediately available for plant use—no inconsiderable amounts.

Further, in all probability, much of the benefit that is derived from this material is due to its mechanical effect upon the soil. As these deposits vary in their proportions of sand and clay, their results will depend much upon the nature of the soils to which they are applied. It thus may happen that the frequent application of a 'mud' rich in clay may do positive harm to a heavy soil, destroying its tilth; while the same material on a light soil would give excellent results, and vice versa. Close observation on the part of the farmer is needed in this matter.

The common salt present is of no direct value as plant food, but serves, undoubtedly, in the liberation of inert or locked-up plant food, especially lime and potash, in the soil. It is for this reason that the continued use of salt muds exhausts, rather than enriches, the soil in these elements, and the necessity of supplementary manures is made obvious.

It is also probable that soils frequently 'mudded' become comparatively poor in humus, and consequently in nitrogen, a condition that always reduces productiveness. For this reason, a certain amount of an organic manure, such as would be supplied by barn-yard manure, should be applied in conjunction with the mud.

A consideration of these facts, therefore, while leading us to acknowledge and recognize the value of marsh mud, at the same time urges its judicious and intelligent use, and in conjunction with other forms of plant food. Too many have erred in its indiscriminate application, under the impression that it was a complete fertilizer, and could be used in any quantity without endangering the condition of the soil.

Through the kindness of Professor Wm. F. Ganong, Smith's College, Northampton, Mass., who is at present engaged in an exhaustive study of these deposits with a view of determining the relation between their composition and flora, I am enabled to present the following data obtained from a mechanical examination of the soil. My thanks are also due to Dr. G. E. Stone, Agricultural College, Amherst, Mass., under whose direction the analysis was made.

Mechanical analysis of the sample of Cornwallis Soil.

Water						3·400
1. Organic matter						3·260
2. Gravels from	2·	to	1·	mm.	diam	·125
3. Coarse sand, from	1·	"	·5	"	"	·260
4. Medium sand "	·5	"	·25	"	"	1·485
5. Fine " "	·25	"	·1	"	"	4·060
6. Very fine " "	.1	"	·05	"	"	46·010
7. Silt "	·05	"	·01	"	"	26·800
8. Fine silt "	·01	"	.005	"	"	8·710
9. Clay "	·005	"	·0001	"	"	5·825
						99·875

SWAMP MUCK.

In the subjoined table we give the analytical data obtained from the examination of certain samples of swamp muck received from farmers during the past year.

As in former reports (1894 and 1896) we have written upon this subject at length, stating the origin, composition and uses of this and allied materials, it will only be necessary here to remind our readers that while crude muck applied directly to the land is of but little manurial value, its plant food can be made available by composting, as with barn-yard manure; and, further, that as an absorbent in and about the farm buildings, indeed, wherever there is liquid manure likely to go to waste, it can be employed to

advantage. As a manure, its chief value lies in the humus and nitrogen it contains. The amounts of these constitutents, considered in connection with the degree of decomposition of the muck, therefore, determine the relative value of any particular sample.

ANALYSIS of Swamp Muck (air-dried), 1899.

No.	Locality.	Sender.	Nitrogen.		Organic and volatile matter.	Sand and clay.	Mineral matters soluble in acid.	Water.
			Per cent.	Pounds in one ton of material, air-dried.				
1	Carleton, Lot 28, P.E.I	W. S. Muttart....	2·63	52·6	79·23	1·38	6·32	13·07
2	Charnwood "	W. A. Leslie.....	1·295	25·9	84·02	3·44	2·75	9·72
3	Bonshaw "	J. B. Crosby	1·57	31·4	54·05	20·32	10·60	15·03
4	Bedeque "	Chas. D. Wright..	1·78	35·6	56·09	16·68	7 26	19·97
5	Newcombe, Lunenburg Co., N.S., No. 1.	Henry West.....	1·16	23·2	84·65	·57	1·06	13·72
6	Newcombe, Lunenburg Co., N.S., No. 2.	"	1·10	22·0	86·48	·54	1·16	11·82
7	Lower Cariboo River, N.S...	D. B. Gray.....	·694	13·8	30·96	44·75	16·64	7·65
8	Bathurst Village, N.B.....	Angus Kenny, No.1	·806	16·2	23·33	54·20	14·75	7·72
9	" "	" No.2	1·15	23·0	34·90	34·22	10·31	20·57
10	" "	B. J. Power	1·55	31·0	72·95	3·98	9·56	13·50
11	St. Stephens "	E. H. Barter	1·534	30·6	77·01	7·14	5·31	10·54
12	Clarendon Station "	H. W. Roberts....	1·59	31·8	69·85	7·79	11·37	10 99
13	Chatham "	Geo. E. Fisher. ..	2·33	46·6	69·70	2·21	18·33	9·76
14	Aylmer, Que., No. 1.....	J. A. Fulford.....	2·136	42·7	60·00	12·94	13·00	14·06
15	" No. 2.....	"	1·81	36 2	48·25	10·52	30·37	10·86
16	Chateauguay Basin, Q., No. 1	R. Jack & Son....	1·75	35·0	57·30	16·30	11·64	14·76
17	" " No. 2	"	1·79	35·8	74·59	·81	10·87	13·78
18	St. Raymond, Que.....	J. P. Cantin.....	·444	8·8	13·24	72·53	10·25	3·98
19	Hermanville "	J. D. McIsaac....	1·059	21·2	34·65	28·88	16·73	19·74

Brief notes on the above may be given as follows :—

No. 1. 'From a swamp from 5 to 6 acres in extent, ranging 1 to 6 feet in depth, thinly covered with stunted growth of juniper, spruce, fir, ash and swamp maple, with an undergrowth of alder bushes, ferns and tall grasses.'

An excellent sample, being composed almost entirely of semi-decomposed vegetable matter, and containing above the average per cent of nitrogen, would prove valuable for composting, and also as an absorbent.

No. 2. "Occurs in a dip or basin about half an acre in extent, depth of deposit from 6 inches at edge to 3¼ feet in middle. Surface covered with undergrowth."

Not very well decomposed, but practically free from clay, sand, &c. As regards nitrogen, it is of average quality. Would make a useful absorbent.

No. 3. While not the equal in quality of the best samples, it is of sufficient value to use. It should, however, be thoroughly composted before being applied to the soil.

No. 4. Of fair average quality, and should prove a useful source of humus and nitrogen, after being thoroughly composted.

Nos. 5 and 6. 'From a large bog within a mile of several farms. Deposit is many feet deep.' A very good muck, though not above the average in nitrogen. It is practically free from inert matter. It requires weathering and fermentation, and then would prove a useful manure. Could be used in air-dried condition as an absorbent in and about the farm buildings. Samples are practically identical.

No. 7. 'From below a deposit of muck.' Not equal in quality to ordinary swamp muck, and it would be better to use the overlying deposit, since the latter would be richer in vegetable matter and nitrogen.

No. 8. 'From an old beaver pond; deposit 6 to 9 feet deep. Taken 8 feet below surface.'

No. 9. From the same deposit, taken 2 feet below surface. No. 9 is the better sample, being richer in nitrogen and organic matter, and containing less clay.

No. 10. A fair muck of average quality. Requires thorough fermentation by composting, according to one or other of the methods given in previous reports.

No. 11. Woody in character and but little decayed. Practically of no manurial value in its present condition, but could be used probably to advantage after air-drying as an absorbent of liquid manure.

No. 12. Slightly above the average.

No. 13. 'From a deposit overgrown with cedars, birch and spruce, varying in depth from 3 to 4 feet.' An excellent muck, rich in organic matter and nitrogen and practically free from sand and clay. It, however, requires weathering and composting before it will furnish its plant food in available forms. Air-dried, it should act as a good absorbent.

Nos. 14 and 15. 'From upper and lower layers, respectively, of desposit.' Both are fair samples, but the upper (No. 14.) is somewhat the better of the two.

Nos. 16 and 17. 'Apparently from an old river or lake bed, the deposit lying between hills, and varying from 150 feet to 1,000 feet in width. About 9 feet deep and underlaid with shell marl." As a soil, No. 16 would probably give better results. It should be well drained and treated with lime, or better still, with wood-ashes at the rate of 50 to 75 bushels per acre. This would correct sourness and supply the necessary mineral constituents, and make it a good soil for market garden stuff. A dressing of good barn-yard manure at the outset would be valuable in starting decomposition and furnishing immediately available plant food.

As an absorbent and material for composting, No. 17 is to be preferred.

No. 18. This is not, properly speaking, a swamp muck, but is rather of the nature of a soil rich in organic (vegetable) matter. Of very little, if any, value as an absorbent.

No. 19. This is not equal to the best samples, but worth composting, if the soil of the farm stands in need of humus.

TANNERY ASHES.

Numerous inquiries have from time to time been received as to the value of ashes from tanneries as a fertilizer. As we had no definite information on this matter, we determined to submit to for analysis two samples of such ashes forwarded by a correspondent in Orillia—one, collected directly from the furance; the other, taken from a heap of the exposed ashes. The fuel producing these ashes is stated as "spent tan bark and a few pine slabs.' Our results are as follows:—

Analysis of Tannery Ashes.

——	From Furnace.	From Heap.
Moisture	0·24	40·32
Loss on ignition (charcoal, &c.)	5·30	4·30
Insoluble mineral matter	6·95	3·76
Phosphoric acid	2·13	1·00
Potash	3·05	·98

The presence of a large percentage of water in the exposed ashes and the evident fact that they had suffered considerable loss through leaching, makes them much less valuable, weight for weight, than the ashes taken at once from the furnace. The latter practically contain one-half the amount of potash found in good unleached wood-ashes, and consequently may be considered as worth approximately half the price of this well known potassic fertilizer. Like wood-ashes, these tannery ashes possess a certain well marked agricultural value for the lime and phosphoric acid they contain.

WOOD-ASHES.

The analysis of a sample of wood-ashes forwarded by Messrs. Reford & Co., Montreal, showed their composition to be as follows :—

	Per cent.
Moisture	2·26
Loss on ignition (charcoal, &c.)	5·62
Insoluble matter (clay, sand, &c	17·36
Phosphoric acid	2·21
Potash	6·22

Commercial wood-ashes necessarily vary somewhat in composition; but good samples should range between 5% and 6% potash, and 1·5 per cent to 2·5 per cent phosphoric acid. It is evident, therefore, that this sample may be regarded as quite equal to the standard of good commercial grades.

FISH POMACE.

The value of fish waste as a supplier of nitrogen and phosphoric acid has been set forth in previous reports of this division (see report for 1896). In the early part of the present year a further sample was analysed in our laboratories. This was forwarded by Mr. H. D'Almaine, farm superintendent for Sir Wm. Van Horne at St. Andrews, N.B., and had been prepared from herring, quantities of which at certain times in the year, I understand, can only be used in the preparation of fertilizer.

Our analysis furnished the following results ·

	Per Cent.
Moisture	40·23
Organic and volatile matter	46·68
Mineral matter	13·09
	100·00

	Per Cent.	Lbs. per ton.
Phosphoric acid	2·39	47·8
Nitrogen	5·99	119·8

Assigning to nitrogen and phosphoric acid the values of 10 cents per lb. and 5 cents per lb., respectively, a moderate valuation, this fertilizer would be worth $14.37 per ton.

Farmers along the coast of the maritime provinces in many places could obtain fish offal for the hauling, and it seems a great pity they do not make more use of what might easily be converted into a most valuable manure. To furnish information regarding the preparation of such a fertilizer, the following account has been written. There is much land, especially in Cape Breton, that might with advantage receive a dressing of a manure supplying organic matter in addition to the elements of fertility, and it is hoped that the subjoined information will lead many to secure this valuable material which, for the most part, is now wasted and, indeed, frequently, as in the neighbourhood of fishing stations, &c., proves a nuisance and a menace to health.

Preparation of fish waste upon the farm.—Some method of composting must be followed, since the artificial drying of the fish or offal and extraction of fat resorted to by the fertilizer manufacturers are too costly for the farmer. If swamp muck exists in the neighbourhood, no better composting substance could be used. After being dug and piled, it should be allowed to thoroughly air-dry and weather. If, however, muck is not accessible, good loam will answer. The compost heap should be made of alternate layers (3 to 6 inches thick) of the fish waste and muck, a layer of the latter being uppermost. Sprinkle each layer of fish offal with quick lime or wood-ashes. A convenient height for the compost heap is from 4 to 5 feet and it is advisable to protect it from rain

with a rough roof of boards, and thus prevent leaching. The heap should be turned over once or twice to check excessive fermentation and to make the mass uniform. If during the fermentation the composting mass becomes dry, it should be moistened. Composts should be kept damp, but not saturated with water. The length of time to bring the whole mass into fine condition will depend much upon the weather; if the compost is made in summer, probably three to four months will suffice.

In order that this fish compost may supply all three of the chief elements of plant food, we counsel the addition of wood-ashes (to furnish potash) at the rate of 200 lbs. per 500 lbs. of fish, before composting. If wood-ashes are not obtainable, kainit (a German potash salt containing 12 to 13 per cent potash) at the rate of 100 lbs. per 500 lbs. fish waste, can be used.

Method used in France.—It has for many years been a common practice in France to preserve fish waste by the use of quick-lime. The fish offal and quick-lime are placed in alternate layers in a hogshead or other suitable receptacle. The moisture of the fish slakes the lime and a so-called albuminate of lime is formed. After a few weeks, the mass is thoroughly turned over and mixed, and spread in thin layers to dry. The resulting material can be kept without offence for a long time if preserved in a dry place. If dry, unleached wood-ashes were used (replacing half the amount of quick-lime) or kainit added in the proportion already indicated, the resulting manure would be rich in potash as well as in nitrogen and phosphoric acid.

Since fish compost readily yields its elements to growing crops, it may be applied in the spring. It should be harrowed in, or at most but slightly turned under. Its best results are obtained on medium soils; that is, those that are characterized as neither too light nor too heavy.

THE FERTILIZING VALUE OF SLUDGE AND POUDRETTE.

In the various systems of sewage purification by precipitation adopted by cities, a product is obtained from the settling vats or reservoirs which is generally known as sludge. The composition of this material will, naturally, vary with the concentration of the sewage, the nature and amouunt of the precipitant (lime, alum, &c.,) and the degree to which it is subsequently dried; hence, the fertilizing value is a matter of close inquiry. For want of correct information, we fear this value is frequently exaggerated, and we accordingly insert the following data obtained in our laboratories this year from a sample forwarded from Hamilton, Ontario. The analysis was made at the request of several large fruit growers in the Niagara district, who had been purchasing or who were considering the purchase of this fertilizer for their vineyards and orchards.

Sludge from Hamilton Sewage Disposal Co.

	Per Cent.
Moisture	31·75
Organic and volatile matter	39·05
Mineral matter	29·20
	100·00
Clay, sand, &c., insoluble in acid	9·66
Alumina (plus small amount of oxide of iron)	4·74
Lime (CaO)	9·23
Magnesia (MgO)	10.40
Phosphoric acid (P_2O_5)	·69
Potash (K_2O)	·19
Nitrogen	·84

Comparing these figures with those recorded in England and Germany for similar materials, the quality of this sludge appears to be somewhat above the average; the

percentages of the essential elements of fertility, it will be seen, however, do not approximate those found in commercial fertilizers, nor can we suppose the plant food in sludge to be as available as in the latter. It is quite evident that these facts, apart from other considerations, would not permit its transportation to any great distance with profit; but, providing it does not affect injuriously the condition of the soil, that it could be got cheaply, and that it was supplemented with other manures (more especially those containing potash), it could be used locally to advantage.

A feature worthy of notice to those whose soils are deficient in lime, is the comparatively large amount of this element present in this sludge, the greater part of which exists in the fresh material as slaked lime, but which becomes converted into the form of carbonate of lime by long exposure.

Unless sludge is thoroughly weathered, as by exposure throughout the winter, it is refractory and not easily incorporated with the soil. This is a serious objection to its general use. Again, heavy clay loams might be injured by a continued use of such a plastic, mud-like material, and we could, therefore, only advise its trial upon sands or gravels, especially those in need of lime and organic matter.

The term poudrette is applied to the dry, powdered sludge, a material usually of greater manurial value than sewage, by reason of its containing somewhat larger amounts of plant food, and being in a better mechanical condition. A sample received from Toronto a few years ago, the product of a process under trial there, furnished the following data:—

Poudrette from Toronto.

	Per cent.
Moisture	3·94
Organic and volatile matter	40·91
Mineral matter	55·15
	100·00
Clay, sand, &c., insoluble in acid	34·05
Oxide of iron and alumina	13·65
Lime (CaO)	2·07
Magnesia (MgO)	·33
Phosphoric acid (P_2O_5)	1·24
Potash (K_2O)	21
Nitrogen	2·04

As analysed, this poudrette is considerably richer in plant food than the sludge, due chiefly to the smaller quantity of water it contains.

Sludge and poudrette are said to be rich in germs of the nitric ferment, which are necessary for the conversion of soil nitrogen into nitrates, the form in which farm crops obtain their supply of this element. It is probable that the beneficial result from the use of these materials is in part due to the presence of these nitrifying germs.

FODDERS AND FEEDING STUFFS.

BROAD LEAF HAY *(Spartina Cynosuroides.)*

In Bulletin No. 19, issued in 1893, we published data showing the composition of broad-leaf hay from grass obtained at Indian Head, N.W.T., Brandon, Man., and Sackville, N.B. The latter sample was so decidedly inferior to the others that it was thought well to repeat the analysis on another sample from the maritime provinces, and thus learn if that sent in 1893 had been cut too late for best results. We accordingly examined, during the early part of the year, a sample kindly furnished by Mr. Jas. Frier, of Shediac, N.B. The results are given in the following table, which also con-

tains, for the purpose of comparison, analyses made of timothy hay and brome grass hay of the 1897 crop on the Central Experimental Farm, Ottawa:

Constituents.	Broad-leaf Hay.	Timothy Hay.	Brome Grass Hay.
Moisture	7·09	9·72	10·76
Protein or albuminoids	4·95	5·94	6·61
Fat	3·73	5·38	4·51
Carbo-hydrates	47·87	43·25	41·01
Fibre	30·82	31·30	31·86
Ash	5·73	4·41	5·25

As regards the most important constituents—the albuminoids (sometimes called flesh formers),—broad-leaf hay is seen to fall considerably behind timothy and brome grass hay. From experiments made in the United States it appears that the digestibility of broad-leaf hay is not quite equal to that of either timothy or brome grass (cut under the same conditions) and, therefore, I think we are quite justified in placing its feeding value lower—probably 15 to 20 per cent—than that of timothy hay and brome grass hay. From our experience in the matter of grasses and their nutritive qualities, we are of the opinion that a much more nutritious hay could be obtained by cutting the broad-leaf earlier in the season than is now customary.

HAY DECOCTION OR TEA.

A correspondent in Sackville, N.B., wrote us in March last as follows: 'We have more hay here than we can sell or get stock to feed to in the ordinary way. It occurred to me that by steeping it we might get the most of the nutriment, leaving the woody portion for compost, the decoction being good for hogs and other stock. The sample I send herewith has been prepared by steeping 16 pounds of hay in about 70 pounds of hot water, the weight of the resulting decoction was 67 pounds, the difference being lost by evaporation. I should like to know its feeding value and if it could be used with economy for stock.'

The analysis of the hay decoction furnished the following data:—

	Per cent.	Per Gallon.
Total solids or extractive matter	2·06	3½ ozs.
Nitrogenous matter or portein	·48	¾ "
Mineral matter or ash	·33	½ "

The total weight of the decoction, 67 pounds (obtained from 16 pounds of hay) would therefore, contain:—

	Pounds.	Ounces.
Total solids or extractive matter	1	6
Nitrogenous matter		5
Mineral matter or ash		3½

The use of hay tea, supplemented by a little linseed and shorts, has enabled many farmers to raise calves successfully without whole milk, but the data here presented make it extremely doubtful if such a decoction as the above contains sufficient nourishment to make its preparation profitable for adult stock or swine. It could, of course, be concentrated by simply boiling down, but whether this could be done with profit would depend largely on the price of fuel and labour. We are inclined to think that as far as dairy and fattening cattle are concerned it would pay better to feed the hay, provided it is of good quality and has been cut early i.e., before the ripening process had set in.

COTTON SEED MEAL.

This concentrated feed stuff is imported from the United States, where it occurs as a by-product in the cotton industry of the south. The hulls or envelopes of the cotton seed being removed, the kernels (which are rich in oil of considerable commercial value) are crushed and subjected to heat and pressure. By this means the greater part of the oil is separated, a residue being left, which is either sold as it comes from the mill—cotton-oil cake— or ground and shipped as cotton seed meal.

This material, recognized as a most valuable feeding stuff, by reason of its high percentage of protein (albuminoids) and its notable amount of oil or fat, is now being extensively used in certain dairying and stock raising districts of the Dominion to furnish a part of the ration. On account of its exceedingly concentrated character, and possibly the presence of some active principle not as yet isolated or determined, cotton seed meal must be used judiciously, that is, in reasonable amounts and with other feeds. Professor Henry, of the Wisconsin experiment station, in his work 'Feeds and Feeding', says that it has been fed with safety and profit to dairy cows to the extent of 5 to 6 pounds daily per head; however, such quantities are not to be generally advised, 2 pounds being probably a safe limit. For fattening steers the amount, it is stated, can be gradually increased to 6 pounds, or even more, per head, daily, though it is generally admitted that good health and thrift demand a mixture of grains or concentrated feeds—which necessarily means a less weight of cotton seed meal than that here mentioned. To those beginning the use of this feed, we would counsel carefulness, employing it at first in small amounts and always mixed with a good proportion of other feeds.

Repeated trials have shown that cotton seed meal cannot be fed to calves. It invariably, even when fed to the extent of a few ounces daily, causes an acute form of indigestion followed by diarrhœa, and is usually followed by death. Neither is it a safe or profitable feeding stuff for swine.

A sample forwarded from Dalling, Que., during the past year afforded the following data :—

Cotton Seed Meal.

Moisture	6·17
Fat or oil	8·72
Protein or albuminoids	43·19
Fibre	5·88
Carbo-hydrates	28·36
Ash or mineral matter	7·68
	100·00

The average composition of cotton seed meal as given by American authorities, is :

Moisture	8·2
Fat or oil	13·1
Protein or albuminoids	42·3
Fibre	5·6
Carbo-hydrates	23·6
Ash or mineral matter	7·2
	100·00

The only difference of note between the two is the much smaller percentage of fat in the sample analysed, evidently due to a larger proportion of the original oil being expressed than is usually the case. The deficiency in fat is to a certain extent counterbalanced by slightly increased percentages of protein and carbo-hydrates.

Since inquiries are being frequently received respecting the comparative values of the more concentrated feed stuffs, we append for the information of our readers the following table, gathered from American sources, from which may be learnt the percentages of the digestible nutrients they contain :—

DIGESTIBLE Nutrients in 100 lbs. of certain concentrated feed stuffs.

——	Protein.	Fat.	Carbohydrates.
Oil cake (new process)	28·2	2·8	40·1
Oil cake (old process)	29·3	7·0	32·7
Bran	12·2	2·7	39·2
Cotton seed meal	37·2	12·2	16·9
Gluten meal	25·8	11·0	43·3
Pea meal	16·8	·7	51·8

If we assume that the ratio of value between digestible protein, fat and carbohydrates, to be as 3:3:1—a ratio which necessarily must be considered as only approximately correct—we ascertain the comparative feeding values of the above feeds to be as follows :—

	Approximate Feeding Values.
Oil cake (new process)	133
Oil cake (old process)	141
Bran	84
Cotton seed meal	165
Pease	104
Gluten meal	154

That is, if judiciously and rationally used, pease would be approximately worth for their nutrients $1.04 per cwt., when bran sold for 84 cents per cwt., and so on.

LAMBS' QUARTERS (*Chenopodium album*).

This weed is abundantly prevalent in Manitoba and the North-west Territories, Dr. Fletcher considering it the most common of all the weeds in those provinces. Since in many parts it has spread so as to entirely cover comparatively large tracts of land, we considered it advisable some years ago to determine its value as a fodder plant, as well as its manurial worth. An account giving the analytical data on these points was published in our report for 1890, from which we may briefly quote as follows :—'Judging from its composition and relationship to other edible plants, there seems no reason why it (Lambs' quarters) should not make a nutritive fodder if cut young and in a succulent condition. As the plant matures there appears to be a considerable deposition of woody fibre, which would lower its digestibility considerably.' Respecting its fertilizing value or, looked at from another standpoint, the extent to which it exhausts the land, we showed that in the fresh condition one ton of the plant contained nitrogen, potash and phosphoric acid worth $2.74, and that of these three elements potash was the most abundant, practically one-half of the ash consisting of this constituent.

In the early part of the present year several samples of the seed of this weed were received from Manitoba, the letters accompanying these requesting information as to its feeding value. Thus, Mr. Thos Dand, C.E., crop correspondent, writing from Delor-

aine, says: 'We have a very large quantity of small seed this year as a residue from thrashing. This weed is on our best new cultivated land and must have been brought here in the winter by snow storms and blizzards. This district has grown at all times the very best 'No. 1 Hard' since 1886. The sample of seed goes to you by this mail and our farmers, since many of them have a large quantity of it, would be glad to have you make an analysis.'

Again, Mr. S. W. Bishop, of Sintaluta, writes under date of December 30, 1898 'I send you a small bag of the seed of pigweed or lambs' quarters, of which we have a large pile at each thrashing. This I have saved and fed to my cattle, 1 gallon each per day, and they seem to eat it readily and with relish. Will you kindly let me know its feeding value, and if it is worth saving as feed?'

We, accordingly submitted the seed to analysis, and obtained the following data:—

Analysis of Seed of Lambs' Quarters (Chenopodium album).

Moisture	9·82
Fat or oil	6·78
Protein or albuminoids	14·19
Fibre	1·27
Carbo-hydrates	63·91
Ash or mineral matter	4·03
	100·00

From these results, I judge the seed to have a comparatively high feeding value. Its percentages of fat and protein—the two most important nutrients—place it approximately, midway between corn meal and bran.

Since these seeds are very small and possess a hard integument, it seems most probable that if fed without previous grinding or boiling the greater number of them would pass through the animal undigested, in which case not only would they be of no food value, but harm would be done by their dissemination over the farm in the resulting manure.

THE CHEMISTRY OF INSECTICIDES.

PARAGRENE.

In the early months of the present year our attention was called by several large fruit growers to a newly introduced insecticide, Paragrene, a material which the manufacturers claim is fully as effective as Paris green and much cheaper.

In a letter received from the manufacturer, Mr. Fred. L. Lavenbury, New York, U.S., under date of March 31, he writes to Dr. Fletcher: 'In answer to your kind inquiry we inclose circular describing Paragrene as an insecticide. We claim that it contains 50 per cent arsenious acid, thus making it absolutely reliable and effective as a poison. It is to be used in exactly the same way and in the same quantities as Paris green. Respecting price, we have adopted a price list for the consumer which makes it impossible for the article to cost more than 14½ cents per pound for 14 pound pails; 15 cents for one and three pound packages; and 16 cents for one-half pound packages, and 17 cents for one-quarter pound packages. Paris green, of course, is sold for a considerably higher price, and our object has been to put this new insecticide at a figure that would be attractive and save the farmer considerable money.'

Believing that a knowledge of the composition of this material would be of interest to fruit growers and orchardists, we obtained a sample for analysis and found it to be a green powder, similar in general appearance to Paris green, though of a lighter colour.

On mixing with water, it remained longer in suspension than Paris green similarly treated. The mixture had a faint but still distinctly alkaline reaction. The analysis of the powder afforded the following data:—

Analysis of Paragrene.

Arsenious acid (As_2O_3)*	44·2
Copper oxide (CuO)	24·1
Lime (CaO)	3·7
Sulphuric acid (SO_3)	3·5
Acetic acid, undetermined.	

* Of this, 4·56 per cent was found to be soluble in water.

It is probable from the above that this substance is a mixture consisting chiefly of aceto-arsenite of copper (Paris green) and small amounts of white arsenic and of arsenite and sulphate of lime.

As regards arsenic, the essential toxic agent, Paragrene falls somewhat behind Paris green, which by law is required to contain 50 per cent arsenious acid. It is possible that the claim of the manufacturers in the matter of this constituent would receive more favourable support from the examination of further samples, as strict uniformity in composition is scarcely obtainable in the preparation of such substances, much depending upon the conditions under which the precipitation is made.

In the consideration of the properties of this new compound as a practical insecticide, there are two features worthy of mention. The first is the slightly alkaline character of the mixture with water, thus probably obviating the necessity of adding lime in order to guard against injury to foliage, as is the case with Paris green. Secondly, we have the fact that Paragene does not so readily settle out as Paris green after the necessary dilution with water, thus enabling an easier and more equable distribution of the poison.

A trial was made by the horticulturist with Paragrene for the destruction of potato bugs, but owing to the small quantity available for this use, Mr. Macoun thinks he has scarcely sufficient data to draw conclusions from as to its merits compared with Paris green. Further experiments will be made with it in the field next season.

KEROSENE-CARBOLIC EMULSION.

This spraying fluid is strongly recommended by Mr. Badger, of Warkworth, Ont., who used it for three sprayings for oyster-shell bark-louse and borers in December last with apparently good effect. The proportions advocated by Mr. Badger are:—

Kerosene	2 gallons.
Water	1 gallon.
Soap	½ pound.
Crude carbolic acid	2 pints.

For use, dilute 1 gallon of emulsion with 8 gallons of water.

From the above, it is seen that this fluid is the ordinary kerosene emulsion with the addition of so-called crude carbolic ocid. There was, however, a difficulty in keeping the mixture emulsified, the 'crude carbolic acid' rising very frequently to the surface after the dilution in the spray pump barrel. Our correspondent requested information that would enable him to prepare an emulsion that would not separate.

We were at first at a loss to understand how it was that the carbolic acid did not dissolve, since 1 part carbolic acid is soluble in 20 parts of water, and moreover, if it were not miscible why it should float, since carbolic acid is heavier than water. An examination of a sample of the material used, however, explained these facts satisfac-

torily. The greater part of the material is not carbolic acid, but crude oils (tarry matters), distillation products from coal tar. The carbolic acid it contains, no doubt is dissolved in making the emulsion and is sent out in the spray, though the crude oils float.

Further experiment showed us that this 'crude carbolic acid' dissolves readily and entirely in coal oil (kerosene) and that when it is thus first dissolved, and not added direct to the soap suds, the emulsion remains perfect for a long time. Such an emulsion, though diluted with eight times its volume of water, kept several weeks in the laboratory without any appreciable separation of the crude carbolic acid. Mr. Badger subsequently prepared the emulsion in the way suggested, mixing the 'crude carbolic acid' previously with the coal oil, and reported the results as eminently satisfactory. On February 16, he wrote: 'We used to-day 20 gallons of the kerosene-carbolic spray for lice on cattle, hogs and hens. In making the emulsion we followed your suggestion and mixed the crude carbolic acid with the coal oil before pouring it into the hot soap suds. When diluted it did not separate as it had previously done.'

This emulsion would appear to merit a thorough trial by those having occasion to use the ordinary kerosene emulsion.

BLUESTONE-KEROSENE MIXTURE.

A correspondent suggests that the addition of bluestone (sulphate of copper) to kerosene emulsion would furnish a spray for use on dormant trees that would, as it were, do double duty, destroying fungus spores and insect life.

This is not practicable, for the addition of a solution of bluestone to the emulsion causes an immediate separation of the constituents of the emulsion, the coal oil, together with the curdy copper-soap formed, rising quickly to the surface. For this reason such a mixture could not be readily applied, nor would it be desirable, since the decomposition that has occurred would have seriously impaired the efficacy of the spray, rendering it practically useless on dormant wood, so far as the action of the bluestone is concerned.

BORDEAUX MIXTURE AND TOBACCO WATER.

A correspondent asks if tobacco water could be used with bordeaux mixture, and thus obtain a spray that would be at once an insecticide and fungicide.

We made careful search through such literature as we had on the subject of spraying mixtures, but could not find any mention of this combination as having been used or even experimented with. Apparently, therefore, there are no results on record to draw conclusions from as to its efficacy.

Accordingly we prepared bordeaux mixture (4 : 4 : 40 formula) and made a strong decoction of tobacco. These were mixed in equal proportions. On standing it was noticed that separation of the copper precipitate occurred somewhat more quickly than in the untreated bordeaux mixture, leaving a clear, greenish-brown supernatant liquid. This, on being filtered off and tested, was found to be quite free from copper, showing that the tobacco water had not in any way interfered with the action of the lime upon the bluestone.

This result leads me to think that if applied when freshly prepared, the addition of the tobacco water would not affect the application from a mechanical standpoint, or destroy the efficacy of the bordeaux mixture as a fungicide.

The question as to whether the tobacco water by being mixed with the fungicide loses in any degree its power of destroying aphides is somewhat more difficult to answer. Further investigation is necessary before we can speak dogmatically on this point, but since the proposed plan could do no harm—and would reduce the labour of spraying in many instances—we think it is one worthy of trial.

SOIL INOCULATION FOR PROMOTING THE GROWTH OF THE LEGUMES.

THE USE OF NITRAGIN IN AGRICULTURE.

For several years past we have experimented with Nitragin*, a preparation containing the germs which reside in the nodules on the roots of legumes, with a view to ascertaining its practical value for encouraging the growth of clover, pease, and horse beans. The results given in detail in our reports for 1897, 1898, have on the whole been very satisfactory.

This year, the work has been continued with clover and horse beans, using the method that we have previously described as 'seed inoculation' and sowing the seed upon a practically pure sand which had been fertilized with muriate of potash and super-phosphate so that the plants might find a sufficient store of mineral matter to draw upon. Owing, however, to a delay in receiving the nitragin from Germany, we were not able to start the experiment till the season was advanced, and, as a consequence, the plants had not attained a sufficient size when growth ceased to allow any data of value respecting the relative weights of the crops being taken. If, as we hope, the clover survives the winter, we shall be able to ascertain what effect the nitragin may have had on the crop of the next year.

Notwithstanding this, we have an important result to report on the treated and untreated clover sown in 1898, that is, on its second year's growth. This experiment was started under the following conditions:—

The soil selected was almost pure sand, humus and nitrogen being present only in exceedingly small quantities. An area of 10 square yards was staked off and fertilized with the following mixture: muriate of potash, 4 oz., superphosphate, 12 oz. (This is at the rate of 300 pounds, superphosphate and 120 pounds muriate of potash, per acre).

On June 13, 1898, two rows of inoculated seed and two rows of untreated seed were sown in this area. On October 28, 1898, the plants from 4 feet in each row (the rows being 6 feet in length) were carefully dug and weighed.

First Year's Crop, 1898.

——	From Untreated Row.	From Inoculated Row.
Weight of foilage, green	225 grms.	270 grms.
" roots "	225 "	255 "
Total	450 grms.	525 grms.
Weight of foilage, air dried	85 grms.	105 grms.
" roots " "	70 "	91 "
Total	155 grms.	196 grms.

The crop from the inoculated seed was much more luxuriant than that from the untreated seed, and the above results show that the yield was considerably, practically 15 per cent, heavier. There is every reason to believe that this increased yield was due to the beneficial influence of the nitragin.

The remaining portions (2 feet) of the rows were left, and it was found when the season opened this year (1899) that the plants in both series had survived the winter. They made excellent growth, but those from the inoculated seed were very much larger. On July 10, 1899, this second year's growth was photographed and the plants taken up and weighed.

*For an account of this bacteriological preparation see the report of the Chemical Division for 1897.

Of the inoculated plants there were :—

Large,	23	plants, average height from root to crown...	28	inches.
Medium,	17	" " " ...	9	"
Small,	44	" " " ...	6	"
Total,	84			

Of the untreated plants there were :—

Large,	12	plants, average height from root to crown...	23	inches.
Medium,	15	" " " ...	7	"
Small,	37	" " " ...	4	"
Total,	64			

Second Year's Growth, 1899.

	Inoculated.	Untreated.
Total weight of plant (leaves, stems and roots)..	745 grms.	252 grms.

Selecting the twenty-one largest plants of each series, we obtained data as follows

	Inoculated.	Untreated.
Stems and leaves.....	378 grms.	90 grms.
Roots.....	70 "	23 "
	448 grms.	113 grms.

These results are truly remarkable and of a most convincing nature. The luxuriance of the growth from the inoculated seed as compared with that from the untreated seed is shown very well in the accompanying photograph, which was taken immediately before digging the plants.

It is impossible to get a good crop of clover on land which is water-soaked, or, on the other hand, when there is a deficiency of moisture—as in a season of drought. But the results of the past three years' investigation indicate that a good crop of clover can be obtained on very poor soil with the aid of nitragin, provided the soil is drained (naturally or artificially), the season favourable, and there is a sufficient supply of mineral plant food in the soil.

There are, however, several rather serious difficulties in the way of the general introduction of nitragin. First, it must be used while still freshly prepared (the German manufacturers will not guarantee its vitality after it has been made six weeks), and, secondly, it must have been protected from strong light and kept at a temperature below 100° F.

We are of the opinion that any farmer might without purchasing nitragin obtain the same results by taking soil from a field that has grown a good crop of clover and sowing it over the poorer soil. The earth which comes from about the roots of clover contains the germs and, therefore, this method would be an actual inoculation of the poorer soil. This plan has worked most successfully with several experimenters, in both Europe and America. Another plan would be to pour cold water over the earth (previously placed in a barrel) from the rich clover land and after allowing the soil to settle, to pour off the supernatant water and soak in it the seed about to be sown.

PRELIMINARY REPORT UPON THE COMPOSITION AND PROPERTIES OF THE FAT IN 'FIRM' AND 'SOFT' PORK.

It has become a matter of great importance to Canadian farmers and those interested in the bacon export trade, to learn the cause or causes which produce 'soft'

or 'tender' pork, since such sells at a much lower price than 'firm' pork, both in the home and the English markets. With the view of furnishing useful information to pork producers, and, if possible, of solving this admittedly difficult problem, the chemical composition and physical character of the fat in these two classes of pork have been studied, it being considered that the results of such an examination would form a valuable basis or standard for reference in making further experiments. These latter would consist chiefly of feeding tests under various conditions (age, breed, exercise, &c.), and the analysis, chemical and physical, of the resulting pork.

On February 1, we received from the Wm. Davies Co., Limited, Toronto, two Wiltshire sides; the one marked 'firm,' and reported on as of excellent quality; the other marked 'soft,' and stated as of very inferior quality. The former weighed 46½ pounds; the latter, 44 pounds.

Both were frozen when received, but, nevertheless, there was a most marked difference in the relative hardness of the two sides. As the sides thawed (at the temperature of the laboratory, about 70° F.) this difference—which was ascertained or measured by the resistance of the fatty portions to pressure by the finger—became still more pronounced. This was further evinced (February 2) in raising the ham by lifting as the sides lay on the table; the 'firm' remained fairly straight, whereas, the 'soft' doubled over. The relative softness is also shown in the accompanying photograph, the sides having been suspended the night previous. It illustrates the amount of 'drag' caused by the weight of the sides, similarly suspended by hooks. The extent of the 'drag' in the 'soft' side is much the greater.

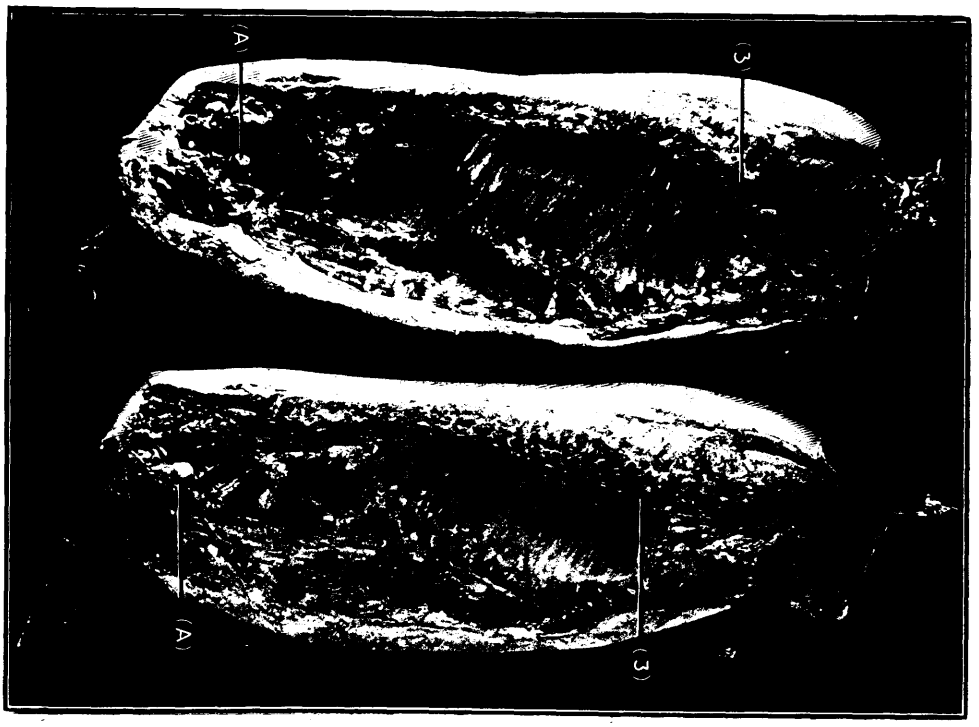
The samples of the fat for examination were obtained by first cutting the sides (*a*) immediately in front of the thigh joint (socket of the femur in the pelvic arch), and (*b*) immediately in front of the first rib, and then taking the fatty tissue at each of these sections. Those taken at (*a*) are designated in the following tables as 'ham'; those at (*b*) as 'shoulder' (see photo). The precaution of confining the place or area from which the fat was taken was made necessary from the fact that it has been stated that the fat varies considerably in composition, according to its position in the animal. Care was exercised in the preparation of the sample for analysis, to dissect out and reject all muscular tissue, blood vessels, &c.

Though the 'soft' side was somewhat the lighter of the two, its proportion of adipose tissue (fat) to muscle (lean) was the greater (see photo).

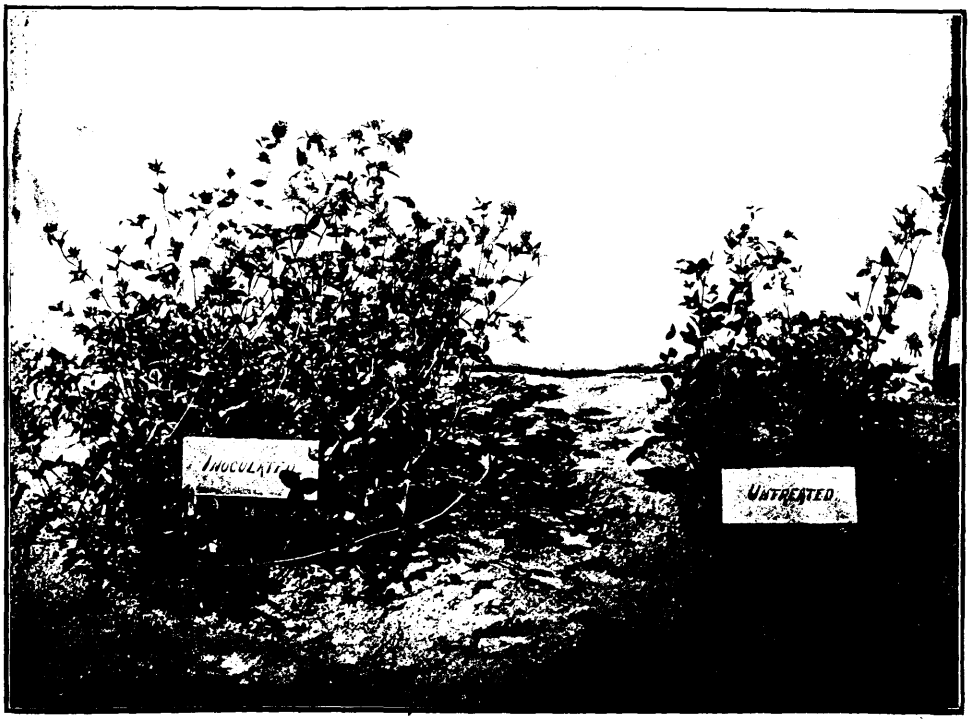
In determining the composition of the fat of the two sides, the following estimations were made: water, nitrogen (from which the amount of tissue other than fat was calculated), fat (which was obtained by difference), and the amount of olein and palmitin and stearin. The amount of salt present was also determined. Table 1 sets forth the results obtained:—

TABLE No. 1.—*Composition of Fatty Tissue in 'Firm' and 'Soft' Bacon.*

	Firm.		Soft.	
	Ham.	Shoulder.	Ham.	Shoulder.
Water	15·56	6·53	12·50	2·67
Salt	2·73	1·12	1·84	·48
Nitrogen	·504	·285	·243	·142
Fibre (Nitrogenous tissue)	3·15	1·78	1·52	·89
Fat, by difference	78·56	90·57	84·27	95·96
Olein in bacon	50·05	58·33	66·37	76·94
Palmitin and stearin in bacon	28·51	52·24	17·90	19·02



Soft Pork Investigation, showing Firm and Soft Sides.



Experiments with Nitragin; Clover Inoculated and Untreated, Second Year's Growth.

From the foregoing data we may notice several very important differences in the composition of the bacons. These differences are discussed in the following paragraphs:

1. It is to be observed that the percentage of water in the fatty tissue of the 'firm' is greater than in the fatty tissue of the corresponding part of the 'soft' bacon.

2. Also, that the percentage of tissue other than fat, that is, of a nitrogenous nature, was also greater in the 'firm' than in the 'soft.' This falls into line with the results stated in the preceding paragraph, since the water for the most part is contained in or held by the nitrogenous tissue. This would indicate, I think, that the walls of the cells containing the fat proper are thicker in the 'firm' than in the 'soft' or 'tender' bacon.

3 Further, it is to be noticed that the amounts of salt present are also larger in the 'firm' than in the 'soft' bacon. This is accounted for by the assumption that the salt, like the water, is held by the nitrogenous tissue to a greater extent than in the fat.

4. The percentages of fat are, from a consideration of the foregoing statements, necessarily greater in the 'soft' than in the 'firm' bacon.

5. The fat proper consists of olein, fluid at ordinary temperatures, and palmitin and stearin, solid at ordinary temperatures. The data show that the percentage of olein is much greater in the 'soft' than in the 'firm' bacon, while as a natural consequence the percentages of palmitin and stearin are greater in the 'firm' than in the 'soft' bacon. These facts furnish the cause of the greater softness in the 'soft' or 'tender' bacon.

COMPOSITION OF THE FAT.

In order to obtain a fuller knowledge of the composition of the fat proper in the 'firm' and the 'soft' bacons, the fatty tissue was rendered and the pure fat filtered off. The analysis of these fats furnished the data in Table No. 2.

TABLE No. 2.—*Composition of Fat from 'Firm' and 'Soft' Bacon.*

	Firm.		Soft.	
	Ham.	Shoulder.	Ham.	Shoulder.
Olein (calculated)	63·71	64·40	79·95	80·18
Palmitin and stearin	36·29	35·60	20·05	19·82
Ratio of palmitin and stearin to olein	1—1·76	1—1·80	1—3·99	1—4·02

These figures show very clearly that the fat of the 'soft' bacon contains a much larger percentage of olein than that of the 'firm' bacon, with a corresponding decrease in the percentage of palmitin and stearin.

They also make evident that no great difference in the composition of the fat taken from the ham and from the shoulder of the 'firm' bacon exist, and that the same statement regarding the fat of the ham and shoulder of the 'soft' bacon also holds true.

PHYSICIAL AND CHEMICAL CONSTANTS OF FAT FROM 'FIRM' AND 'SOFT' BACON.

Table No. 3 sets forth certain determinations that were made upon the pure, filtered fat. These are of considerable importance, since, though of a strictly scientific character, they allow us to make deductions easily understood regarding the nature of the fats :

TABLE No. 3.—Physical and Chemical Constants of Fat from 'Firm' and 'Soft' Bacon.

	Firm.		Soft.	
	Ham.	Shoulder.	Ham.	Shoulder.
Melting point	37·6°C.	37·75°C.	27·4°C.	28·2°C.
Spec. gravity at 96°C	·8668	·8859	·8678	·8740
Spec. gravity at 100°F	·9009	·8980	·8970	·8988
Sapon. equivalent	285·3	282·3	287·3	286·0
Reichert number	·408	·714	·408	·663
Iodine absorbed	55·3	55·9	69·4	69·6

1. The melting point of the fat from the 'soft' bacon is practically 10° Centigrade lower than that of the 'firm' bacon.

2. The specific gravities in both series are so close that it is not possible to use this constant as a means of differentiation or for deducing therefrom any information respecting the relative composition of the fats.

3. The saponification equivalent likewise appears to be of little value in the diagnosis.

4. The Reichert number shows the practical absence of volatile fatty acids in both series, though there is an indication of larger traces of the presence of such in the shoulder fat than in that of the ham.

5. The 'Iodine absorbed' is of great value in this investigation. From it may be calculated the percentage of olein or liquid fat present in a fat. The data here presented clearly demonstrate the larger amount of olein in the 'soft' fat, a fact that gives the explanation for the greater softness or tenderness of the 'soft' bacon.

On the completion of the work recorded above, it was deemed advisable to institute a series of feeding tests upon the Central Farm, to be followed by a similar examination in the laboratory of the pork produced. Such a series (employing nearly 200 pigs) was commenced in the month of May, and is still in progress. All the pigs were between one and two months old when the experiment begun. The scheme of rations used for these pigs was drawn up by Mr. Grisdale, the Agriculturist, who has the control and management of the investigation outside the work done by the Chemical Division.

Already some seventy carcasses of these pigs have been submitted to chemical and physical examination—a work which has consumed more than four months time of the chemical staff. If, as we hope, the investigation proceeds satisfactorily, the data will be completed by April, 1900, when it is expected they will be collected and published, together with deductions therefrom, in bulletin form. Such an extensive trial should furnish us with results from which deductions of value can be made concerning the causes

producing 'soft' pork. The effects of food, as regards character and quantity, of exercise, &c., &c., upon the quality of the pork produced will, it is expected, be brought out, enabling us to furnish information that will be of service to those raising and feeding pigs.

At the outset of the experiment above referred to, it was thought well to ascertain the character of the fat in very young pigs, so that we might have data respecting age and immaturity as affecting the quality of the bacon. Accordingly, before the special feeding was begun, four small pigs were slaughtered and their fat examined in the laboratory. The dressed weights of the pigs ranged from 23 to 42 pounds. Inspection at the factory showed all to be more or less soft. The proportion of olein to palmitin and stearin in the fat of these pigs is given in the subjoined table :—

—	A.	B.	C.	D.
Olein	90·6	86·9	83·3	73·3
Palmitin and stearin	9·4	13·1	16·7	26·7
Ratio of palmitin and stearin to olein	1:9·6	1:6·6	1:5·0	1:2·7

Though the percentages of olein are seen to vary considerably, they are all sufficiently high to characterize the bacon as soft, thus corroborating the expert's opinion.

The above data are probably insufficient to base any final conclusion upon, yet they appear to indicate that age and weight—or perhaps rather immaturity or lack of 'ripeness'—are factors having a marked effect upon the character of the fat. Further work may show that the percentage of the olein decreases as the pigs grow and if such be the case, one of the causes of softness, at least, will have been discovered. The series of experiments now in progress will furnish data on this important feature of the problem.

WELL WATERS FROM FARM HOMESTEADS.

It is gratifying to be able to report that among the waters received this year for analysis a much larger percentage of good samples occurs than heretofore. The immediate relationship between an unpolluted, wholesome water supply and good health and thrift among cattle is one, however, that still needs emphasizing in many parts of the Dominion. It seems more than probable to the writer that many deaths among horses and stock, generally reported as due to obscure and apparently unknown causes, might be traced to the continued drinking of contaminated water, for such, apart from disease germs they may harbour, may, and often do, contain compounds (derived from certain chemical changes that take place in the organic matter of the excrementitious refuse present) possessing well-marked poisonous properties. The value of the abundance of pure water for the farmer and dairyman can scarcely be over-estimated. If this were more widely recognized, greater care would be exercised in guarding the well against the infiltration of noxious materials.

Respecting the purification of waters largely charged with saline matter, such as common salt, sulphates of soda, lime, and magnesia, we have to say that no system of filtration or precipitation will be found altogether effective. Recourse must be had to distillation. Stills for household purposes are now manufactured that can be used on the kitchen stove, and which require but very little attention. Sufficient water for drinking and culinary purposes, free from all soluble saline matter, may by these means be readily and cheaply obtained.

ANALYSIS OF

RESULTS STATED IN

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.
			1898.				
1	Millerton, N.B.	J. B.	Dec. 10..	Trace.	·052	·082	·6
2	Middlehurch, Man.	R. R. T.. No. 1..	" 12..	·03	·04	·041	18·6
3	"	R. R. T., No. 2..	" 12..	·01	·10	·024	29·0
4	South March, Ont.	M. W. per Dr. G.	" 13..	·02	·11	2·439	8·8
5	Nappan, N.S.	R. R	" 24..	·016	·086	·094	4·8
6	Ottawa, Ont.	A. G.	" 28..	·015	·213	·1397	1·0
			1899.				
7	Dresden, Ont.	O. McV	Feb. 10..	·255	·058	.....	70·0
8	Maria, Que.	T. J. M.	" 20..	·02	·17	.....	24·6
9	Dauphin, Man.	Wm. M	" 22..	·86	·30	1·432	96·0
10	Chance Harbour, N.S	Capt. D. C. F.	Mar. 24..	·07	·128	4·85	26·4
11	Alexander, Man.	J. McG.	" 27..	9·55	·115	·42	4700·0
12	Pembroke, Ont.	E. B.	" 28..	·034	·122	·0115	2·6
13	Rapid City, Man	G. B. S.	Apr. 11..	·07	·925	7·247	110·0
14	Deloraine, Man.	J. M. D.	" 11..	3·69	·235	·576	116·0
15	Central Bedeque P.E.I.	F. L.	" 25..	1·66	·72	·592	200·0
16	Hintonburgh, Ont.	D. H. McL.	May 8..	Trace.	·187	·094	·15
17	"	J. B.	" 17..	·03	·233	2·775	88·0
18	Saskatoon, N.W.T.	Mrs. T..	" 19..	Trace.	·264	·0329	6·6
19	Enderby, B.C.	W. F. H., No. 1.	June 2..	·02	·10	1·156	7·4
20	"	W. F. H., No. 2	" 2..	·012	·175	1·208	2·8
21	Kamloops, B.C.	E. A. H.	" 26..	·01	·085	·09	6·2
22	Lennoxville, Que	A. W. G.	" 26..	Trace.	·11	4·241	28·0
23	"	F. C. G.	July 8..	·06	·09	4·398	23·5
24	Newbury, Ont.	J. H. B.	" 10..	·06	·20	·0659	45·8
25	Ompah, Ont	Alex. Watt.	" 10..	·54	·342	6·127	15·2
26	Scotch Village, N.S	J. McH	" 15..	·04	·095	None.	12·0
27	Esquesing, Ont.	J. J	" 19..	·88	·184	11·019	11·8
28	Billings' Bridge, Ont.	H. C. R	" 22..	·14	·315	13·14	43·8
29	Newbury, Ont.	J. H. B., No. 1.	" 27..	·215	·172	1·24	53·6
30	"	J. H. B., No. 2.	" 27..	·04	·105	14·34	72·0
31	Sutton, Que.	A. E. E., No. 1.	Aug. 22..	Trace.	·04	1·795	32·4
32	"	A. E. E., No. 2.	" 22..	Trace.	·02	·247	.....
33	East Dunham, Que.	P. K.	" 22..	·07	1·93	None.	3·0
34	Carlake, Ont.	R. R. C.	" 30..	2·25	·04	·124	1100·0
35	Vernon, B.C.	J. A. H	" 31..	·66	·03	·148	1·2
36	Nepean, Ont.	R. N.	Sept. 5..	None.	·0875	2·849	21·0
37	Glen Ewen, N.W.T.	C. L. G. T.	" 9..	·445	1·0	·0618	240·0
38	Fredericton, N.B.	F. S. H.	" 20..	None.	·0625	·417	None.
39	East Dunham, Que.	P. K.	" 23..	·08	·80	·0329	2·4
40	Hamilton, Ont.	W. G. W., No. 1.	" 25..	·84	·235	None.	144·0
41	"	" No. 2.	" 25..	·08	·065	·297	30·0
42	"	" No. 3.	" 25..	·02	·04	·147	8·4
43	"	" No. 4	" 25..	2·03	·02	·379	1120·0
44	Ville Marie, Que.	A. M. D.	Oct. 2..	None.	·036	·0823	·5
45	Regina, N.W.T.	G. S. D.	" 24..	8·304	·08	·4	6125·0
46	Huntley Township, Ont.	E. E.	" 31..	·07	·085	5·563	10·6
47	Almonte, Ont.	R. McK.	" 31..	·406	·099	6·542	22·0
48	Penniac, N.B.	C. N. G.	" 31..	·045	·08	5·11	40·0
49	Wapella, N.W.T.	H. C. D.	Nov. 27..	·11	1·38	2·195	22·0

SESSIONAL PAPER No. 8a

WELL WATERS, 1899.

PARTS PER MILLION.

Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
96·0	56·0	40·0	None	An excellent water; free from all pollution.
494·4	370·4	124·0	"	Free from pollution.
662·4	478·4	184·0	Very slight traces	"
273·6	189·6	84·0	Traces	Polluted.
58·4	38·4	20·0	Very slight traces	An excellent water; free from pollution.
56·0	21·6	34·4	"	Free from contamination.
441·6	408·6	33·6	"	Of very doubtful purity.
283·2	170·4	112·8	None	Free from pollution.
7391·2	6636·0	1055·2	"	Unwholesome.
260·0	180·0	80·0	"	Suspicious.
10780·0	10037·0	743·0	"	Doubtful.
59·2	40·8	18·4	"	Unpolluted.
6136·0	5069·0	1067·0	Traces	Unwholesome; heavily charged with organic and saline matter.
3608·0	3380·0	228·0	None	Very suspicious.
472·8	415·2	57·6	Very heavy traces	Exceedingly bad water.
51·2	21·6	29·6	Slight traces	Good water.
845·6	646·4	199·2	Heavy traces	Seriously polluted.
637·0	426·0	211·0	None	Good water.
2032·8	1531·2	501·6	Very slight traces	Saline water.
256·0	176·0	80·0	Very heavy traces	Suspicious water.
1260·8	921·2	269·6	Heavy traces	Wholesome water.
298·0	170·0	128·0	None	Suspicious.
.....	.....	.....	.....	"
464·0	320·0	144·0	Slight traces	"
370·0	249·0	121·0	Very heavy traces	Seriously contaminated.
2428·8	1919·2	509·6	None	Free from all contamination.
588·8	341·6	247·2	Slight traces	Very bad water.
723·2	568·8	184·4	Very heavy traces	Most seriously polluted.
501·6	353·6	148·0	Slight traces	"
608·8	452·0	156·8	Heavy traces	Very bad water.
282·0	189·2	92·8	Very slight traces	Suspicious.
44·8	27 2	17·6	None	Exceptionally good water.
194·4	94·4	100·0	Heavy traces	Free from sewage pollution.
4890·0	4094·0	796·0	Traces	Mineral water.
228·2	201·8	26·4	Heavy traces	Good water.
428·0	292·0	136·0	Traces	Very suspicious.
12092·0	10288·8	1603·2	Slight traces	Unwholesome.
67·0	31·0	36·0	None	Free from pollution.
117·6	48·0	69·6	Traces	"
563·2	531·2	32·0	None	Suspicious.
541·6	391·2	150·4	Traces	"
598·4	470·4	128·0	Very slight traces	Good.
3628·0	3184·8	443·2	Heavy traces	Not a first-class water.
202·0	272·0	30·0	Very slight traces	Very good water.
11574·0	10144·0	1430·0	Traces	Strongly saline.
328·0	250·0	78·0	Heavy traces	Seriously contaminated.
.....	.....	.....	.....	"
286·0	252·0	34·0	Slight traces	Polluted.
1820·0	1567·5	252·5	Heavy traces	Contaminated.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1899.

DR. WM. SAUNDERS,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially under my notice during the past season. There is, as in previous years, and as must always be the case, a vast amount of material accumulating in the Division which cannot be mentioned in the annual report, but which is frequently of use in answering correspondents and explaining to visitors the work of the Division.

Since the appointment of Mr. Arthur Gibson as a new assistant, in April last, many specimens have been secured for permanent exhibition in the museum. Exhibition cases in which the commonest injurious and beneficial insects can be shown have been a great desideratum here, a want which is now being filled as quickly as possible. Several new cases have been secured during the summer, but when the accumulated material has been arranged even these will not be sufficient to display all the specimens, and other cases are now being made.

The experiments in growing grasses and fodder plants have been continued and, as in the past, have proved of great interest to all visiting farmers. The Awnless or Smooth Brome Grass, which since 1887 I have taken great pains to introduce and distribute through the north-western provinces, still continues to give the greatest satisfaction to all who have tried it. It is a heavy producer of excellent fodder and hay, is succulent, appears early in spring and lasts late into the autumn. It is a free-grower, thriving both on light sandy soils and in rich low bottoms. Owing to its vigour and free growth, it has been found useful for holding alluvial flats liable to flooding and also as a binder of drifting sand. Some two or three years ago a sample of seed was sent to Mr. R. J. Bouteiller, Superintendent of Sable Island, off the coast of Nova Scotia, to whom it has given much satisfaction. He reported on it last year as follows:—'The Awnless Brome Grass seed was planted about the 20th May, and I mowed a heavy crop in August, much of it headed out. I am much pleased with it and believe it will be a success.' During the past summer Major F. Gourdeau, the Deputy Minister of Marine and Fisheries wrote as follows:—'Referring to the Awnless Brome Grass, of which you supplied seed to Sable Island, I beg to inform you that a letter has been received from the Superintendent of the island, in which he states that the plot of this grass is ahead of anything else, and measured on the 27th June between 3 or 4 feet and more in height, while timothy in just as good ground was a little over half of that.'

Awnless BromeGrass has also given tolerable satisfaction upon alkali patches in the west, succeeding better than all other varieties tried.

Subjects requiring special attention since I last reported were the following :—

THE HESSIAN FLY.—A serious outbreak in Manitoba.

THE ROCKY MOUNTAIN LOCUST.—This insect again appeared in some numbers in southern Manitoba, but was not the cause of an appreciable diminution in the crops. The exceptionally wet and late season in Manitoba during the past summer was unfavourable for its early development and spread, and the farmers, having been stirred up to an appreciation of the danger of allowing this insect to remain undisturbed, ploughed down the greater part of the stubbles this autumn, thus burying the eggs too deeply for the young to emerge next spring.

THE DESTRUCTIVE PEA APHIS.—One of the most notable outbreaks of the year was by a plant-louse which has been given the above name but which before this year was unknown.

ROOT MAGGOTS.—Some experiments against these destructive enemies of the gardener were tried last season with many different substances, but so far without very satisfactory results. Mixtures containing some form of carbolic acid were most useful.

THE DIAMOND-BACK MOTH (*Plutella cruciferarum*, Zell.).—Late in the autumn there was in eastern Ontario a widespread and severe attack upon cabbage of various kinds, rape, and turnips, by this insect, which has been well known for many years as an occasional pest of these plants, and was fully treated of, and figured, in my report for 1890. In *Farm Insects*, by John Curtis, 1860, the same insect is described and well figured as the Turnip Diamond-back Moth.

THE ASPARAGUS BEETLES.—Two new enemies of the gardener have appeared in Canada for the first time this year, the two Asparagus Beetles. These are treated of at some length later on.

Fig. 1.—The Forest Tent Caterpillar.

TENT CATERPILLARS.—Orchard and shade trees were again this year seriously injured throughout the greater part of Ontario and Quebec by the caterpillars of the two common species of Tent Caterpillars. Nothing new can be added as to remedies ; these consist of the collection of eggs in winter, the destruction of the nests and clusters of young caterpillars in spring, and last, but most important, the spraying of trees with poisonous mixtures as soon as possible after the hatching of the eggs. The last operation, when performed carefully, is a never-failing remedy.

BARK-LICE.—The San José Scale and several other allied species of scale-insects have naturally been the subject of much correspondence. Thorough experiments are now being carried out by specialists in all parts of North America with the hope of discovering a practical remedy. Several materials have given good results which with ordinary insects might be considered all-sufficient remedies, but with the San José Scale it seems inadvisable to recommend under the existing laws which have been passed by the Federal Government and those of Ontario and British Columbia that fruit growers themselves, should be allowed to treat their trees with any of the materials which, up to the present, have been claimed to be 'sure remedies,' such as pure kerosene, the same mechanically mixed with water, and crude petroleum.

THE APRICOT SCALE (*Lecanium armeniacum*, Craw).—Another scale insect from California, which in some way has been introduced into the Eastern States, and is spreading there to some extent, has been found in two or three orchards at Sherbrooke, Que.

THE RASPBERRY WEB-WORM.—A local but interesting attack by a new enemy to cultivated raspberries was reported from St. John, N.B., last year, and has been worked up during the past season.

THE CRANBERRY LOOPER (*Caterva catenaria*, Cram.).—A new attack of some severity upon strawberries was by the common 'Cranberry Worm,' which was reported by Mr. George Bonner, of Point Aconi, Cape Breton, N.S.

THE PEA MOTH (*Semasia nigricana*, Steph.) is still much complained of, particularly in the Maritime Provinces, as shown by the following letter :—

'CLIFTON (King's Co.), N.B., December 19.—I have not made any recorded observations, but think this insect was not quite so destructive last season as usual. It has, however, come to be such a matter of course with us, that we take its ravages quite philosophically and pick the caterpillars out of our peas for the table ; when too bad, we throw the whole mess to the pigs or cows. This insect has been injurious here for a period beyond my recollection, some 50 years.'—J. W. WETMORE.

THE CARROT RUST-FLY (*Psila rosæ*, Fab.) continues to be a troublesome pest of carrots in the province of New Brunswick. Mr. J. E. Wetmore, of Clifton, N.B., writes :—'Of late years we have about abandoned the culture of the tender varieties on account of its depredations. It does not trouble the hardier varieties here apparently, for we can get full crops of the white carrots when the orange ones are a complete failure in the same field.'

In Prince Edward Island, Father Burke reports widespread injury by plant-lice upon carrots.

THE SPRUCE GALL-LOUSE (*Chermes abietis*, Linn.)—A cause of considerable inquiry and anxiety among those interested in the manufacture of paper during the past year or two has been the Spruce Gall-louse. This insect is prevalent through a large part of Ontario, attacking the Black and Norway Spruces. In the Rocky Mountains, galls probably made by a different species were noticed in abundance on White Spruces at Banff, Alberta, and, on Vancouver Island, trees of the Menzies Spruce (*Picea sitchensis*, Carr.) in certain places in the forests, were much disfigured by another species of Chermes, probably *C. sibirica*, Cholodk., which forms large galls, sometimes two inches in length by nearly one in diameter. These were not found at all on the Douglas Spruce.

THE BLACK VIOLET APHIS.—An infestation of greenhouses not previously complained of in Canada by the above insect occurred in Toronto, and is treated of later in this report.

THE GREENHOUSE LEAF-TYER is also a new pest treated of hereafter.

THE CARPET BEETLE OR 'BUFFALO MOTH' (*Anthrenus scrophulariæ*, Linn.).—This troublesome pest of the housekeeper seems to be spreading and becoming more destructive year by year. During last spring a few specimens were taken out of doors at Ottawa on the flowers of Currants and Spiræas. Beetles were also sent from Bewdley (Northumberland Co., Ont.) which had been found by Mr. T. W. Ramm, in the folds of a cloth left hanging in an apple tree during winter.

Correspondence.—From November 30, 1898, to November 30, 1899, the number of letters received by the Division was 2,495, and of letters sent 2,320.

Meetings attended.—Meetings of farmers, dairymen and fruit growers have been attended at the following places :—January 10 and 11, at Kingston ; 27, at St. Catharines, February 3, at Hemmingford, Que. ; 10, at North Gower, Ont. ; March 10, at Merivale, Ont.,

17, at Montreal; April 3, at Napanee, Ont.; 4, Brampton; 5, Oakville; 6, Hamilton; 7 St. Catharines; and three series of meetings in Manitoba, the North-west Territories and British Columbia are reported on at the end of this report.

Acknowledgments.—As in previous years, I am under great obligations to many correspondents, to practical farmers, who have much aided the work of the Division by making observations and sending in prompt reports on the occurrence of injurious insects and weeds, and to scientific experts in Canada and abroad. I must particularly mention in this connection Prof. John Macoun, of Ottawa, for assistance on many occasions, and also Dr. L. O. Howard, United States Entomologist, of Washington, D.C., and Dr. J. B. Smith, of New Brunswick, N.J., for frequent assistance in the identification of insects and for the use of electrotypes and magic lantern slides.

In conclusion I have much pleasure in expressing my appreciation of the enlarged opportunities for doing good work in the Division entrusted to my care, which have been granted me during the past year.

Mr. Arthur Gibson, of Toronto, was appointed as an extra assistant on April 1 last, and has shown great assiduity and care in all matters entrusted to him. Mr. J. A. Guignard, B.A., the Assistant Entomologist and Botanist, continues to help me in all branches of the work of the Division, and as heretofore has done much to bring the Division of Entomology and Botany to such degree of efficiency as it has attained.

I have the honour to be, sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

CEREAL CROPS.

Complaints of injury to the wheat crop by insects during 1899 were few, with the exception of a new and severe outbreak of the Hessian Fly in Manitoba, a rather serious occurrence of the same insect in Western Ontario, and a slight one in Prince Edward Island.

In the November *Crop Report* (Ontario Bureau of Industries) it is stated:—'There has been a notable absence of insect pests. There are few complaints of insect pests except that Hessian Fly, Jointworm and Wireworm have done some damage.' 'Alberton, P.E.I., October 31.—Seldom has Prince Edward Island garnered a more satisfactory all round harvest than this year. Hay is bursting the mows, the granaries are filled with golden grain, and although in some sections potatoes are not an average crop, on the whole, we rejoice in an excellent yield of roots.'—REVD. A. E. BURKE.

'Pleasant Grove, P.E.I.—The wheat crop on the whole is a good one; some fields were damaged by what we call 'black neck,' said by some to be the rust. Attacks by the Hessian Fly were not common, a few plants being injured, but we have had a considerable quantity of Wheat Midge on the Island this year.'—E. WYATT.

Barley was slightly injured by Hessian Fly in Manitoba, and oats and corn in Ontario to some extent by grasshoppers. The two most serious outbreaks of the season upon cereals were by Hessian Fly in Manitoba and in Western Ontario, and by a new enemy of the pea, the Destructive Pea Aphis, which did great damage to field peas from the Maritime Provinces to Western Ontario in Canada, and extended right down to the Southern States in the Union. That old enemy, the Pea Weevil, was also more than usually destructive and abundant during the season of 1899.

THE HESSIAN FLY

(*Cecidomyia destructor*, Say).

Fig. 2.—The Hessian Fly—enlarged and natural size.

Complaints of injury by the Hessian Fly during the past season were numerous to fall wheat in Ontario and to spring wheat in Manitoba. Wheat was injured in many parts of Manitoba, but chiefly in the Red River valley. The most western occurrence reported to me (with specimens) was from Moose Jaw, in the North-west Territories. At the request of some of my correspondents for public advice as to the best means of preventing future loss, articles were prepared for publication in the *Farmer's Advocate* (September 15) and the *North-west Farmer* (September 20), both excellent agricultural journals, widely circulated and read by farmers, in which the chief points in the life history of the insect were given and suggestions made as to the best known remedies.

The following extracts from some of the large correspondence on the matter will show the extent and nature of the outbreak. The first reports and specimens from Manitoba were received from Mr. Hugh McKellar, Chief Clerk of the Provincial Department of Agriculture.

'Delmer (Norfolk Co.), Ont., August 8.—In view of the immense damage done by the Hessian Fly to the wheat crop in this and in many other localities throughout the

province, farmers are very much interested in the matter and would like to know something of the habits of this insect—whether it is likely to assert itself in next year's crop, whether the discontinuance of wheat growing for a season would be necessary to exterminate it, or whether such omission would be of any value in eliminating the pest, &c., &c. Any information you could give us would be very gratefully received, especially at this juncture—the eve of another seeding.'

'Delmer, September 13.—In South Oxford the fly was very injurious, destroying fully one-half of the fall wheat remaining, after an unusually severe 'winter killing'—there was scarely a wheat field that was not injured more or less; the earlier sown suffered most. In North Oxford damage was much less, in West Brant, also much less, ditto in West Norfolk, in East Elgin middling severe, quite severe in East Middlesex; and again, in North and West Middlesex not so severe.'—CHAS. BRADBURN.

'Winnipeg Man., August 26.—Herewith I am sending you specimens of an insect that has done considerable damage on the farm of Mr. James Little, Stonewall. The specimens were forwarded by Mr. Ira Stratton, of Stonewall, who says that about one-quarter of Mr. Little's wheat has been cut down by these insects. Would you kindly let us have any information at your command regarding this pest, and what measures should be adopted to prevent its recurrence next year?'—HUGH MCKELLAR, *Chief Clerk, Dept. Agriculture.*

'Macdonald, Man., August 26.—I notice since starting to cut my wheat that quite a lot of the straw is broken just above the second joint, although the heads seem to be well filled; of course the sap is not altogether stopped as the straw is not broken completely off. I find on examining it that there is a single maggot or worm in a brown shell, between the leaf and stem just above the joint, that has caused the injury. Can you tell me what it is and if it is likely to be worse another year? There is from 1 to 7 or 8 per cent of the straw affected with it.'—HENRY KIRKWOOD.

'Portage la Prairie. Man., August 28.—Inclosed find wheat joints which I have cut from my field. The wheat is bent down just above the joint. I find by opening the straw that there is an insect on the upper side of the joint. The grain in the head appears to be all right, but the straw and head are not as large as the balance that is standing. My heavy wheat does not appear to have been affected. Would you kindly let me know through the *Nor-west Farmer* what it is, as I presume there are other fields throughout the province affected the same way?'—CHAS. CUTHBERT.

'Winnipeg, August 29.—At several points throughout the province I have noticed this year in the wheat fields that a greater or less proportion of the straws appear to break about the first joint from the ground, and, where this is very bad, it gives almost the appearance of their having been broken down by hail, except that most of the straws seem to lean in one direction as though they had gone down under pressure of high winds from one quarter. I am told by some parties that a little worm about $\frac{1}{4}$ of an inch long is found in the straw, at the first joint. The appearance of the head is entirely different from what we call "dead heads" as the grain is maturing in the heads, some of them still being comparatively green, although I think in every case the grain will be shrivelled, and the heads seem to be shorter and smaller than the average heads in the field. I saw two fields of this out at Melita a little while ago, and yesterday at Otterburn saw a great deal of it, and I understand from the farmers at Emerson, that it is very prevalent throughout that district. I was also speaking to a man from Plum Coulee, who told me he had to set his binder much lower than usual in order to avoid cutting off the heads that were broken down, and I am inclined to think that this trouble, whatever it is, is very prevalent throughout southern Manitoba.'

"Winnipeg, Oct. 11.—I fancy the damage done by the Hessian Fly has been pretty serious in some localities, but, as people were not acquainted with the insect or were not looking for it, not many noticed it; perhaps, too, they attributed the shortage to a wrong cause. I understand that its attacks were very bad in the Stonewall, Carman and Niverville districts."—G. H. GREIG, of *The Farmer's Advocate.*

'Winnipeg, Oct. 3.—In response to your request for information on the Hessian Fly in this province, by Mr. McKellar's instructions, I made an excursion to Stonewall on Friday and Saturday last. There is no doubt whatever that the fly is all through

the wheat-growing country around Stonewall and Balmoral—every farm I inspected had it. I found puparia in every wheat and barley field I entered, and in every stack of unthreshed wheat looked at. I was able to examine the screenings from one threshing place (on the farm of Mr. J. Little) and here there were puparia in abundance. The first place visited was the farm of Mr. J. McEwen, where there was a piece of breaking very bad with the fly. Mr. McEwen estimates the damage at one-third of the crop, and I am sure the estimate is a careful one. The next place visited was Mr. Jas. Little's. It was from this farm that the specimens were sent to you last month. The damage here was quite as great as on the last place, but in this case the land bore a crop of wheat last year. It was on this farm that I examined the screenings from the thresher. Mr. Martin Shepley estimates the damage done to his summer-fallow at one-fourth or perhaps as much as one-third. I have mentioned these three farms because they are the only cases in which I was able to see the farmers and discuss the question with them. As to barley I could secure no estimate of the damage done. No barley had been threshed, and there is not the same interest in the barley crop as in wheat. I did not find the puparia so numerous in barley fields as in wheat fields. The puparia were almost invariably above the second joint, usually singly, though sometimes in twos and threes. I collected a number of specimens of which I send you a few in case you wish to breed the parasites.

'Summer-fallow and breaking suffered quite as badly and as generally as land cropped last year. Fallow and breaking are naturally the earliest sown, as they are soonest in condition for seeding. The weather during seeding was very cold and backward, and continued so up to the 10th June, after which the most perfect conditions for growth prevailed. I may also quote the statement of Mr. J. Little that the wheat which was earliest cut was less broken down than that cut later. In reply to a further question, he said he did not know whether it was less *damaged*, but it was certainly less broken down. Mr. J. McEwen stated that greener portions of a field were less broken down than riper ones. From this I would point out that the amount of damage was estimated generally from the state of the crop before threshing, that green or underripe grain does not break off so readily, and that a crop cut a shade green would not show the full amount of damage done.'—MELVIN BARTLETT, *Dept. Agriculture.*

'Buffalo Lake, Moose Jaw, Assa., Aug. 30.—When I wrote you some three or four weeks ago with regard to the wheat pest, I had not observed any indications of it. Since then it has become quite evident. I learn from a neighbour adjoining me that he had it last year. At present there are quite a number of heads through my crop and a very considerable number in my near neighbour's. It seems especially bad on the outside of the field; where he was cutting wheat 2 or 3 days ago, the outside 10 or 15 feet was very materially damaged. It seemed to attack the maturer heads, not troubling the greener grain much.'—G. S. TUXFORD.

'Emerson, Man., Sept. 1.—I am enclosing to you some samples of wheat straws injured by the insect referred to you some days ago by Mr. Geo. Greig of the *Farmer's Advocate*, Winnipeg. You will find them located immediately above the joint first from the ground. Kindly examine and let us know the name, and likelihood of recurrence another year, remedy if any, and any information you deem of use. This pest is more or less found all over the province, and is estimated to have done as much damage in some places as to reduce the yield 20 per cent.'—W. W. FRASER.

'Winnipeg, Sept 1.—We enclose sample of straw from Winkler Station, where it has drawn attention. Is it the Hessian Fly?'—RICHARD WAUGH, *The Nor-West Farmer.*

'Winnipeg, Sept. 1.—Enclosed find a few stems of wheat straw cut at ground and fallen in crop so as to be missed by the binder. In each straw is an insect, the cause of fall. About one in a hundred of the stems was so affected. What is it and how can it be treated?'

'Holland, Man., October 4.—In every field I have looked (that is in Manitoba), I have found traces of the Hessian Fly. I know of no other insect doing the farmers any injury this season.'—F. D. BLAKELY, of *The Nor-West Farmer.*

'Balmoral, Man.—I am sending you under separate cover an insect in pieces of wheat straw. It is found at the joint nearest the ground. Just above this joint

it eats its way through the stalk and escapes. The straw bends or breaks at this place, leaving the straw as if fowls had pulled it down. One man told me his wheat would not be more than half a crop owing to the work of this insect. Would you kindly let me know what it is? It was not noticed until cutting commenced'.—R. W. NEILL, M.D.

'Pilot Mound, Man.—A considerable quantity of the wheat is breaking down bad y at the second joint. I was attributing the cause to the straw being weak, owing to rust and showery weather making it softer than usual. I have examined some of the broken straws and found one containing a chrysalis, which I enclose. I hope the western wheat fields are not going to be troubled with weevil or any kindred pest. The wheat crop in this district is practically all in stook. Several were thinking that it is always better to begin on the green side as a very severe wind storm seemed to have broken the straw down.'—D. A. STEWART.

'Portage la Prairie, Man.—As to the extent of the damage by the Hessian Fly, it is very uncertain, some districts were more seriously affected than others. We had several light hailstorms here and there, and many farmers thought they were slightly damaged, but I now think that the damage was caused by the Hessian Fly. I find that the yield is not up to the expectations of the farmers, more especially in the older districts, and I am convinced that it was the Hessian Fly that reduced the yield. But we have been blessed with the most uniform good crop I have ever seen in the province, and hence the slight damage done is not seriously felt. The weather has been, and is yet, simply grand. I found in gathering these specimens I send, that they were more plentiful in late grain than in earlier, also the last heads to come out were the most affected.'—CHARLES BRAITHWAITE.

As stated above, last season is the first in which the Hessian Fly is known to have done harm to crops in Manitoba, and many farmers did not recognize the insect until the matter was brought before them by discussion in the daily journals and agricultural press. With a view to gathering as much information as possible about the occurrence and extent of injury, a series of questions was submitted by the *Farmer's Advocate* to its readers, and answers were received from many of them. Some of these answers were published in the issue of December 5, from which it would appear that the loss, according to locality, was from 5 to 25 per cent of the crop, and that the attack was general, irrespective of the nature and condition of the soil, or the time of seeding. Nevertheless farmers in different localities held strong opinions that there were decided differences, some stating that early sown grain was exempt from attack, while others thought the opposite. Mr. W. R. Graham, Superintendent of the Stony Mountain Penitentiary farm, Manitoba, stated to me on October 4, 1899, that the Hessian Fly did not attack his early sown wheat at all, and he thought this was general throughout his neighbourhood, that in 1899 early sown wheat was much less attacked than that which was sown late and held back by the late season.

In answer to the questions in the *Farmer's Advocate*, Mr. R. W. Greig, of Otterburn, reports that late-growing grain suffered most, although, in some cases, that which was sown very early was injured more than some of that which was put in late. Mr. H. O. Ayearst, St. Paul's municipality, reports wheat on new land as 'badly damaged, at least 25 per cent of the crop; no injury on old land, new land only being injured.' On the other hand, Mr. S. R. Henderson, of Kildonan, reports it to have been 'worst on old land that had been summer-fallowed,' with surface cultivation in the spring, and sown early.' Mr. Robert Fisher, of Springfield, says: 'I could see no difference on old land or new, fallow or stubble, fall or spring ploughing, or in early or late sowing, though none of our sowing was very early. My own crop was seriously injured by the fly, 8 to 18 per cent of the whole crop being destroyed.'

The extent of injury was doubtless due to the condition of the wheat plant at the time the females were laying their eggs. The injury by the maggots of the summer brood is, as a rule, at the lowest joints of the stems, and, as upon hatching the young maggots work their way down to the base of the leaf upon which the eggs were laid, it would indicate that the plants which showed injury were those of which the stems were just shooting up at the time the eggs were laid. At the same time, it must be remem-

bered that there is on spring wheat in spring an early attack at the roots similar to that on fall wheat in autumn, by which very large numbers of wheat plants are destroyed without making stems at all. This attack is, as a rule, not noticed by farmers, because the plants which are left living, stool out more and fill up the gaps.

In a field which I had under constant observation during the summer of 1890, many plants were entirely killed by the spring attack, and others bore only a single weakly stem, most of the shoots having been destroyed; but, from the stooling of the uninjured plants, the general appearance of the field was that of a fair crop, and noneof the straws could be found containing puparia, showing that all the eggs were laid before the plants began to shoot. Without close observation this attack would have been overlooked and would not, in all likelihood, have been noticed by farmers. Nevertheless the puparia of the insects which had done the harm, were still in the fields to emerge later and carry on the injury. This same state of affairs may have been the case in Manitoba last year, and much injury then done which was unnoticed. Although not detected, the Hessian Fly must certainly have been present in Manitoba in considerable numbers last year for eggs to have been laid over such a wide area. I have no doubt from an examination of specimens collected in various parts of Manitoba last autumn, that in that province there is only one brood of the Hessian Fly. This insect confines itself in a remarkable degree to the wheat plant, and, although barley and rye are occasionally attacked, this is exceptional; the very rare occurrence of pupæ in timothy, which has been recorded, must be regarded as quite accidental. No fall grain of any kind is grown in Manitoba, and puparia formed in the straws last summer still (December 30, 1899) contain living larvæ in good condition.

Prof. F. M. Webster, the author of most valuable studies on wheat pests, has maintained for many years that the Hessian Fly would be found to be single-brooded when a point sufficiently far north or south of its metropolis, or centre of distribution, was reached, the extremes either of cold or heat preventing the production of food in suitable condition for the second brood, the summer brood instead of emerging in autumn hibernating as flax seeds in the north and in the south remaining in a quiescent condition (æstivating) as flax-seeds during the hot dry period of the protracted southern summer.

This theory of the insect's power to adapt itself to varying conditions was explicitly set forth by Prof. Webster in Ohio Bulletin No. 51, 1893, and as late as March last the same author writes:—'As you know, I have always questioned the occurrence of a second brood of Hessian Fly so far north as North Dakota, but I have never had an opportunity to substantiate my position. I had hoped that you might settle this Hessian Fly problem, and put the question to rest once for all with respect to the number of broods. The insect certainly occurs in areas where there is no fall wheat, but an abundance of spring wheat, and it does not seem to me possible that it could survive in such localities if it were double-brooded, as there is nothing on which a fall brood could winter over, except the spring wheat stubble.'

The importance of exact knowledge as to the number of broods is seen to be very great when we come to a consideration of remedies. The severity of the attack during the past season and the interest which has been created in the subject, through the agricultural journals, added to the fact that the weather has been most propitious this year for autumn work, have induced farmers to make themselves acquainted with the natural history of the Hessian Fly, and to adopt the methods which experience has shown are the best: namely, to burn over the stubble when possible before ploughing, and, at any rate, to plough down deeply all stubble this autumn or before the season for the flies to appear next spring.

As Mr. Greig has stated in the *Farmer's Advocate* for October 20 :—'Whether or not the stubble is burned off, the land should be carefully ploughed. Even with no Hessian Fly, careful ploughing is really one of the great essentials to a successful crop. The work cannot be too well done. Not only does good ploughing leave the land in better shape and kill more weeds, but it greatly reduces the amount of harrowing and after work necessary to get the land into the best condition for the seed; and no doubt grain that comes away vigorously and early, and makes rapid growth, has more chances of escaping this or any other pest.'

The following article was published in the *Farmers' Advocate* for September 15, 1899, and similar articles were prepared for the *Nor-West Farmer* and other Manitoban papers:—

THE HESSIAN FLY.

During the past season rather extensive injury has been wrought by that old-time enemy of the wheat-grower, the Hessian Fly. From Western Ontario comes intelligence of the worst attack upon fall wheat, and the question is asked by some farmers there, whether it would not be well to discontinue altogether for a season the cultivation of fall wheat. The most serious injury and the attack of by far the greatest importance as pointing to future possibilities of loss from the Hessian Fly is reported from the Province of Manitoba, by Mr. George H. Greig, the Manitoba editor of the *Farmer's Advocate*. Inquiries and specimens have been received from almost all parts of the province, and from as far west as Moose Jaw in the Territories. Correspondents estimate the loss at between 5 and 20 per cent. This, of course, is all in spring wheat, as in the west no grain is sown in the autumn.

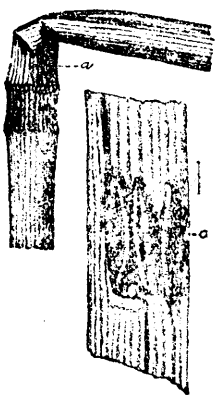


Fig. 3.—Hessian Fly: injured wheat-stem; three puparia enlarged.

The life history of the Hessian Fly is well known. The effects of the injurious work of the maggots on fall wheat can be recognized in the spring of the year by one or more dead shoots or whole plants in wheat fields. Upon examining these plants the characteristic pupa-cases, which resemble closely small elongated flax seeds, may be found in the crowns of the injured plants. Sometimes three or four specimens will occur beneath the leaf-sheaths of a single shoot. The flies from this brood emerge in the spring and lay their eggs upon the leaves of the shooting grain, and later, as at the present time in Manitoba, the same flax-seed-like pupa-cases described above and shown at Fig. 3 may be found above (as a rule, but occasionally higher), the first or second joints of the stems of barley, rye and wheat, where they lie between the base of the leaf-sheath and the stem, somewhat sunk in the tissues, so as to give the appearance of being actually inside the stem. During their growth the maggots have lived at the expense of the wheat plant, sucking the sap, so that the stems are weakened and frequently fall down, bending over just above the point of attack. This is well shown at Fig. 3*a*, and by it the presence of this enemy will probably be recognized by many Manitoba farmers who may have overlooked it in their crop. In Manitoba, it is most probably the case that there is only one brood of the Hessian Fly in the year, the winter being passed in the 'flax-seed' condition, for the most part in the stubble, but also to some extent in the straw which was harvested. Further south than Manitoba there are two distinct broods.

The perfect insect, a tiny blackish gnat, not expanding more than a quarter of an inch from tip to tip of its wings, appears in May and June and lays its eggs, which produce the summer stem-attacking brood. In Manitoba the flies from this brood do not emerge until the following spring, but in Ontario they appear in August and until about the middle of September, and the females lay their minute scarlet eggs upon the inside crease of the leaves of early-sown fall wheat. The young maggots, upon hatching, work their way down to the axils of the leaves, where the injury to the plant is done. Most of these maggots become full grown before winter sets in, and assume the 'flax-seed' condition.

Remedies—1. Late sowing.—With regard to fall wheat, the postponement of seeding until after the third week in September delays the appearance of the young plants above the ground until all the egg-laying flies of the second brood are dead. In cases where fall wheat has been sown in August and is already well up, it will be well this year, in such localities as the Hessian Fly is known to have been present, to feed off the young grain with sheep. In this way many of the eggs, it is claimed, are eaten with the leaves of the wheat. Care must be taken that the fields are not cropped too closely or too late in the season.

2. Burning refuse.—Many of the 'flax-seeds' of the summer brood are carried with the straw, and at threshing are dislodged and thrown down beneath the machine,

among the rubbish, or are left in the straw. All screenings and dust should therefore be destroyed carefully, and all straw should be either used during the winter or burnt before spring.

3. Fertilizers.—When it is known that a young crop of fall wheat has been injured by the Hessian Fly, it is a good plan to apply, the following spring, a light dressing of some quick-acting special fertilizer in order to invigorate the plants.

4. Treatment of stubble.—As the Hessian Fly is undoubtedly restricted in Manitoba to the summer straw-attacking brood, the remedy is simple, and, if persisted in, I cannot think that the Hessian Fly need ever become a serious menace to western wheat-growers. The insects passing the winter for the most part in the stubble and not appearing until the following spring, when there are growing wheat plants for the females to lay their eggs upon, if the stubble be burnt over or plowed down in autumn and the straw fed to stock or burnt at any time before the flies emerge in the spring, this dire enemy of the wheat-grower should be easily controlled.

It was to be expected, as stated in my last annual report (*Exp. Farm Report*, 1898, p. 174), that at no very distant date we might have trouble from the Hessian Fly in our western wheat fields, for Prof. Lugger has recorded that in the Red River valley, in Minnesota, where the conditions are similar to those of a large part of Manitoba, a large area of that state was infested in 1896, the damage in some places amounting to more than 25 per cent, and that on an average the farmers lost from 5 to 10 per cent of their entire wheat crop.—J. FLETCHER.

Fig. 4.—Hessian Fly: puparium containing six cocoons of *Polygnotus hiemalis*—enlarged.

One of the chief reasons why the Hessian Fly has not been very injurious in Minnesota since 1896 is, Prof. Lugger thinks, the abundance of parasites which appeared in 1897. A few of these friends of the farmer (*Polygnotus hiemalis*, Forbes) have been found in infested straws sent to me by Mr. W. W. Fraser from Emerson, Man. Three specimens of the most important parasite of the Hessian Fly, *Bœotomus* (*Merisus*) *destructor*, Say, were bred by Professor Lugger from straws sent to him by Mr. Chas. Braithwaite from Portage la Prairie. It is to be hoped that these parasites will increase largely in numbers. Unfortunately, however, Professor Lugger writes under date October 20, that in Minnesota 'Parasites of the Hessian Fly, are decidedly scarce this year. From 40 different places (about 75 infested straws from each) I have raised less than 25 parasites. Nearly all of them came from straw obtained from near Crookston, Polk Co., Minn. South of that place I have found none, north but a few.' Manitoba material received from Mr. Braithwaite contained three specimens of the females of *Bœotomus destructor*. On the other hand, in Prince Edward Island a much more satisfactory state of affairs may be reported; for, from a packet of infested straws from Mr. Wyatt received during 1898, no less than five different kinds of parasites were reared, viz:—*Bœotomus destructor*, *Eupelmus Allynii*, French, *Eupelmus*, n. sp., *Tetrastichus productus*, Riley, and *Entedon*, possibly *E. metallicus*, Nees. Cuts 3, 4, 5 & 6, used here have been kindly lent by

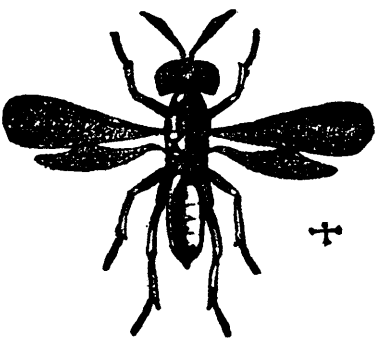


Fig. 5.—*Bœotomus destructor*, female—enlarged.

Fig. 6.—*Eupelmus Allynii*, male—enlarged.

Prof. Lugger. Reports from Prince Edward Island this year mention serious injury by Hessian Fly; this is most probably owing to the increase in the numbers of these parasitic species.

THE DESTRUCTIVE PEA APHIS

(*Nectarophora destructor*, Jnsn.).

Attack.—Pale green plant-lice with legs darkened, particularly at the joints, honey tubes very long; clustered in enormous numbers at the tips of the shoots, beneath the leaves, and sometimes over the whole plants of field peas, as well as upon the flowering Sweet Peas. These insects appear suddenly in large numbers and very soon kill the plants by sucking their sap. The winged specimens are rather large for aphides, being about one-eighth of an inch in length, with a wing expanse of nearly one-quarter of an inch.

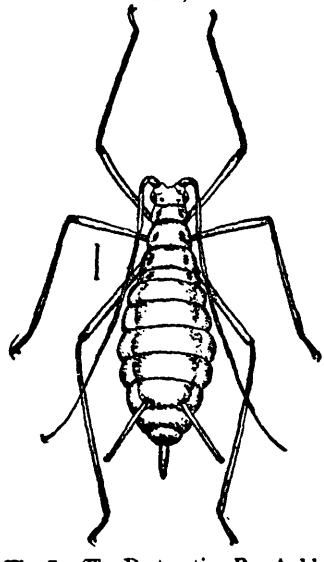


Fig. 7.—The Destructive Pea Aphis; wingless viviparous female—enlarged.

One of the most remarkable outbreaks of the year, which extended over a very wide area, was by a previously undescribed species of plant-louse. This was reported from various places in Canada from the Maritime Provinces to Western Ontario, even extending up into the sparsely settled country in the Nipissing District. It also occurred in destructive numbers in many parts of the United States; Prof. Johnson, of Maryland, the describer of the species, who read a paper on the subject at the last meeting of the Association of Economic Entomologists, says:—

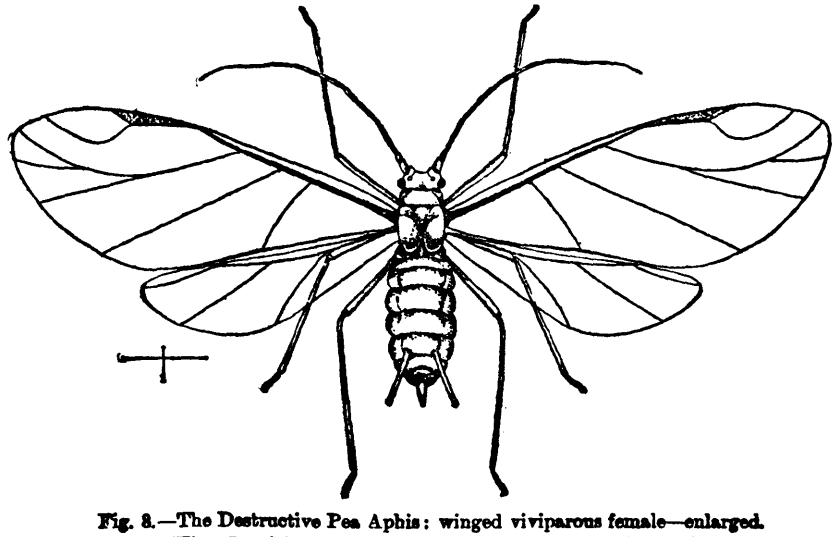


Fig. 8.—The Destructive Pea Aphis: winged viviparous female—enlarged.
(Figs. 7 and 8, after Johnson, Md. Agr. Exp. Sta. Bul. 63.)

'Pea growers nearly everywhere along the Atlantic coast consider that they have been visited by a veritable scourge. The attack has not been confined to Maryland alone, but I have records of the occurrence of the pea-louse in Delaware, New Jersey, New York (Long Island), Pennsylvania, Virginia, North Carolina and Connecticut.

'The growing of peas in Maryland is a very important industry, and reliable conservative authorities place the loss this season at $3,000,000, the principal cause being the pea-louse. In many cases the destruction was complete, varying from mere garden patches to hundreds of acres.'

The Destructive Pea Aphis appeared in alarming numbers in the United States this year much earlier in the season than was the case in Canada, and consequently the loss to pea growers was greater, because in Canadian fields the seeds inside the pods in some instances had become fully formed before the Aphis appeared. By the end of May in Maryland many acres of peas were already destroyed, but in Canada it was not until the very end of July that the first complaints of injury began to be received.

The following extracts from some of the letters of correspondents will give an idea of the suddenness with which this insect appeared and the extent of its injuries :—

'Alberton, P.E.I., Oct. 31.—It appeared as if nature had striven this year to multiply aphides to infest every kind of plant. All the fruit trees were infested, the whole range of garden truck had its load, and out in the fields they so mutiplied on peas sown without grain as to flatten vigorous crops to the ground and completely ruin them. The rain prevented the kerosene emulsion from doing its work.'—REV. A. E. BURKE.

'New Minas (Kings Co.), N.S., July 29.—I observed to-day when walking through my peas, that there were swarms of active flies somewhat resembling house flies, only very shiny. (These were evidently Syrphus flies, the larvæ of which do such good service by feeding upon plant-lice, as stated further on.—J.F.) On looking closely, I found that the vines, including the young pods, were all covered with creeping insects. I send you some of these, and shall be glad to know anything you can tell me about them, for I fear that they will destroy the crop.'—BUDD BISHOP.

'Nappan (Cumberland Co.), N.S., August 8.—I send you samples of the work of the insect which is destroying our peas. I am very much afraid that it is going to ruin completely our experimental pea plots. These insects increase and spread with amazing rapidity. On Aug. 2, I went carefully over all the pea plots and noticed that there were a few of these insects distributed all over them. By the 6th they were in great numbers in spots all over the field, and now, two days later, they cover the whole vines, so that the whole crop will surely be ruined. The lice cluster upon, and completely hide the tender parts of the stalk, the blossoms and the under surfaces of the leaves. On account of their being mostly on the undersides of the leaves, it is hard to get at them with any kind of spray. This aphis seems to be very much like the one we sometimes have on plum trees, but it is now much more numerous than anything I have ever seen on plum trees, for these literally cover the whole field and they only take about 10 days from the time they first appear to suck the life out of the plants and leave white dead stalks. I am afraid this is a very serious matter for our pea crop.'—R. ROBERTSON, *Superintendent Expt'l Farm.*

Later in the season Mr. Robertson wrote under date of Dec. 15: 'The worst insect of the year with us was the Pea Aphis which was not only extremely abundant and destructive on our own farm; but judging from the number of inquiries by visitors at Nappan, about what was termed in a general way 'the blight,' it must have been very prevalent in many parts of New Brunswick and Nova Scotia.'

'Adamsville (Kent Co.), N.B., Aug. 18.—I send you herewith a stalk of pea covered with insects. All the fields of peas around here are covered with them and they kill the peas outright. I have a field infested; when I first noticed them was when the peas were in blossom. They appeared to be withered, so I examined them closely and found that they were covered with these little insects. The plants are now all withered and look as if they were rusted. I have found the insect also on vetches here. I inclose you a sample of these also; they are destroyed in the same way as the peas. I am cutting them at once for fodder. I would like to know if it will be injurious in any way to feed these vetches to cattle or horses. This enemy of the pea and vetches has never been noticed in this section before.'—A. J. ARSENAULT.

'Elmhurst (King's Co.), N.B.—Our field peas shortly after the formation of the pods became infested with green lice, which were to be found on all parts of the plants,

but especially thick on the pods. The plants then turned brown and dried up so as to be useless as fodder. Is there any remedy for this pest? Would it be any benefit to have the next crop at some distance from the one infested?'—C. R. PETERS.

'Thornloe (Nipissing District), Ont., Sept. 14.—My crop of peas was entirely ruined by plant-lice about half the size of a grain of wheat, which were on the plants by millions. These peas were the first ever sown on my farm, as I only came here last fall. I would like to know if this pest is often found in open country. The clearing in this part amounts to only a few acres here and there, in an immense forest of rather light young timber. If it had not been for these lice, my peas would have been a good crop, as the land suits peas, so far as they have been tried by my neigbours.'—SAMUEL REID.

'Toronto (York Co.), Ont.—I am greatly troubled this summer with green-flies, upon my sweet peas. They are in great numbers; I never saw so many as there are this year When I went along the vines with the spray from the hose, they would fall on the ground so thickly as to make it green. There was another kind which attacked the plants under the ground clinging to the roots. This is of a brick red colour but otherwise resembles very closely the green-flies which were so numerous on the leaves and stems. When I pulled up some sickly vines last summer, I also found some of these insects clinging to the roots. These latter are not so numerous as the green ones mentioned above. Wireworms, cutworms and red spiders have also given me a great deal of trouble on my sweet peas this year.'—ED. LEADLEY.

'Freeman (Halton Co.), Ont., Aug. 7.—I send a sample of peas heavily infested with plant-lice. These are from a 14-acre field belonging to my cousin, F. W. Fisher, at Burlington, close to here. This is a fair sample; I have never seen anything like it before and should like to know if it is common. I should like to know what variety of aphis this is, for it looks as if the whole crop would be lost.'—GEO. E. FISHER.

This pea aphis was also very destructive to both field peas and Sweet Peas at Ottawa, but in the case of the field peas the outbreak occurred so late in the season that most varieties ripened before much harm was done. Sweet Peas in many gardens were badly attacked. Perhaps the worst case of infestation was upon a hedge of Sweet Peas planted rather late upon the Central Experimental Farm, where an excellent opportunity was afforded of watching the development of the plant-lice and also of a war which was waged strenuously against them by various kinds of parasites. The plant-lice clustered thickly around the young shoots and towards the ends of the branches, stunting the growth of the plants very much and preventing them from flowering. They appeared at Ottawa in the middle of August, and some specimens could be found right up to the hard frosts of late autumn. By the beginning of September several kinds of predaceous insects, such as lace-winged flies, lady-bird beetles and Syrphus flies, began to appear in large numbers, and from that time on the numbers of the plant-lice decreased rapidly. When the lady-bird beetles began to pupate, they crawled up above the vines and attached themselves to the wire netting intended for the sweet peas to climb over. This they studded so thickly as to be noticeable from a considerable distance. The species which were most numerous were *Hippodamia convergens*, Guér., and *Coccinella 9-notata*, Hbst. Next to these were the larvæ of *Syrphus ribesii*, L. This latter, however, was unfortunately rather commonly attacked by the hymenopterous parasite *Bassus lætatorius*, Fab., which again in its turn occasionally fell prey to the small Chalcid *Isocratus vulgaris*, Walk. In addition to the above parasites many specimens of *Praon cerasaphis*, Fitch, were bred from material collected at Ottawa. In one garden another minute Braconid, a new species of *Aphidius*, which has been named by Mr. Ashmead, of Washington, *Aphidius fletcheri*, did good service. The empty shells—the bodies of the hosts—from which the parasites had emerged, were very abundant on the plants. These hymenopterous parasites were kindly identified by Dr. Howard, U.S. Entomologist.

I had not an opportunity to examine material from all the localities at which this plant-louse occurred in Canada during the past summer, but parasites in numbers were found at most places; and, if the Ottawa outbreak may be taken as a guide, added to the fact that although so injurious this year the Destructive Pea Aphis has never appeared in destructive numbers before, we have reason to hope that even next year it may not again be the cause of serious loss. It must be noted, however, that the occur-

rence of the parasites seems to have been extremely restricted as to locality. The *Aphidius* mentioned above was very abundant in the garden of Mr. Collingwood Schreiber at Ottawa, while hardly a specimen could be found at the Central Experimental Farm, only two miles distant, where another parasite, *Praon cerasaphis*, took its place as the abundant species. Prof. Johnson, who has made careful studies of the insect in the United States, expressly states that he has been unable to secure a single true parasite from the many hundreds of specimens he has attempted to breed. On the other hand, he found the predaceous insects feeding upon them in some localities in extraordinary numbers. Speaking of the larvæ of one of the Syrphus flies, or Hovering flies, as they are sometimes called, he mentions one instance, as reported to him by a reliable grower, that 25 bushels of the larvæ were run through his screens the last few days they were working at threshing. At the same time, hardly a Destructive Pea Aphis could be found where only a few days previously they were present in countless millions. The Syrphus flies are very active, with bodies as a rule bronzed and marked with yellow, almost like wasps. They may be recognized by their habit of remaining apparently stationary, poised in mid air for a few seconds, and then dashing off a few feet to take up another position in the same manner. The adult flies do not themselves eat the plant-lice but their elongated leech-like larvæ live entirely upon them. The eggs are laid near the colonies, and when the young grubs hatch they crawl among the plant-lice, and having transfixed one they raise it up and hold it aloft until they have sucked all the juices out of the body. They are voracious and grow rapidly, destroying a very large number of plant-lice in a day. There are several species, all of which feed upon aphides. When full grown the larvæ harden into pear-shaped puparia, and the flies emerge soon afterwards. There are several broods in a season. The lady-bird beetles are such good friends of the farmer and gardener that everybody ought to know their appearance, but there is never a year passes but some one reports having taken great pains to destroy them when they have been found in numbers, believing them to be enemies. The grubs have aptly been said to somewhat resemble small alligators. The lace-winged flies also have larvæ of somewhat the same appearance, but smaller. They are armed with long hollow jaws with which they suck out the juices of the plant-lice, and are equally voracious with the lady-bird beetles. There are many points of interest about these lace-winged flies. The eggs are beautiful objects, being attached to the end of slende upright threads. The perfect insects have gauzy lace-like wings which, when not in use, are folded together like a pent-house over the back. Their eyes are bright golden bronze.

Fig. 9.—Fifteen-spotted Lady-bird: *a*, larva; *b*, pupa.

In Mr. Leadley's letter above quoted, mention is made by him of a bright red aphis found by him on the roots of his sweet peas. Specimens of this same aphis were sent in last year by Messrs. Steele Briggs Co, of Toronto, but the species was not identified from the few specimens sent, as no winged individuals could be found. Upon the outbreak of the Destructive Pea Aphis last summer it was thought that perhaps the species concerned might be the European *Siphonophora pisi*, Kalt., but Dr. Howard informs me that this latter is a much smaller species.

Remedies.—When an insect appears suddenly in the large numbers that the Destructive Pea Aphis did during the past season and increases with such rapidity, it is evident that it would be impossible to apply any remedy over such a large acreage as was simultaneously attacked, in most places where this insect occurred; but upon green peas and the flowering sweet peas in gardens the ordinary remedies used against other plant-lice were found to be quite effective against this one also. Upon the Central Experimental Farm the Horticulturist had the plants sprayed with a tobacco-and-soap wash made of 10 lbs. of tobacco leaves in half a barrel of water, the liquid from which was strained off after a few hours, and two pounds of whale-oil soap were added. When the soap was all dissolved, water was added to make 40 gallons, and the liquid was then applied with a spraying pump. Most of the plant-lice were found to be dead two

days afterwards and on such parts of the rows as received two applications, the vines were quite cleared of the insects.

THE ASPARAGUS BEETLES

(*Crioceris asparagi*, L., and *C. 12-punctata*, L.)

Attack.—The Common Asparagus Beetle—Slender black beetles about ¼ of an inch in length, conspicuously marked with six white blotches on the back and a red border to the neck and elytra, or wing-cases, appearing in the early spring and eating into the asparagus shoots, upon which they lay their greenish black eggs. The grubs, which hatch from these eggs, are dark olive and slug-like. These also attack the shoots. The Twelve-spotted Asparagus Beetle :—Occurring sometimes with the above, are beetles of about the same size, but slightly broader and of a uniform reddish orange colour, with twelve black spots upon the wing-cases. The grubs somewhat similar to those of the Common Asparagus Beetle, but of a dirty yellowish colour, feed inside the berries of asparagus.

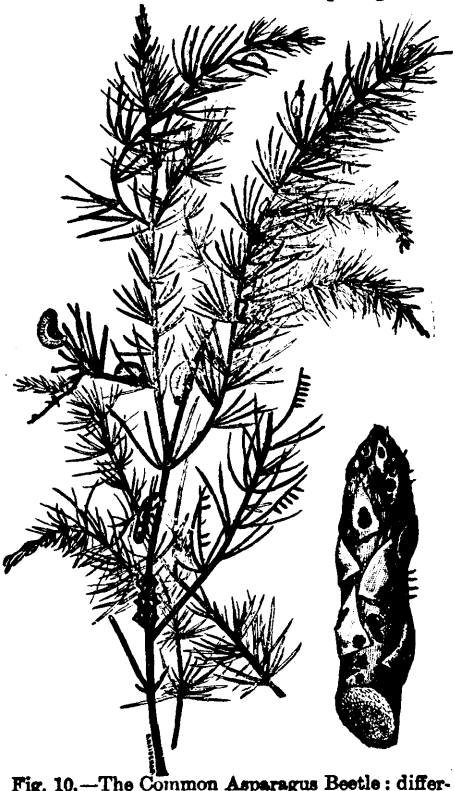


Fig. 10.—The Common Asparagus Beetle : different stages on asparagus spray.

Both kinds of Asparagus Beetles have been common in some parts of the Eastern United States for many years. The former obtained a permanent foothold on this continent in 1856, and the latter in 1881.

THE COMMON ASPARAGUS BEETLE.—The first record of this insect, as a crop pest, in America was at Astoria, near New York city, in 1862. In a most complete article on the subject, by Mr. F. H. Chittenden in the United States *Year Book* for 1896, it is stated as follows :—"From the seat of its introduction at Astoria, forty years ago, it soon spread to the asparagus farms of Queen's County, N.Y., and by 1862 it was reported to have occasioned the loss of over a third of the crops of certain localities, such loss being estimated at $50,000."

The Common Asparagus Beetle is now found as an enemy of the asparagus plant in most of the North-eastern States, lying in the Upper Austral faunal zone. Its distribution is by means of the adult beetles flying, and by their transportation to new localities with the roots of asparagus.

Last year it was reported by Mr. A. H. Kilman (*Rep. Ent. Soc. Ont.*, 1898) that it had reached the Niagara River in the State of New York, and during the past summer it occurred in injurious numbers in the Niagara peninsula of Ontario. The first Canadian specimens sent to me were from Mr. E. Arnold, of Queenston (Lincoln Co.), Ont., and upon enquiry I learn that many asparagus beds in the Niagara district were much injured last season. Mr. John Dearness, a member of the San José Scale Commission, informed me that during 1899 he had seen the beetles abundant and injurious near St. Catharines, Ont., where also he had found that the beds were badly affected with the Asparagus Rust (*Puccinia asparagi*, DC.)

Fig. 11.—The Common Asparagus Beetle—enlarged.

The Common Asparagus Beetle is a narrow black beetle a little less than ¼ of an inch in length and very prettily marked. The head legs and feelers are blue black, the thorax is chesnut red, the wing-cases are mainly blue black with six silvery white spots and are widely bordered around their edges with orange red. The markings on the wing-cases have, as shown in the illustration, somewhat the appearance of a double black cross. The wing-cases are shining and bear several longitudinal lines of deep punctures. This insect injures asparagus both in the larval and perfect states. The perfect beetles pass the winter hidden beneath rubbish, loose bark of trees or stones, and appear just at the same time as the asparagus comes up, when they fly to the buds and begin to eat into the succulent shoots, upon which also they lay their eggs. These are brownish black in colour, large, compared with the size of the beetle, being nearly one-sixteenth of an inch in length, nearly three times as high as wide, and stand out in every direction from the shoots. They are attached by one end and are laid on the shoots, and later on the foliage, in rows of 6 or 7 eggs. The young grubs hatch in a few days and are grayish with black shiny heads and legs, admirably shown in figure 12 *c*. They at once attack the young shoots, eating into them, and when touched these larvæ also emit a dirty blackish fluid which soils the shoots, spoiling them for the market. They are very voracious and grow rapidly, becoming full grown in about a fortnight, when they are dark greenish-gray, shiny bag-like grubs (Fig. 12*d*), which crawl quickly but clumsily, drawing up their bodies and attaching themselves by their anal prolegs to the object upon which they are crawling. When ready to pupate, the grubs burrow into the ground and change to yellowish pupæ (Fig. 12*e*). In about a month from the time the eggs are laid, according to Fitch, the perfect beetles appear. There are probably two broods in a season in Canada. Mr. Chittenden says (*loc. cit.*): "The minimum life-cycle period of the species in the District of Columbia and southward is about three weeks from the time the egg is laid. In the colder climate of New England and in spring and summer weather the development from the egg to beetle will require from four to perhaps seven weeks. In its northern range two and perhaps three broods are usually produced, and further south there is a possibility of four or five generations each year."

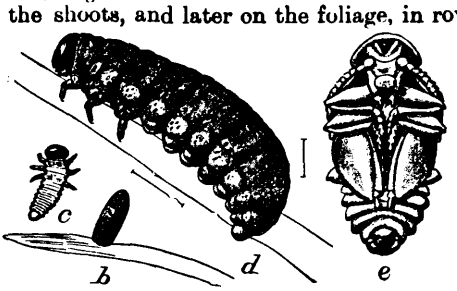


Fig. 12.—The Common Asparagus Beetle: *b*, egg; *c*, *d*, larvæ; *e*, pupa—enlarged.

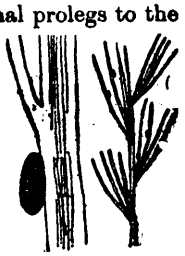


Fig. 13.—Egg of Spotted Asparagus Beetle—enlarged.

THE TWELVE-SPOTTED ASPARAGUS BEETLE is about the same length as the above but is a slightly broader insect. The general colour is orange red, and the wing-cases bear 12 round black spots, the knees are also marked with black. This species was a much later introduction into America than the Common Asparagus Beetle, not having been noticed until 1881, when it was found in considerable numbers at Baltimore, Md., by Prof. Otto Lugger. It has, however, spread rapidly and now occurs with, and covers almost the same area as, the Common Asparagus Beetle.

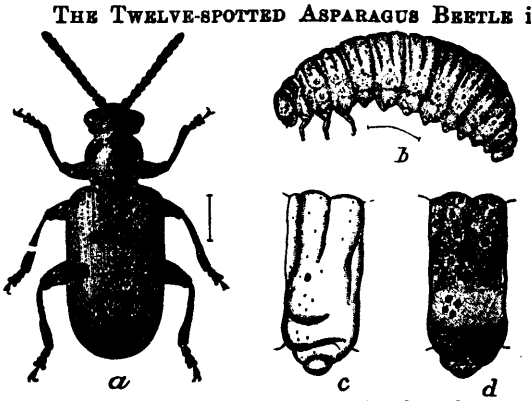


Fig. 14.—The Twelve-spotted Asparagus Beetle: *a*, beetle; *b*, larva; *c*, 2nd abdominal segment of larva; *d*, do. of *O. asparagi*—*a*, *b*, enlarged; *c*, *d*, more enlarged.

In the Canadian occurrence of these beetles during the past summer, both

species were about equally numerous on the infested beds. In the United States the 12-spotted Asparagus Beetle is regarded as rarer and less injurious than the common species. Although the hibernated beetles appear equally early in the season with the Common Asparagus Beetle and attack the young shoots, Mr. Chittenden states (*Bull. 10*, n.s., U.S, Div. Ent.) that the larvæ live chiefly in the green and ripe fruit of the Asparagus. There are, however, several records of serious injury by this species in early spring to the growing crop. Mr. Chittenden has described the eggs and the method of oviposition as different from those of the Common Asparagus Beetle (*Bull. 10*). Instead of being attached by one end and having the surface sculptured, these are attached to the plant by their sides as shown natural size and enlarged (Fig. 14). The larva also differs much (Fig. 14 *b*, *c*). Mr. Chittenden thinks that these larvæ live almost entirely in the berries, each one passing from one that it has excavated to a fresh one when in need of food. The berry drops off soon after the larva enters it, and the first brood of the beetles matures long before the berries redden on the plants. The same writer also gives the following very accurate description of some of the habits:—It is about the same size and proportions as the larva of the common species but is readily separable by its ochraceous orange colour. The ground colour is light yellowish cream overlaid with ochraceous orange; the head, with the exception of the mouth parts, is also ochraceous. Thoracic plate dark brown divided into two parts.

Mr. Chittenden gives the following very accurate description of some of the habits of these insects:—"The Twelve-spotted Asparagus beetle, as it occurs on the plant when in fruit, very closely resembles at a little distance the ripening asparagus berries. The Common Asparagus Beetle, as is well known, dodges around a stem like a squirrel when disturbed, but the Twelve-spotted form appears to trust to flight, taking wing more readily than the other. Both species make a loud creaking sound when handled. This stridulation is produced by rubbing the tip of the abdomen against the elytra."

Figures 10 to 14 in this article have been kindly lent by Dr. L. O. Howard the U. S. Entomologist.

Remedies.—Owing to the inadvisability of applying any poisonous substances to the young shoots in spring, at the time they are being cut for the market, with the object of destroying the hibernated beetles, remedies should be directed mainly against the larvæ which appear on the plants during the summer. There are many useful measures which may be taken to control these insects:—

1. Dusting with lime.—Perhaps the most effective is the destruction of the larvæ by dusting the plants at short intervals, every three or four days, with fresh air-slaked lime, which adheres to their slimy bodies and quickly kills all those with which it comes into contact. This is best done early in the morning when dew is on the plants.

2. Arsenites.—Active poisons, as a mixture of Paris green and flour, or Paris green and lime, applied dry to the grown stems in the same way as for the Colorado Potato Beetle, answer well, and kill not only by contact with the larvæ but destroy both the larvæ and the perfect beetles when they eat the poisoned foliage.

3. Beating.—The beetles and many larvæ may be beaten from the asparagus plants into nets or broad pans containing water and coal oil. Nets made specially for the purpose are most convenient. A good pattern for an easily made net which can be held beneath the plants with one hand while the insects are beaten down on to it with a light rod, has a stick on each side and a flat sheet of cotton between, three feet wide at the top and one foot at the bottom (Fig. 15). Two cross bars close together at the base allow of this net being easily held by taking the upper bar in the left hand, so that the lower bar rests against the back of the wrist. The larvæ may also be brushed off the plant with a stick, and, if this is done in the middle of a hot day, it is claimed that few of them get back again, a very short time in the hot sun proving fatal.

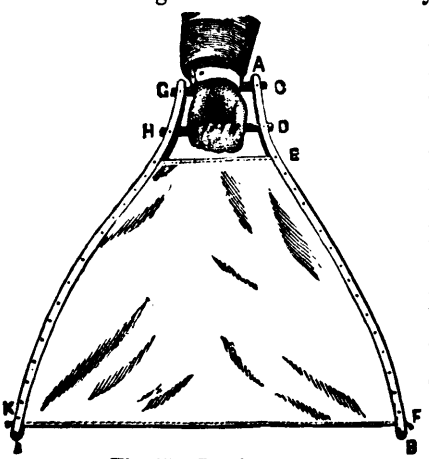


Fig. 15.—Beating net.

4. Traps.—During the cutting season the crop should be kept well down, a few shoots being left to attract the egg-laying females. In a week or so these should be cut and destroyed, other shoots being left to take their place. Young beds not old enough to be cut should be kept dusted with lime.

5. Poultry.—Chickens and ducks when available are very useful in eating the beetles when they first appear in spring, and it is claimed they do no harm to the beds.

THE BLACK VIOLET APHIS

(Rhopalosiphum violæ, Pergande).

Attack.—Dark coloured plant-lice clustering beneath and about the bases of the leaves and penetrating into the heart of violet plants grown under glass for winter flowering, sucking the plants and injuring them so as to prevent them from flowering, the growth being stunted and the leaves curled up.

During the convention of the Canadian Horticultural Society held at Ottawa last September, Mr. J. H. Dunlop, a large florist of Toronto and an extensive grower of violets under glass, asked what could be done to prevent the attacks upon his violet plants by the Black Violet Aphis, which he stated had been a cause of considerable loss in his greenhouses. On October 13, a visit was made to Mr. Dunlop's establishment by Mr. Arthur Gibson, of this Division, and specimens of the plant-louse mentioned were secured. These have since been bred in confinement, and specimens have been kindly identified by Mr. T. Pergande, through Dr. Howard's courtesy, as *Rhopalosiphum violæ*, a species lately described by Mr. Pergande. As a plant-louse, when examined closely, this is a very beautiful species, the body being of a brownish green, marked with black patches, and the stigma and all the veins of the wings are clearly and broadly marked with black. At the time of Mr. Gibson's visit, the aphides were very numerous, almost every plant examined in most of the violet houses being found to be infested. Very little systematic work had been done at that time towards controlling these insects. Mr. Dunlop was of the opinion that, as is known to be the case, the violet is easily injured by tobacco fumigation; consequently, little smoking had been done. Later, however, the attack became more serious and was the cause of a loss in this year's violet crop, estimated at $1,000. Fumigation with tobacco had been resorted to for three weeks at intervals of one week apart, at the time of a second visit paid by Mr. Gibson on December 26. Powdered tobacco stems had also been dusted over some of the plants. These applications had killed many of the aphides, and the insects were then practically under control, but the plants were showing many spotted leaves. The treatment of violet plants with tobacco is considered objectionable by the best growers. Mr. B. T. Galloway, Chief of the United States Division of Vegetable Physiology, who has studied the commercial culture of violets and is the author of an excellent book upon that subject, writes as follows with regard to some leaves which were submitted to him from Mr. Dunlop's houses where the fumigation had been done:—'The violet leaves are affected with the well known spot which is very apt to appear at almost any season of the year under certain conditions. In our experience we have never found it safe to use tobacco in any form on violets; even the very weakest fumigations have a tendency to weaken the foliage and bring on spot. My suggestion in this case would be to thoroughly clean the plants, withhold water from the foliage for two or three weeks and keep a night temperature of about 40 degrees, with a day temperature of 55 or 60 degrees. In other words, attempt to give as good conditions as possible to bring the plants to health.'

Remedies.—For greenhouse plant-lice and certain other insects, the most generally adopted method to prevent such attacks is the fumigation with tobacco in its various forms. In the case of violets, however, as Mr. Galloway states, the tobacco fumigation tends to weaken the foliage and cause the 'spot' to appear. In an excellent bulletin recently issued by the United States Division of Entomology (*Circular No. 37, 2nd*

Series), the use of hydrocyanic acid gas for greenhouse fumigation is recommended, as of particular value to violet growers. Indeed this line of application of the gas is said to have been specially devised for violet houses by Messrs. Woods and Dorsett, the authors of the bulletin, who are officers of the Division of Vegetable Physiology and Pathology, and the latter is a practical violet grower. Careful and exact directions as to the proper way of using the gas, together with the necessary precautions which must be taken to avoid danger to the plants or to the operator, are given. Different plants are liable to injury in a varying degree, so that it becomes necessary to know the strength of the gas which may be used with each class of plants. Many experiments have been tried with this end in view, and directions are given in the bulletin cited for some of the leading greenhouse plants, e.g. :

'Double English Violets.—"Marie Louise," "Lady Campbell," and others. For plant-lice and general fumigation, fifteen-hundredths of a gram of 98 per cent cyanide of potassium for each cubic foot of space is required. The exposure, if made according to directions, will not hurt the plants in any stage of growth. The gas has been used on a large scale in fumigating violets for the past three years with the greatest success, only a few treatments during the season being required. Leaf-eating larvæ, slugs, millipedes, cutworms, &c., when exposed, are killed as well as plant-lice. Red Spiders, however, are not entirely eradicated by the treatment. The foliage of single violets like California and Princess of Wales are sometimes slightly injured by the stronger dose of gas. A weaker dose (one-tenth of a gram cyanide of potassium per cubic foot) should be used when they are to be treated.'

THE CLOVER MITE

(*Bryobia pratensis*, Garman).

Attack.—Reddish brown mites $\frac{1}{25}$ of an inch in length, oval in shape and with remarkably long front legs, causing the leaves of fruit and other trees, as well as of clover, to turn yellow.

This species of mite belongs to the same family of vegetable feeding mites, the *Tetranychidæ*, as the ordinary so-called 'Red Spider,' often found on house plants and in conservatories, and which also attacks orchard trees, rose and currant bushes, sweet peas, and other low plants, causing the leaves to assume a sickly appearance and to dry up. The eggs of the Clover Mite frequently come in from inquiring correspondents. They are ruby red in colour, broadly rounded above and comparatively large, about $\frac{1}{100}$th of an inch in diameter. They are usually deposited in large flat mat-like clusters in and around crotches of the branches of orchard trees, particularly of plum trees, and often in sufficient numbers to give a distinct red colour to the bark. Specimens of eggs were received first from British Columbia, and since then have come from many parts of Ontario, and as far east as Gaspé in the extreme east of the Province of Quebec.

Though spread over such a large territority in Canada, the Clover Mite does not seem to have attracted attention by its injuries anywhere except in British Columbia, until last summer, when the following letter was received :

'Queenston (Lincoln Co.), Ont., July 17.—With this I send you some twigs of some Niagara Plum trees. They are much paler green than others and are evidently affected by some insect, possibly the Red Spider. Did you ever know this insect to work on plum trees in this manner? The entire foliage of large trees seems affected. What had I better do to check it? Is it dangerous?'—C. E. FISHER.

In Canada the Clover Mite passes the winter in the egg state, but in many parts of the United States it has been complained of from time to time in the last ten years as an unwelcome invader of dwelling houses in the mature state, during autumn and winter. The small size of the Clover Mite enables it to go through ordinary wire screens with ease to the serious disquietude of the house-keeper.

The large number of inquiries about this mite, both on account of its invasion of houses in autumn and of its injuries on trees and other plants, made it necessary for the United States Entomologist to publish a special circular on the subject (*Circular No. 19*, Second Series).

Though the injuries to fruit crops by the Clover Mite have not been serious in Canada east of the Rocky Mountains, a good deal of harm is done in the Pacific States and in British Columbia to many fruit trees, particularly plums, apples, almonds and cherries, and together with other kinds of mites this is often spoken of under the general name of 'Red Spider.' Besides the injuries above referred to, there is no doubt much damage is done by this insect to clovers and grasses which is overlooked.

Remedies.—The protection of fruit trees from the attacks of this mite is not difficult where the winter is chiefly passed in the egg state on the trunks of trees. It has been found that spraying the egg masses during the winter with kerosene emulsion diluted with five parts of water will destroy the eggs without injuring the plants. Their entrance into houses in autumn may be prevented by spraying the lower portions of the buildings with pure kerosene, and, if the mites are found infesting grasses or other plants, these latter should also be sprayed with kerosene emulsion diluted with nine parts of water, to which some finely powdered sulphur can be added with advantage. When the mites have gained access to a house, they may be destroyed by the free use of pyrethrum insect powder or by burning brimstone in the room. Gasoline or benzine may be sprayed over them, but these liquids are dangerous from their extreme inflammability, and hot water frequently applied would answer the same purpose.

THE GREENHOUSE LEAF-TYER

(*Phlyctænia ferrugalis*, Hbn.).

Attack.—Slender semi-translucent green caterpillars, when full grown nearly an inch in length, with two distinct black spots close behind the head, the green dorsal vessel showing distinctly down the middle of the back, bordered on each side with a double white band, feeding inside a slight tent made by drawing the sides of leaflets together with silk threads. The cellular tissue of the lower sides only of the leaves is eaten.

During the past summer I had brought to my notice injuries to roses in the greenhouses of Mr. J. H. Dunlop, of Toronto, by the caterpillars of a small European moth, which has been introduced into America for some years and has been occasionally noticed as a greenhouse pest, and on one occasion as injuring celery out of doors in Michigan. Mr. Dunlop first noticed the work of this insect about three years ago, when it destroyed the whole of the roses in one of his houses, and did much harm in others. The only effort to control it was by catching the moths and destroying them. Every year since 1897 the caterpillars have been the cause of some loss. On October 13 last, Mr. Arthur Gibson visited the houses and saw large numbers of the moths flying among the roses and resting on the sides of the house. Living caterpillars were also found of all sizes at this time and appeared to feed almost entirely on the under sides of the leaves, eating away the soft green tissues and spoiling the appearance of the foliage. From the time they hatch until full-grown, the caterpillars live in tents made by drawing down the leaflets of the leaves; the cocoons are spun between the leaves. In a work entitled *Commercial Violet Culture* by Mr. B. T. Galloway, of Washington, it is stated that violets are sometimes attacked during the summer by this insect, the larvæ attacking the leaves and destroying the softer parts, leaving only the skeleton or frame of the tissues. The caterpillars are surrounded by a light web and occasionally two leaves are fastened together to give them protection. It is further stated that the insect never produces serious injury, but it is advisable to watch for it and take such steps for it as may be practicable. The picking of the leaves containng the larvæ is recommended and, if it should become abundant, fumigation with hydrocyanic acid gas.

A second visit was made on December 26, and although the specimens were many fewer, the houses having been carefully gone over, a moth was found flying, and a cocoon containing the living pupa, but no caterpillars. Mr. Dunlop states that the caterpillars may be found all through the winter.

The following description was taken of the larvæ :

Full-grown caterpillar,—Length at rest, $\frac{3}{4}$ of an inch. General appearance : slender, semi-translucent green caterpillars with the dark green dorsal band showing distinctly through the skin, rather fainter on 2nd, 3rd, and 13th segments. This is bordered on each side by a double white sub-dorsal band, which also is rather fainter on the 2nd, 3rd and 13th segments. On the 2nd segment are two distinct black spots, one on each side. Head one-twenty-fifth of an inch in width, smooth and shining, whitish, splashed with light brown on the cheeks, slightly furrowed at vertex, and bearing a few pale hairs. Mandibles brownish ; ocelli black. Spiracles white and very small, joined by a faint whitish line. On the 2nd, 3rd and 4th segments this line is represented by a few faint white dots and is obsolete on segment 13. Thoracic feet and prolegs of the same colour as the body ; the thoracic feet each bear exteriorily two black dots, one above the other. The whole body is sparsely covered with slender pale hairs, the ventral surface lighter in colour than the dorsal. When at rest these caterpillars have a habit of curling round to the side of the body, their heads and the first three or four segments of the body. The length of the pupal period in October was 17 days.

THE RASPBERRY WEB-WORM

(*Lyda multisignata*, Nort.).

Attack.—Bright green smooth false-caterpillars, when full-grown over half an inch in length, which web together many of the leaves on raspberry canes, making a tent in which several of the caterpillars feed together.

A rather interesting new enemy of the raspberry has for some years occurred at St. John, N.B.; larvæ were received in 1898, from which two males and a large number of female saw-flies were reared last summer. These have been kindly identified by Dr. Howard as *Lyda multisignata*, Nort. The caterpillars when full-grown are over half an inch in length, the head round and smooth, the cheeks and back of the head chestnut brown, as well as the mandibles, and a large round patch in front of the face. Ocelli black. On the segment next to the head is the thoracic shield, which in some specimens is also darkened with brown patches, and on each side of the throat beneath, running across the same segment, from the back of the head to the bases of the first pair of thoracic feet, is a short dark brown chitinous band. Antennæ 7-jointed, and for caterpillars conspicuous. On each side beneath the last segment is also a 3-jointed antenna-like appendage protruding downwards. These appendages in *Lyda* are called abdominal antennæ by Dr. A. S. Packard in his *Text Book of Entomology*, 1898, page 165, and a figure is given of a *Lyda* larva which might almost be used as an illustration for the species under discussion. The upper flap of the last segment is rounded at the tip and bears three dark triangular marks extending from the base towards the apex, but not reaching it ; the median, only half the length of the lateral ones ; lying in a depression at the extremity, there is also a distinct median dark dot. The lower flap of the last segment, dark brown narrowly margined with green, and as well as the upper, bearing a sparse fringe of short slender bristles.

This attack was first brought to my notice by Mr. George Raymond, of Bloomsfield (King's Co.), N.B., who wrote under date August 1, 1898 :—'A friend of mine in St. John has a small garden, where she has been growing raspberries for a number of years. For the last six years they have been troubled with a worm on the leaves, at first very small, and on the under side. As they grow, they spin a web drawing the leaves all round them and destroying the foliage. They have been much more destructive this year and it is only by persistent picking of the leaves that they can be kept in check.'

Miss H. Raymond, in whose garden the injury was done, wrote a full account covering most of the facts mentioned above, but stating that the larvæ were gregarious, about six being found in the same tent, and from her account and from specimens forwarded to the Division the attack of this species upon raspberries resembles very

closely that of another Lyda which has been found in southern Manitoba upon plum trees (*Lyda rufipes*, Marl.) and was treated of in my report for 1896 at page 253.

Upon rearing the perfect insects, which emerged at Ottawa from the middle to the end of June, specimens were sent to Miss Raymond, and she subsequently wrote saying that she had often seen these flies upon the raspberry bushes about the middle of June. She also stated it was about six years since the insect had appeared in troublesome numbers, and it had been worse during the past four.

Remedies.—As these caterpillars appear on the raspberry bushes at the time the berries are forming, it is inadvisable to use Paris green and similar poisons. Moreover, Paris green has been found to be more injurious to raspberry foliage than to some other plants; if therefore poisons are used, the vegetable poison, white hellebore, is preferable, because, although very fatal to many insects and particularly to all kinds of sawfly larvæ, the poisonous principles, being very soluble, are soon washed away by rain and dew, and there is little danger in using the fruit a week after an application of white hellebore. As, however, the tent-like webs are very conspicuous and this is certainly a very uncommon insect, the method of handpicking which has been successfully adopted by Miss Raymond, will probably in most outbreaks answer all purposes.

THE APIARY.

The following report has been handed in by Mr. John Fixter upon the Apiary, at the Central Experimental Farm, the management of which as heretofore has been left entirely in his hands.

REPORT OF MR. JOHN FIXTER.

The Season of 1899.

April 1.—Eighteen colonies were removed from the winter quarters: six were placed in the House Apiary, six in the sheltered apiary, and the other six in the exposed apiary. In the case of the two last there was a considerable depth of snow on the ground, from 1 foot to 18 inches. The hives had to be watched as the snow melted to prevent them from toppling over. From April 1 to 4, there was scarcely any flying, but from the 15th to the 17th, there was much more. The hives in the exposed apiary were covered with coarse sacks as a protection, leaving a very small entrance for the bees. In the sheltered apiary and House Apiary no such protection was given. The bees in these apiaries appeared to work better than those which were exposed. On many days when the weather was cool, with cold winds, those that were sheltered were flying well, while none of the others were.

The balance of the colonies were taken from their winter quarters on April 17. All began to fly at once and no mixing appeared to take place. The colonies that were set out early were flying as well as is usual in the month of May. From April 17 to 23, many of the bees were flying every day, when the first pollen was noticed, being brought in off the swamp maples and willows. From April 20 to 30, the bees were seen gathering sap off hard maples that were running, and also off hard maple stumps where trees had been lately cut.

From May 1 to 15 the bees gathered a great amount of pollen, but very little new honey, and nearly every hive was full of brood and young bees—the first drones were noticed May 24. A considerable amount of honey was fed from May 15 to June 1, so as to keep up brood rearing and to prevent starving.

Up to June 1 there were many flowering trees and shrubs in bloom, but there was no increase in honey. From June 1 to 6, the bees were flying well, gathering pollen, but no increase in honey. On June 6 Alsike Clover came into bloom. Up to June 17 there was no honey gathered. From June 18 to 30, the bees gathered a great deal of honey from clover and raspberry.

On July 3 the first honey was taken off. July 8 the basswood trees were well out in bloom, bees appeared to be very thick on the flowers, but there was very slight increase in weight of hives; during the balance of July, bees gathered very little honey, and there was no increase in the weight of the hives after August 1. The autumn flowers gave no surplus, and there being no buckwheat sown in this district in 1899, no honey was gathered from that source.

The season being such a poor one for honey gathering, all the summer experiments have been left for another season. It is intended to test the different hives with equally strong colonies—Langstroth 8 and 10 frames, Jones hive and Hedden hive—also to test each kind for comb-honey and extracted honey; different-sized sections and further different-sized pieces of foundation in the sections.

House Apiary.

The House Apiary was again tested with two tiers of hives. This plan can be safely recommended for cities or towns where space is limited, and two tiers can be arranged just as well as one in the same building. This plan can also be highly recommended in sections of the country where the hives are continually being disturbed by boys or in any unused buildings which can be looked up.

Returns.

The past season has been a very poor one, both as to the quality and as to the quantity of honey. The returns per hive of the Central Experimental Farm Apiary for the season of 1899 show an average of only eighteen sections per colony. The colonies which were run for extracting gave 23 pounds per colony. Swarming was well kept under, very few colonies being allowed to swarm. The total number of colonies at the end of the season is sixty.

NOTES ON SUMMER MANAGEMENT OF BEES.

There is scarcely a place in Eastern Canada where bees cannot be kept profitably. There are, of course, some localities more favourable than others for the purpose, and there are certain seasons which are so unpropitious that bees have to be fed and little or no surplus honey is stored; but, on the whole, with careful management, bee-keeping may be made not only a remunerative occupation but a source of a great deal of pleasure to those engaged in it.

The keeping of bees may be practised almost anywhere, even in large cities, in towns or villages, as well as on the farm. In cities or towns the hives may be placed on the roof of any building where they get some shade, or, what is better, the hives may be kept inside a room, as explained under the head of House Apiary in previous reports. An important point, however, is to place them where they can be watched carefully during the swarming season.

I would advise placing the hives on their summer stands early in spring without waiting, as is done in many sections, until the soft maples and early willows bloom; but advantage should be taken of the first calm day when the temperature is about 60 degrees. When carrying the bees out, have weighing scales near at hand, also clean bottom boards to replace those which have been in use all the winter, and which must be cleaned before using again. Weigh at once and note the number and weight of each hive, the number for reference, and the weight to know what amount of stores is still left to carry the colony over until the honey flow. On a very warm day when there is no

wind, examine each colony and see that it has a good laying queen and plenty of stores. Should there be insufficient honey, give them a frame of honey with the cappings scraped off, placing it as close to the brood as possible, also close the entrance more or less according to the strength of the colony. If the colony is very strong, the entrance may be left about two inches in width; if weak, close down to about one-half inch. Great care should be taken to protect the hives from cold draughts in spring. As the weather gets warmer and the colonies stronger, open the entrances. On many days the bees in the House Apiary and in the sheltered apiary will be flying and gathering pollen, while the bees in the exposed apiary are at home keeping the cold air off the brood. If you have a propolis quilt or chaff cushion on the hives, leave it there until the colony is strong enough for a super for sections, or for extracting frames; then all should be removed.

The time for putting on supers is when the hive is full of bees and there are good prospects of a honey flow; by allowing plenty of room, swarming will be prevented to some extent. In this section of the country great care should be taken to see that each colony has plenty of honey during the period between the fruit bloom and clover bloom. Many failures at this time are due to lack of stores, and too much attention cannot be paid to this point. I would advise feeding if necessary up to the clover bloom to force brood-rearing, so as to have the colonies strong. Excessive swarming may be forced or prevented as desired.

If swarms are desired, crowd the bees and stimulate them with syrup. I would not advise allowing more than one swarm from each colony. To prevent excessive swarming give the bees plenty of room and do not wait until they swarm, but put on the supers as soon as the colony is strong enough to work in them. Should swarming occur, remove the hive to another stand, take a new hive, put the swarm into it and place it on the stand from which the swarming hive was removed. The old colony may be further weakened by taking out several frames and shaking all the bees off in front of the newly hived swarm.

For hives placed in a garden choose some convenient place near the dwelling where those busy about the house can see any swarms as soon as they leave the hive and settle. It is better to locate the hives away from the immediate proximity of high trees because when the bees swarm they are apt to settle too high up to be secured without much trouble. When gathering a swarm, a most important help is Manum's wire cloth swarming device, or a similar one, even a large pail attached to the end of a pole, will answer. The use of these will save many swarms and many stings for the operator. The pole may be made in joints so as to allow of extension to the required height There are many patterns of swarm collectors, most of which consist of a ring of stout wire about 2 feet in diameter, bearing a bag of some light material of about 2 feet in length. This is put up beneath the swarm and the bees shaken into it. It is then lowered and the bees are emptied out in front of a new hive, already prepared for them.

Swarms which settle on shrubs, are much more easily handled. All that is required is to take a piece of sacking, spread it on the ground under the swarm, place the hive properly prepared on the sacking, give the limb or shrub a sharp jar, when the swarm will drop in front of the hive and at once enter it. Another excellent plan is to take a frame of drawn comb or a frame of unsealed brood, and draw it up against the swarm; a large majority of the bees will soon gather upon the frame, which should then be placed in a hive with several more frames. Those bees which have already clustered on the frames will begin to call their companions; as soon as a few have found the entrance they will announce their discovery by the usual vibration of the wings ('humming'). Should the swarm still cling to the tree or shrub, a bunch of grass or a twig from an evergreen is useful to brush them off with. The hive should be left until the bees have all entered it, and as soon as they have done so, the hive should be carried to its permanent location in the apiary. If the colony is a strong one and the season favourable, place at once on the hive a super or extracting frames. When the honey flow and swarming seasons begin, everything should be in readiness to receive the swarms. Supers should be filled with sections, each of which is provided with a full sheet of foundation, and the extracting frames should also have full sheets of foundation in them, and must be

wired so as to prevent the heavy combs from breaking when the honey is being extracted. Even in the brood frames, full sheets of foundation are preferable, except perhaps for some expert apiarists.

The time to remove section honey is when the supers are fairly well filled and capped; it is best not to wait until the corner sections are filled, as these if not full enough may be put back into the next super. When removing the section honey, start shortly before sundown, smoke the bees at the entrance, then take a wide chisel and gently pry off the super and stand it on end, close to the entrance of the hive; leave it there a short time, then remove it to the honey room, leaving the doors and windows open all night for such bees as still remain on the comb to escape. By the following morning all the bees will have either returned to the hive or gone to the fields. The doors and windows of the honey room should be closed very early the next morning, or robbing will take place. Comb honey should not remain on the hive to be daubed after the sections are sealed. Remove the honey to a very warm dry room, where it will ripen thoroughly. The extracting frames may be left on the hive to ripen until the busy honey season is over; they may be tiered up two or three high. When an empty super is added, put it at the bottom next to the brood chamber. When removing extracting frames, a bee-escape is placed between the extracting super and the brood chamber, and at night the bees will descend through this but cannot return again, When all the bees are down, remove the frames to the extracting room. All honey, whether in comb or extracted, should be kept in a warm, dry room.

JOHN FIXTER.

THE WORST WEEDS OF THE NORTH-WEST.

Strange as in may seem, it is no easy matter to decide off hand what is the *worst weed* in a district, and even in a single locality there is frequently great diversity of opinion on this point. Judging from the replies of correspondents, the 'worst weed in the district' seems to mean the one plant which has given most trouble at a recent date to the farmer who happens to be interrogated.

There are, however, certain plants which, for one reason or another, every year prove to be troublesome and aggressive enemies of the farmer, causing loss of crop, necessitating extra labour, or compelling him to treat or utilize his land in a way other than he would wish.

From a close study of this subject in the West during the past five years and after consultation with the energetic and competent Weed Inspectors of Manitoba and the North-west Territories, Messrs. Charles Braithwaite, of Portage la Prairie, Man., and T. N. Willing, of Regina, N.W.T., respectively, it seems to me that the following plants are specially noxious, and every effort should be put forth to destroy them when detected, or to prevent their introduction to new localities.

STINK WEED or Penny Cress (*Thlaspi arvense*, L.), miscalled sometimes 'French Weed.' Annual. Introduced. A most pernicious and persistent weed with a strong nauseous odour and which endures the lowest temperatures of the West with impunity. Young plants overtaken by winter before their seeds are formed, revive in spring and mature in June; the seeds are produced in enormous numbers, and there are two complete crops ripened every year. This plant belongs to the same natural order as the mustard and cress, the turnip, and the cabbage. The milk of cows which eat it, is tainted and unfit for food. As a field pest it is a vigorous grower, crowding the crop and robbing the land of moisture. The succulent nature of the leaves and stems render it very dificult to kill unless destroyed when quite young.

Remedy.— Plough down before the seed pods form and harrow fallow-land constantly so as to destroy all seedlings. Land for summer-fallowing upon which plants with fully formed pods occur, must be mowed over and the plants burnt before turning down.

Land under grain crops should be harrowed two or three times with a light harrow having sloping teeth or with a weeder, from the time the grain is two inches high until it is six or even eight inches. Mr. Willing says 'Stink Weed is decidedly the hardest weed we have to handle, and some of it has been found in all districts where farming has been carried on to any extent from Manitoba to the foot hills, and from the United States boundary to the Saskatchewan.'

WILD OAT (*Avena strigosa*, Schreb.).—Annual. Introduced. Closely resembles some varieties of cultivated oats, but ripens its useless hairy seeds irregularly, so that many fall to the ground before the grain they grow among is ripe, thus crowding the crop and infesting the land with a useless and aggressive weed. Mr. Braithwaite says: 'After Stink Weed, the Wild Oat has certainly done farmers the most harm this year.' There are in Canada three kinds of Wild Oats which have been introduced from Europe. The kind most abundant in many parts of the North-west and British Columbia is the Black Wild Oat (*A. strigosa*).

Remedy.—The best means of clearing land of this pest is to work it in early spring and, when many of the seeds have germinated, go over it again with a disc harrow and sow a very early variety of oats or barley, to be cut twice as green feed and then turned down. If this land can be used the following year for a hoed crop or roots it will be better than sowing grain.

CANADA THISTLE (*Cnicus arvensis*, Hoffm.).—Perennial. Introduced. The Canada Thistle, so-called, is extremely abundant in some of the rich lands of the Red River valley and is well established in many spots right across the continent to the Pacific. West of Manitoba, however, it is far less troublesome than many other weeds. Mr. Braithwaite says: 'I may say I am more concerned about Canada Thistle and Tumbling Mustard than any others of our weeds. The Thistle is spreading rapidly from vacant government lands north and east, and the Tumbling Mustard has spread from the North-west down through the Souris districts.' Mr. Willing views its spread in the North-west with anxiety; he says, 'Canada Thistle seems to have come to stay and is very plentiful along the northern branches of the railway, but, it is true, many other weeds as yet are giving more trouble to farmers.

TUMBLING MUSTARD (*Sisymbrium altissimum*, L.).—Annual. Introduced. This coarse member of the Mustard Family was only introduced into the wheat fields of the West about ten years ago, but it has now spread from Indian Head, where it was first noticed, eastward through Manitoba and westward to the interior of British Columbia. Mr. Willing says 'Tumbling Mustard is now more plentiful than any other weed in south-eastern Assiniboia.' Tumbling Mustard has all the bad charac-

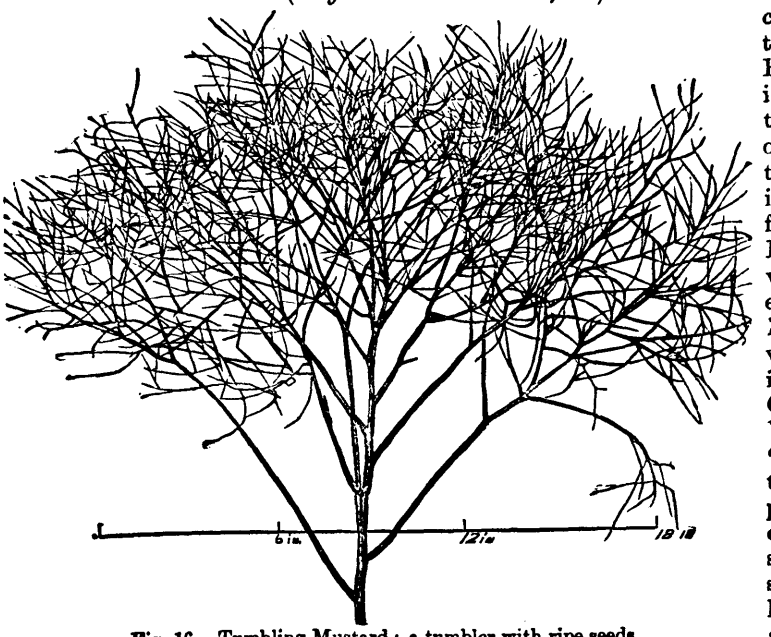


Fig. 16.—Tumbling Mustard: a tumbler with ripe seeds.

teristics of the other mustards and besides is a large free-growing, exceptionally prolific plant, of which when the seeds are ripe the head breaks off and becomes a 'tumbling weed' (Fig. 16), which may be blown for miles across the prairies in the autumn and during the winter, thus scattering the seeds quickly over wide areas. The reddish or greenish-brown seeds are very small, and a single plant produced one million and a half by actual count. Owing to the small size of the seeds, they are easily cleaned from grain. The distribution of the plant is almost entirely by the wind blowing the heads across the prairies during the winter.

Fig. 17.—Hare's-ear Mustard.

Remedy.—The best means of clearing land of this and other kinds of mustard mentioned below consists of harrowing or cultivating with a weeder the growing crops of grain as long as possible in spring, and subsequently hand-pulling the flowering plants and mowing them down at the edges of fields, on road allowances, railway banks and waste places.

HARE'S-EAR MUSTARD [*Conringia orientalis*, (L.) Andrz.].—Annual. Introduced. This is an extremely injurious plant with large leaves, grayish-green, like those of a young cabbage or field pea, but shaped like the ear of a hare or rabbit; flowers small and creamy white, followed by long square pods from 3 to 4 inches long, a vigorous grower and an absorber of much moisture. The ripe stems, sometimes 4 feet high, are wiry and stiff, and give much trouble when grain is harvested, not only in cutting, but also in binding and handling. The seeds of this plant are much larger than those of the Tumbling Mustard and are frequently found in seed grain, with which they are distributed. The Hare's-ear Mustard now occurs widely through Manitoba and the North-west Territories. Mr. Willing places it third in his list of the worst weeds.

FALSE FLAX (*Camelina sativa*, Krantz).—Annual and winter annual. Introduced. A slender-branched plant of the Mustard Family which matures early, the numerous pear-shaped pods containing several seeds. This is widely spread in the West. The chief causes of its increase in the past has been the late date at which summer-fallowing has been done.

FIG. 18.—Ball Mustard.

BALL MUSTARD [*Neslia paniculata* (L.) Desv.].—Annual Introduced. A tall, slender, somewhat branching, orange-flowered plant, with a great number of small single-seeded almost round pods, each one borne on a slender foot-stalk. Like the Tumbling Mustard and the Hare's-ear Mustard, this is a recent introduction into America, but has spread through the wheat-growing districts with alarming rapidity. Mr. Braithwaite says: 'This is a very bad weed as is shown by the way it has spread.' Mr. Willing writes of it: 'Ball Mustard has made more headway in Alberta and Saskatchewan in a given number of years than any introduced weed.'

WILD MUSTARD (*Brassica sinapistrum*, Bois.).—The true Wild Mustard or Charlock, also called Cadluck and Herrick, is not, compared with many others, a common weed in the West. The plant most frequently spoken of there as Wild Mustard is the Bird Rape (*Brassica campestris*, L.). The two plants may be easily distinguished. In Wild Mustard the stems and leaves are rough, the joints of the stems marked with purple, the knotted pods about one inch long on short thick foot-stalks, erect and tipped with an empty or one-seeded two-edged beak. In the Bird Rape the stems and pods are perfectly smooth and glaucous, the pods, which are from 1½ inches to 2½ inches in length, stand out from the stem on slender spreading foot-stalks.

SHEPHERD'S PURSE (*Capsella Bursa-pastoris*, Mœnch).—Annual. Introduced. This plant, like the Stink Weed, is frequently overtaken by winter when in full flower, but is in no way injured, the flowers and pods of the late autumn developing the following spring and producing an early crop of seeds. Few people have paid the attention to this weed in the West, which its noxious character, as it there develops, demands, and as a consequence it is increasing and spreading in an alarming manner, not only in gardens but in wheat fields. Owing to the early date at which the minute seeds develop and the enormous numbers in which these are produced, I fear this weed is going to be a cause of serious loss to western farmers. The plant is easily recognized by its rosette of cut-up leaves lying close to the ground, and bearing from the centre a much branched stem covered from bottom to top with numerous flat triangle-shaped pods. This weed is a close relative of the Stink Weed, and land infested with it should be specially attended to. The seeds are frequently too ripe by the middle of June to allow of their being ploughed down without danger. Summer-fallows should therefore be cultivated or mowed before being ploughed.

LAMB'S QUARTERS (*Chenopodium album*, L.).—Called in different places by several other names, in Manitoba most widely known as Pigweed, also as Fat-hen, Goosefoot and Wild Spinach. Lamb's Quarters, however, is the name used over by far the largest area in Canada, and Pigweed properly belongs to the common Amaranth or Red-root. The Lamb's Quarters, which is an annual plant, of which there are both native and introduced forms, the latter, however, being by far the most abundant in the West, finds in the highly fertile and slightly alkaline soils which prevail there, just such conditions as enable it to develop most luxuriantly, and it is so prevalent in some seasons as to cause a very large loss to farmers, not only in crowding out and robbing the grain while growing, but in every other way reducing the value of the crop by increasing the labour and expense of harvesting, threshing and shipping, and the subsequent and always unpopular dockage for weed seeds by the grain buyer or miller. The Lamb's Quarters prevails to so much greater an extent than any other weed that with some farmers the word 'weeds' means nothing else. It is a succulent annual which does not ripen its

seeds very early in the season; therefore, if land is harrowed before sowing and the grain sown in favourable weather, the crop, as a rule, gets well ahead and keeps the lead over the weeds, so that these do not develop to an injurious extent. In springs when there is cold weather after seeding, the seeds of the hardier weeds germinate more quickly than any of the cultivated grains, and in the constant struggle which goes on throughout the season between a crop and its weed enemies, the one which gets the best start, as a rule, holds the advantage to the end. The farmer is able to help much in this struggle to his own advantage, by using improved methods of farming suited to his own land and the variations of the season.

Remedy.—With annual weeds, the main point to be aimed at is to destroy them as seedlings and as soon as possible after the green seed leaves appear. No weed seedling can spring up on land except from a seed, and, if all weeds can be destroyed by any means before they ripen their seeds, the land, in time, must become clean. The method of harrowing growing grain lately practised in the West with excellent results is, I believe, the cheapest and best means of controlling Lamb's Quarters and all other annual weeds which every year do so much harm in western wheat fields, many of which are so large that no other manner of treating them is practicable.

Wild Buckwheat (*Polygonum Convolvulus*, L.).—Annual. Introduced. In certain seasons this climbing bindweed is a terrible pest in the West, many acres of crop being entirely ruined by it. The seeds ripen very irregularly, some of them before the date at which summer-fallows are generally turned down. Western farmers, however, are wisely summer-fallowing much earlier and oftener than has been the custom in the past, and, although in this way they may increase their labour to the extent of one or even two harrowings, there is no doubt that many weeds will noticeably decrease in abundance, this abundance having been largely due to the frequency with which ripe seeds were ploughed down upon land summer-fallowed after the middle of July. Speaking of the last year or two, Mr. Willing says: 'Wild Buckwheat and Lamb's Quarters are getting away with as large a share of the farmer's profit as any of the weeds which occur here.'

Remedy.—The early and regular summer-fallowing of land every third year. Mr. Braithwaite has tried and strongly recommends a method of treating land infested with Wild Buckwheat. He says: 'I have found that, if an ordinary harrow be turned upside down so that the nuts and the tops of the teeth only protrude, a growing crop of grain may be cleaned of most of the Wild Buckwheat by simply dragging the inverted harrows across it. Of course, if a weeder is used at the right time this will never be necessary, but this weed germinates very quickly and roots deeply. When it has about three leaves, it is very tender and the harrows will break off or pull up millions of plants or check them and give the grain a chance.'

Russian Pigweed (*Axyris amarantoides*, L.).—Annual. Introduced. This is a tall coarse-growing plant with a hard woody stem which up to the present has not given much trouble in grain fields but is spreading rapidly in Manitoba and the Territories along railways. Farmers will do well to watch it closely and prevent its increase. It belongs to the same family as the Lamb's Quarters.

Cow Cockle (*Saponaria Vaccaria*, L.).—Called also Soapwort, Cow Herb and China Cockle. A soft succulent annual with pretty pink flowers, belonging to the Pink Family, which was introduced into southern Manitoba from Europe. It has spread with rather alarming rapidity through many parts of the prairie provinces. The seeds are round, hard and black, two or three times as large as those of Wild Mustard, the surface is slightly roughened, a character by which they can be easily distinguished from the seeds of wild vetches, which are of about the same size.

Great Ragweed (*Ambrosia trifida*, L.).—Annual. Native. This is the 'Crown-weed' of millers. As an aggressive weed the Great Ragweed seems to be largely con-

fined to the rich lands of the Red River valley. It is a very coarse tall-growing plant, which does not ripen its seeds until late in the season. Summer-fallowing every third year and a little hand pulling during the two crop years will soon clear land of this weed. The Great Ragweed is particularly obnoxious to grain buyers and millers, owing to the difficulty with which its seeds are separated from grain, as they are of about the same size and weight as the grains of wheat and consequently cannot be easily blown or sifted out of wheat.

CANADA FLEABANE (*Erigeron Canadensis*, L.).—Called also Horseweed and incorrectly 'Fireweed.' Annual. Native. A tall wand-like plant with small greenish-white flowers, to be seen with the two common biennials False Tansy (*Artemisia biennis*, Willd.) and Common Evening Primrose (*Œnothera biennis*, L.) upon all summer-fallows. These three plants all of them flower much later than the time when land should be summer-fallowed to get the best results, both for controlling weeds as well as for the more important reason, in the West, of conserving moisture in the ground. The best remedy then for these is to summer-fallow early.

BLUE BUR (*Echinospermum Lappula*, Lehm.).—Annual. Introduced. A weed which has appeared only of late years in the West but has spread very rapidly, owing to its bristly barbed seeds. As a rule this weed is a denizen of waste places and roadsides, but it is gradually working its way into the crops. The seeds ripen about the middle of July; therefore land should be ploughed before that date to prevent the plants from seeding.

Fig. 19. Peppergrass

PEPPERGRASS (*Lepidium apetalum*, Willd.).—Native. Winter annual. A weed which occasionally appears very abundantly, particularly on light land and in wet seasons. For the most part the seeds germinate in the autumn and the seeds are produced the following season. The appearance of the plants in autumn and spring is as flat rosettes of narrow deeply indented leaves lying close to the ground with a single central tap root. Disc-harrowing in autumn and spring is the best treatment of land for this and other plants of a biennial habit.

SKUNK-TAIL GRASS (*Hordeum jubatum*, L.).—This grass is one of the most troublesome weeds in hay. Although it may when young be cut as hay and fed without danger, the hard ripe seeds often cause very painful sores in the mouths of horses and cattle, as they are very sharp pointed and barbed. They run down by the side of the teeth, or penetrate any soft part of the mouth particularly beneath the tongue and into the tongue itself. There are two distinct forms of this grass, one with long silvery awns, 2 inches long, and another with a more erect habit which has awns little more than half that length. Various methods have been tried to clean hay lands of this troublesome pest, but none with much success. If the Skunk-tail Grass is cut when quite young, it makes tolerably good feed, and hay lands where it occurs should be mowed early before the ripening of this injurious grass. A method of cleaning hay practised at Gladstone, Man., is to toss the hay with a pitch fork on a windy day before using it, when most of the light feathery heads of the Skunk-tail Grass will blow away from the hay and may then be gathered up and destroyed. Whenever this grass is seen in waste places or roadsides it should be mowed before it is ripe and burnt.

This grass is generally described as an annual, but in Manitoba it is certainly a biennial, and apparently sometimes a perennial. It is a bunch grass and has no running root-stocks, growing only from seed.

FIG.— 20. Indian Hay.

Native Perennials.

There are a few native perennial plants which are troublesome weeds on farms. Among these may be mentioned the WHITE-STEMMED EVENING PRIMROSE (*Œnothera albicaulis*, Nutt.), the SPREADING DOGBANE (*Apocynum androsæmifolium*, L.), the BLUE LETTUCE (*Lactuca pulchella*, DC.), SKELETON WEED (*Lygodesmia juncea*, Don.), POVERTY WEED, or Smotherweed (*Iva axillaris*, Pursh), the PRAIRIE ROSE (*Rosa Arkansana*, Porter), and INDIAN HAY, or Sweet Grass (*Hierochloa borealis*, R. & S.). All of these on account of the difficulty with which they are eradicated have in different districts been stigmatized as 'the worst weed in the country.' They are all deep-rooting perennials with great tenacity of life, and the method which on the whole has given the best results, is to plough deeply in summer after the plants have drawn off a large amount from their supply of reserve material laid up by the leaves in the underground stems during the preceding summer. The broken up root-stocks, however, will still have much vitality, and if left undisturbed will throw out fresh shoots, and the land will be in a worse condition than before. To prevent this, about a month or less after the first ploughing, the land should be disc-harrowed, and this operation should be repeated again a month later, when the root-stocks of most plants will be so far weakened as to be past recovery. A few, however, as the Canada Thistle, Blue Lettuce and Sweet Grass, may require further treatment and the placing of the land under a hoed crop the next year.

Occasional Weeds.

There are every year, probably dependent on the season, certain plants which, appearing suddenly, draw general attention by their abundance over greater or smaller areas. Some of these are of little importance, but others sometimes cause considerable anxiety and loss. Among these may be mentioned the following:—

WORMSEED MUSTARD (*Erysimum cheiranthoides*, L.).—A biennial plant with acrid principles in all its parts, the seeds particularly having caused death in cattle when fed in quantities among other seeds screened from wheat.

SMALL-FLOWERED WALLFLOWER (*Erysimum parviflorum*, Nutt.).—A native biennial, sometimes abundant in land which has been left without summer-fallowing for too long a period.

WESTERN WALLFLOWER (*Erysimum asperum*, DC.).—Last year one of the most conspicuous plants in some crops in western Manitoba and south-eastern Assiniboia was the beautiful golden-yellow-flowered Western Wallflower, or Prairie Rocket. This is a native biennial very easily pulled from the ground, and, although on account of its brightness it was much noticed, it can hardly be classed as a noxious weed. It very

seldom grows to a large size in crops and is easily killed by autumn or spring cultivation.

YELLOW WHITLOW-GRASS (*Draba nemorosa*, L., var. *α*, *leiocarpa*, Lindl.).—This is a small few-branched winter annual, seldom more than four to six inches high, with few leaves and a great many smooth pods about half an inch in length on slender wide-spreading foot-stalks. The flowers are bright yellow, borne at the ends of the branches. There is no danger, I believe, of this feeble native plant ever becoming an aggressive crop pest, but it was conspicuously abundant on almost every summer-fallow through Manitoba and the North-west Territories last June. At every one of the twenty-one meetings held, specimens were shown or questions were asked about it.

GRAY TANSY MUSTARD (*Sisymbrium incisum*, Englm., var. *Hartwegianum*, Watson).—Native. Biennial. A tall grayish-green slender plant 3 to 4 feet high, very leafy at the base and bearing at the summit a compressed panicle, thickly loaded with short erect pods. The leaves are very finely divided and cut up, from which fact it is sometimes inaccurately spoken of as 'Rag-weed,' a name which belong to quite a different plant. This crucifer was the most striking unusual plant on western wheat fields and summer-fallows last year, attracting the notice of everybody by its tall cones of grayish green leaves standing up above the young grain in June. Mr. Braithwaite writes: 'The Green and Gray Tansy Mustards were very much in evidence this year, but, being natives and biennials, they only showed up on breaking, summer-fallows, or in crops sown on stubble. Our farmers are now understanding the nature of the different kinds of weeds, and will in future control this kind by late fall or spring cultivation.'

GREEN TANSY MUSTARD (*Sisymbrium incisum*, Englm., var. *filipes*, Gray).—Somewhat like the last, but of a bright yellowish-green colour, and without the hoary pubescence, the branches, instead of being close together, spread loosely and form an open head, the seed pods also are borne on slender spreading foot-stalks, and the leaves are much more finely divided. A character which makes this a more dangerous weed than the last, although as yet it is the rarer of the two, is that the seeds ripen very much earlier, so that there is more danger of the ripe seed being ploughed in when land is summer-fallowed.

GOLDEN FUMITORY (*Corydalis aurea*, Willd.).—An occasional weed in Manitoba is this biennial fumitory. While in the East, where it is rather an uncommon plant on rocky banks, the stems seldom exceed 6 inches in length, in the Manitoban wheat fields patches from 2 to 3 feet across are not uncommon, and instances have been reported to me frequently of several acres of crop being choked out by it.

TARRY COCKLE (*Silene antirrhina*, L.).—A plant which could hardly have been suspected of ever developing into an agricultural pest is the slender-stemmed member of the Pink Family, to which the name of Tarry Cockle has been given. This is a plant with an upright stem bearing (in the West) many erect branches, each joint of which has a dark brown sticky patch to which dust and insects adhere. I have seen this occurring in some quantity at different places, and specimens are frequently sent in by farmers for name. Last summer Mr. Braithwaite found large patches of it in crops at Blythe, south of Brandon, in Manitoba, and the Rev. W. A. Burman saw at least 400 acres near Carberry so infested that the weed had almost crowded out all the wheat.

THREE-FLOWERED NIGHTSHADE (*Solanum triflorum*, L.).—Called also Wild Tomato. A native annual plant with deeply indented leaves, and the whitish flowers in umbel-like, three-flowered cluster, followed by green or purplish berries, about as large as small cherries; the whole plant has a musky odour, pleasant at first but afterwards very nauseous. This weed is a coarse decumbent herb forming patches 2 or 3 feet across, and is frequently troublesome in gardens and around the edges of fields.

SPEAR-LEAVED GOOSEFOOT (*Monolepis chenopodioides*, Moq.).—Annual. Native. A dark green succulent plant forming thick patches wherever soil is a little alkaline. Frequently growing so abundantly in root crops and gardens, as well as in wheat fields, as to require much labour to keep it down. The leaves of this plant are borne very thickly on the clustered stems, the lowest ones shaped like the head of a halberd or spear, but those above becoming gradually simpler in outline and smaller. Short seed-bearing spikes occur along almost the whole length of the stems.

WEEDS AND WEEDERS.

The introduction of weeders into the dry regions of the West, I consider an event of enormous importance to all grain growers. During the past five summers I have had exceptional opportunities, in driving through Manitoba and the North-west Territories, of meeting, and seeing the farms of, some of the best farmers in the West. In many places I have met men who made a practice of harrowing their growing grain crops with a light harrow, and invariably with great advantage. Upon the introduction of the various weeders these were used by a few of the most enterprising settlers, and almost always with decided satisfaction. So much was this the case that last spring several carloads of them were shipped into Manitoba by implement makers. The season of 1899, however, was so wet and late that the weeders were not used so much as would ordinarily have been the case. From what I have seen of these implements here, but particularly at the Indian Head and Brandon Experimental Farms, and from what I know to be the condition of the wheat fields in Manitoba and the North-west Territories with regard to annual weeds, I am convinced that there is more to be hoped for in the regular use of these implements after the grain is up, than from any other measure so far suggested for cleaning lands infested by such aggressive and persistent agricultural pests, as Stink Weed and the different kinds of Mustard, as well as all other seedlings growing among grain crops. Weeders can be used not only safely, but with the greatest advantage to a grain crop, from the time the leaf is an inch high until the plants have shot up 6 or even 8 inches.

One of the frequent complaints made against weeders by western farmers is that they cover too narrow a strip of the crop at a time, but in the *Farmer's Advocate* of Winnipeg for December 5, at page 612, is given a cut, which the proprietors have kindly allowed me to use here, showing a successful way of uniting two of these implements and covering 24 feet at once. In this way the writer, W. F. Baker, of Portage la Prairie, states that he can go over nealy 50 acres in a day. The two weeders are fastened together with a rope, and the horses are kept apart by a stick between the halters. The wheat in the fields reported upon, had been cultivated twice after it was 4 inches high, and he says, as has been found by many others to be the case, and as I have myself frequently seen: 'If properly used when weeds are very small, nearly all weeds can be destroyed. On July 18, the wheat thus cultivated was 4 feet high and nicely out in head. The field shown in the cut was 70 acres of the first crop after summer-fallowing. It yielded 1,800 bushels (nearly 26 bushels to an acre), and so far as shipped, graded No. 1 hard. Another 70-acre field, cultivated with the weeder, yielded 29 bushels, while a larger field, that we thought did not require a weeder, yielded only 17 bushels.'

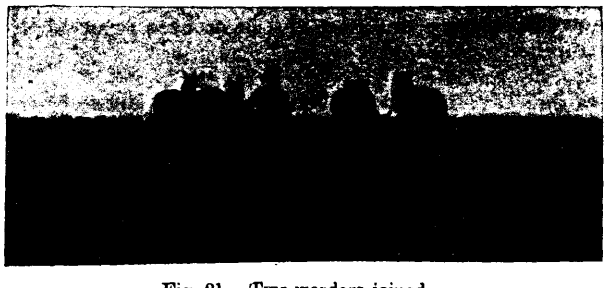


Fig. 21.—Two weeders joined.
(Cut kindly lent by the *Farmer's Advocate.*)

Mr. Angus Mackay, at Indian Head, has the greatest confidence possible in these implements, and last year used them on every acre he had under grain.

There has been considerable inquiry during the past year or two as to the treatment of grain crops infested with mustard, with solutions of sulphate of iron and sulphate of copper. There is no doubt whatever, as I have proved by experiments here and the Rev. W. A. Burman has shown in Manitoba (1898), that the annual mustards can be killed and even Stink Weed, when young, seriously injured by solutions of sulphate of copper, as weak as 2½ pounds to 10 gallons of water. On this subject I would merely point out that, at the very lowest estimate, and using the most economical effective solution yet recommended (2 per cent sulphate of copper*), $1 per acre would be the very lowest estimate at which the cost of this operation could be calculated. In the West where a good many of the farmers work several hundred acres, which they frequently never visit again after the spring work is done, until they turn in the reapers at harvest time, this extra expense including the purchase of spraying pumps and sulphate of copper, and the extra work of drawing water, and mixing and applying the solution, would be far less advantageous or likely to be practised, than the use of weeders or light harrows, which most certainly is better farming; for this operation, besides doing better work in destroying the seedlings of all kinds of weeds, has been proved to be most beneficial to the growing crops by reason of the extra cultivation thus given to the land at the very time when it requires it, and the fields so treated yield much heavier crops.

Mr. Charles Braithwaite, who has had greater opportunities of forming an opinion on this matter than any other man in Manitoba, replies as follows to an inquiry as to the utility of surface cultivation of growing grain crops :—

'PORTAGE LA PRAIRIE, Oct. 9, 1899.—I may say that, from my own observations, in ordinary years I certainly agree with your opinion. Working growing grain with light harrows or weeders has a twofold advantage: it destroys weeds and also creates a mulch which prevents moisture from evaporating. Of course, this year being a moist year, the work could not be done as effectually as in drier years. During the season of 1898, Mr. Henry Nichol, of Brandon, had two weeders and kept them going until the grain was 5 and 6 inches high. His crop averaged 30 bushels per acre, while his neighbour's did not average over 15 bushels, and some within 5 miles of him had to plough up their crop on account of weeds and drought. I had this from Mr. Nichol himself, and he is, as you know, a thoroughly reliable man. I could tell you of scores of others who have saved their crops by this method. Of course, as I tell the farmers, this surface cultivation of grain with any kind of implement must be done with common sense, not too deep nor too shallow, and, when the land is in proper condition for harrowing, not too wet and not too dry.'

THE WHEAT CROP IN MANITOBA IN 1899.

The wheat crop in Manitoba in 1899 has been estimated at 27,000,000 bushels, almost all of excellent quality and exceptionally free from weed seeds. This satisfactory result is due chiefly to the season. The late date at which severe frosts occurred allowed almost the whole crop to be got in without injury, and the freedom from weeds was due largely to abundant moisture last spring and the previous autumn. On account of cool wet weather last spring, seeding of wheat was much delayed, but the seeds of many weeds being in the ground germinated quickly and came up in the first warm days. Enormous numbers of these seedlings were destroyed at the time the grain was sown; thus the land was clean of all the weeds that had germinated, and the wheat being put in under the most favourable circumstances, germinated promptly and got ahead of the weeds. In addition to the benefit due to the wet spring of 1899, the exceptionally wet autumn of 1898 was also very beneficial by causing many of the seeds of annual weeds to germinate before winter set in, so that they were destroyed by frost These, under the usual climatic conditions which prevail in ordinary years in Manitoba and the West, do not, for lack of moisture, germinate before the following spring. As a

* See article by Mr. Shutt, page 194.

consequence of the above mentioned circumstances, the fields were exceptionally clear of weeds last spring, a satisfactory state of affairs which lasted until the end of the season.

The following extracts from letters of men who can speak with authority illustrate this point.

Mr. H. McKellar, who as Chief Clerk of the Department of Agriculture meets farmers from all parts of the province and receives reports throughout the season on the condition of the crops, says as follows :—'I have made reference on two or three previous occasions to the absence of weed seeds in this year's crop. The fact that the grain is much cleaner this year than it has been for several years is commented upon by everyone who handles grain. In fact, I might say that this year one hears nothing about dockage for weed seeds. This merely bears out the excellent appearance of the fields which we noticed in driving through them together last June and July.'

Mr. Charles Braithwaite, who as Provincial Weed Inspector travels continously over the province, inspecting crops and advising farmers how best to treat their land and avoid loss from weeds, writes : 'This is without exception the cleanest crop the West ever reaped. The climatic conditions were favourable ; last summer and fall there was moisture enough to germinate weed seeds, and then again this last spring there was a good growth of weeds before the land was fit to seed. The weeds germinated and and were destroyed in the cultivation at seeding time, and the grain came right away.'

The following report is from Mr. G. H. Greig, of the *Farmer's Advocate*, who has good opportunities of judging :—

'Winnipeg, Oct. 11—The crop generally speaking through Manitoba and the West is very much cleaner and freer of weeds than it has been for some years. The assumption is that, owing to the excessive moisture in the soil last spring, seeding was not started as early as usual, and consequently a great many weed seeds would germinate before any cultivation was given the land ; the seedlings were afterwards killed by the cultivation at seeding time. At all events, the season has not been favourable to weed growth, and crops are cleaner than they have been for years. No doubt, very much credit for this desirable state of affairs is due to the excellent work done by local department of agriculture in holding meetings during the past three years, at which the nature of weeds and the best way to fight them were explained.'

The following report by Mr. F. T. Shutt, Chief Chemist to the Dominion Experimental Farms, will be read with interest by those seeking information as to the remedial treatment of mustard with sulphate of copper and sulphate of iron. The application of these solutions may be found useful in small areas in the East or in British Columbia, but is not a practical nor advisable method to recommend on the large farms in the drier regions of the West.

SPRAYING FOR DESTRUCTION OF MUSTARD.

By Frank T. Shutt, M.A., Chemist, Dominion Experimental Farms.

One of the most persistent weeds that farmers in many parts of Canada have to contend with is mustard, commonly known in Europe as Charlock. Though an annual, it is most difficult to eradicate from fields in which it has become established, owing to the fact that the seed—of which a large number is formed—are endowed with a strong vitality and are preserved from decay by the oil they contain, until favourable conditions for sprouting occur.

Pulling the mustard when it appears among the grain, or keeping the weed from seeding by working the land (as under a hoed crop), are the two methods which have hitherto been in vogue to exterminate this pest, and when the work is done thoroughly they may be considered satisfactory and efficient. The former, however, is always costly, and the latter is sometimes not convenient. When, therefore, it was announced in the agricultural press that spraying with certain solutions of sulphate of iron and

sulphate of copper had been tried successfully in England and France, it was deemed advisable to make similar experiments here. We should then be in a position to furnish information at first hand on this subject.

The fields of the Experimental Farm being free from this weed, it became necessary to make the trials upon an adjoining farm, and for that purpose a field of barley was selected which showed a considerable amount of mustard. The size of the plot treated in each case was one-tenth of an acre, and the quantity of solution uniformly supplied to each area was 5 gallons, or at the rate of 50 gallons per acre. The date of spraying was June 26, the grain being 15 inches to 20 inches high, and the mustard practically the same height and just coming into flower. The chief data may be briefly stated as follows :—

Sulphate of Iron, 5 per cent.—No effect upon barley. The leaves were practically all stripped from the stems of the mustard, but the weed was not killed, as evidenced by new leaves subsequently starting the plant flowering and the seed-pods filling out and maturing. The leafless stems were quite green a fortnight after the spraying, and were apparently furnishing nourishment to the seed.

Sulphate of Iron, 10 per cent.—A slight scorching of some of the leaves of the barley was to be noticed. A fortnight after the spraying this was not discernible, and, though this spray may have *slightly* retarded growth, it is not probable that the yield of grain was affected.

Though the effect upon the mustard was more pronounced than in the foregoing instance, as noticed by the 'spotting' on the stems, it was not sufficiently strong to prevent flowering and the ripening of the seeds, a large proportion of which proved, upon testing, to be vital.

Sulphate of Copper, 2 per cent.—A certain amount of injury to the leaves of the barley resulted, evidently retarding growth to a somewhat greater degree than the 10 per cent iron sulphate solution. At the end of two weeks, however, this effect had practically all disappeared, and it became doubtful if there were any permanent injury to the grain. The mustard very quickly showed the effect of the spraying, both the stems and the leaves dying without allowing the plant to seed. Two weeks after spraying, a few living mustard plants were found in the plot, but it is believed they had escaped the solution, owing to the height and overshadowing of the barley.

Sulphate of Copper, 5 per cent.—This solution damaged the barley in a much more pronounced manner than the preceding solution ; in all probability it somewhat lessened the yield of grain, though, as the ground was very uneven in character, no comparative data on this point could be obtained.

The mustard was all killed ; an inspection two weeks after the spraying did not reveal any living plants.

In order to ascertain the effect of these solutions upon this weed at a younger stage of growth than that just reported upon, mustard seed was sown in rows in a plot upon the Experimental Farm. When the mustard plants had reached the height of 6 to 9 inches they were sprayed as follows :—

July 20 : *Sulphate of Iron, 5 per cent.*—Not all killed ; the few survivors possessed green stems and in time sent out new leaves. It is extremely doubtful, however, if the plants will have sufficient strength to flower.

Sulphate of Copper, 2 per cent.—All the plants died within a few days.

July 22.—Further sprayings were made : *Sulphate of Iron*, 5 per cent. The stems were stripped of all their leaves, but in the course of a few weeks fresh leaves had appeared on many of the plants. *Sulphate of Iron*, 10 per cent : Though somewhat more severely attacked than by the 5 per cent solution, there was sufficient vigour left in many of the plants to send out new leaves after a few weeks.

Sulphate of Copper, 2 per cent: Only a very few of the older and more vigorous plants escaped destruction, probably not more than three to five per cent. This solution is evidently strong enough to kill all mustard plants 6 inches in height and less.

Sulphate of Copper, 5 per cent.—All the plants killed.

From the above data, I make the following inferences:—

1. That a two per cent solution of sulphate of copper (that is, 2 pounds in 10 gallons of water) is, all things considered, the most effective, safest (as regards the grain crop) and most economical to use. The spraying should be done thoroughly, and for that purpose 50 gallons per acre will be required. If a heavy rain follows the spraying within 24 hours, the operation will have to be repeated.

2. That, in order that the work may be effective, spraying should not be delayed after the mustard plants have reached a height of 6 to 9 inches. If allowed to grow taller than this, stronger solutions would be necessary and in larger quantity, as the grain would then largely protect the mustard.

NOTES ON LECTURING TOURS IN MANITOBA, THE NORTH-WEST TERRITORIES AND BRITISH COLUMBIA IN 1899.

By instruction of the Honourable Minister of Agriculture and at the request of the several governments of Manitoba, the North-west Territories and British Columbia, I left Ottawa in June last to hold three series of farmers' meetings in the West. The subjects of the addresses delivered were chiefly as follows: In Manitoba, locusts and weeds; in the Territories, weeds and their eradication, special mention being made of the value of summer-fallowing and the use of the implements known as weeders, and nature studies and agricultural education in schools; in British Columbia, the value of Farmers' Institutes, weeds and their eradication, insects injurious to fruits, hay and pasture grasses.

Leaving Ottawa on June 10, I reached Manitoba on the 13th. Passing along the railway between Ottawa and Manitoba, the backwardness of the season was remarkably apparent. Spring flowers which had been in bloom at Ottawa a month earlier, were only now opening their buds. This lateness was also a feature of the season all through Manitoba and the Territories.

MANITOBA.

Upon reaching Winnipeg, I made an examination of the shade trees, which are such an attractive feature of this beautiful city, and found that the Ash-leaved Maples were infested by three different insects: (1.) the Negundo Plant-louse (*Chaitophorus negundinis*, Thom.), (2.) the Cankerworm (*Anisopteryx pometaria*, Harr.)—both of these although much less abundant than in former years, still required attention—and, lastly but much more conspicuous, (3.) the Fleshy Leaf-gall of the Negundo. This is a fleshy swelling on the mid ribs of the young leaves which disfigures them very much. The galls are about an inch in length and contain several yellowish larvæ of a small gnat probably belonging to the genus *Diplosis*. An article was prepared for the press under the caption of 'Spray the Trees,' which was published in the local newspapers, and many availed themselves of the advice given therein.

On June 13 I reported myself at the Provincial Department of Agriculture, and, having been joined by Prof. Otto Lugger, the State Entomologist of Minnesota, I left Winnipeg on the 14th, and with Mr. Hugh McKellar, the Chief Clerk of the Provincial Department of Agriculture, who had made arrangements for an investigation of the areas in southern Manitoba, which were infested by the Rocky Mountain Locust in 1898. We reached Boissevain on the evening of the 14th and held a well attended meeting of farmers the same evening. The first

Fig. 22.—The Rocky Mountain Locust.

address was delivered by Mr. McKellar, who explained what steps had been taken by the Honourable Thomas Greenway with a view to assist the farmers to avoid loss by locusts, which were so abundant in 1898 as to have caused considerable anxiety, and, as none of the observers who had been on the lookout for the egg-laying females last autumn had succeeded in observing any, the hope had been expressed that there would be no locusts this year. The department, however, feared that this was too hopeful a view of the matter, and, on account of the gravity of the case, the Minister had requested the Dominion Entomologist and the State Entomologist of Minnesota to visit the district and examine whether there was any probability of an outbreak of locusts in 1899. Reports had been received that the insects had begun to appear south of Boissevain and Deloraine, and, although the date at that time was three weeks later than when the locusts had appeared last year, it was considered wiser to have the matter investigated carefully, so that, if locusts were found, farmers might be visited and urged to use the methods of destroying the insects which had been found useful elsewhere.

I then followed with a statement of all that was known of the Manitoba occurrences of the Rocky Mountain Locust, the extent of the losses which might accrue if farmers did not adopt the simple and inexpensive means of controlling them which had been advised. Prof. Lugger explained in a lucid manner the life history of this locust, which he illustrated with some large and original charts and gave the results of his long experience in fighting locusts in Minnesota and Dakota. The measures advised were practically those which had already been made known widely through newspapers, agricultural journals and government reports, and were briefly as follows :—The ploughing down in autumn and spring of all stubble in the districts where locusts had been seen, the ploughing down of the young locusts with the stubble as soon as possible after they hatched, beginning at the outsides of fields and working towards the centre ; wherever the young had hatched and made considered growth before the stubble was ploughed down, the use of the hopper-dozers, and on restricted areas the poisoning of the insects with arsenical mixtures.

Mr. Charles Braithwaite, the Provincial Weed Inspector, was also present and spoke at this meeting ; he also accompanied us through the rest of our investigation, in which he was of much assistance.

Fig. 23.—Messrs. Fletcher, Lugger and McKellar finding locusts' eggs.

On the morning of the 15th we started early and drove down to the beautiful farm of Mr. A. S. Barton, and thence to Mr. Frank Thompson's, where the exact localities could be pointed out in which the locusts had occurred the previous year. No trace of the insects or their eggs was found ; indeed, there was, both here and during a 25-mile drive to Deloraine, a most remarkable absence of all kinds of locusts or 'grasshoppers,' the name by which they are generally spoken of in the West. On reaching Deloraine, we were met by Mr. John Renton, of that place, and Mr. Thompson, of Waskada, who told us that hoppers had been seen on the hatching grounds six miles south of Deloraine, where I had found them last year. Accordingly, we drove to these farms, where they had been most abundant, and made a thorough search for the eggs. We soon saw that young locusts were hatching in large numbers, some were just emerging from the eggs, and some unhatched ; many egg-pods also were empty, but showed that the eggs had been destroyed by parasites. The egg-pods were about an inch below the surface, mostly on elevated spots, and on the sunny side of furrows on these elevated spots. This date of hatching (June 15) was fully three weeks later than that at which the young grasshoppers must have hatched last year, for I found fully matured insects on July 4, 1898. This was due to the late wet spring, a circumstance which also was of great benefit to farmers by making it easier for them to control weeds.

On the evening of the 15th a meeting was held at Deloraine, which was well attended by farmers from the surrounding country, and addresses were delivered similar to those given at the Boissevain meeting, except that we were now able to speak strongly and definitely as to what steps it was advisable for the farmers to adopt without delay. At this meeting Mr. D. S. McLeod brought specimens of locusts from Lennox, only a few miles south-west of the Deloraine occurrence; these were apparently a week or more older than any we had seen in the fields we visited. At this meeting Prof. Lugger gave the chief address of the evening, describing in detail the best means to adopt under the present conditions to prevent the spread of the swarms now hatching; he also showed plans and explained thoroughly the construction of hopper-dozers, in case these implements should be required later in the season. From what we had seen, however, we were able to encourage the farmers to hope that, if all would plough down the stubbles left for summer-fallowing at once, the locusts might be prevented from spreading and causing serious loss.

After the Deloraine meeting we left for Napinka and took the early morning train to Brandon, where a profitable morning was spent examining the magnificent crops on the Brandon Experimental Farm. The Awnless or Smooth Brome Grass, the introduction of which by the Experimental Farms has been such an immense boon to the farmers of the West, was at that time (June 16) just spearing, and the meadows were a thick mat of grass, over two feet in height. In the afternoon a good opportunity of meeting many of the best farmers of the province was afforded at the ploughing match of the Blythe Farmers' Institute, held near the Brandon Hills Post Office. Here we were again invited to deliver addresses on our grasshopper investigations, a subject which proved of much interest to the hundreds of farmers present. We returned to Brandon in the evening, and on the morning of the 17th I separated from my very pleasant companions.

Owing to the excellent arrangements made by Mr. McKellar and by the generosity of the Northern Pacific and Canadian Pacific Railways who had given the whole party free transportation over their lines, we had been able in a very short time to travel a long distance and also to meet the farmers most keenly interested in the locust occurrences. That the farmers of southern Manitoba appreciated the efforts of the governments to help them, is attested by the following letter received from Mr. McKellar at the end of the season:—

'There is no doubt but that your visits to Manitoba in 1898 and June 1899, examining the Deloraine district, invaded by grasshoppers, did much good. Farmers were interested in the definite information given by you regarding the habits of the grasshoppers and the best methods for fighting them. Instructions *in re* fall ploughing or early spring ploughing and early summer-fallowing have been followed. A few farmers have used hopper-dozers this season, and if necessary, more will be used the coming year. The injury done in 1899 was not appreciable. The crops were of very heavy growth, and the harm done, therefore, not so evident. There has been more fall ploughing in the Deloraine, Whitewater and Boissevain districts last fall than in any previous year. This was partly on account of the very favourable fall, but farmers were no doubt stirred up to the work by the knowledge that they were taking the best means possible for destroying the eggs of grasshoppers that might have been deposited during the summer.'

North-West Territories.

June 18 was spent in answering correspondence which had been forwarded to me from my office at Ottawa, and on the afternoon of the 19th I left for the West, reaching Moosomin at 4 o'clock, in time to join the Honourable G. H. V. Bulyea, the Commissioner of Agriculture for the North-west Territories, and hold an afternoon meeting of farmers; this was the first of a series of seventeen meetings held in the southeast of Assiniboia. These meetings were arranged by the Commissioner to be held at the points where it was considered good work could be done by explaining to farmers living in that magnificent and fertile section: (1) the exact meaning of the North-west Noxious Weed

Ordinance and the attitude of the Provincial Government on the subject; (2) the nature of noxious weeds, the danger of many varieties being introduced from the East; and giving a detailed description of the kinds most to be feared in each locality, with the best means of eradicating or fighting against them. The order of the meetings was as follows: The Commissioner, who was present at almost every meeting, opened with an exposition of the Weed Ordinance; I followed with a treatment of the subject of weeds and their eradication, illustrating my remarks with fresh specimens of the worst weeds to be found in each locality, either brought in by farmers or collected before the meeting. There were also shown prepared specimens of those not yet introduced but which were to be feared and which might appear at any time among crops. At most of these meetings we were accompanied by, and received much assistance from, Mr. Wm. Trant, of Regina, who not only took an active part in the meetings but prepared careful accounts of each for the press, in which the chief features of the addresses were presented in an excellent manner. Some of these meetings were also rendered much more attractive and useful by the presence and timely addresses of the active Deputy Commissioner of Agriculture, Mr. C. W. Peterson, and the Territorial Weed Inspector, Mr. T. N. Willing, who is both an expert botanist and also a practical farmer who has lived for many years in the West. It will be seen by the list of places given below where meetings were held, that a large area of country was visited, the exceptional fertility of which was clearly proved by the prosperity of the farmers, as evidenced by the fine houses and buildings and the well-kept farms.

At Regina we were honoured by the presence of His Honour the Lieutenant Governor of the North-west Territories, the Honourable A. E. Forget, who took an active part in the proceedings.

The series of meetings began at Moosomin on the 19th and ended at Gainsborough on July 7. They were convened through the different agricultural societies, and in every instance an officer of the local society presided. The enthusiastic welcome accorded the Honourable Commissioner and the keen interest shown in the subject as evinced by the large attendance at all the meetings, and the animated discussions, were very gratifying. The numbers which were present were remarkably large considering the distance most had to travel, and the fact that it was necessary to hold these meetings at a very busy time of the year for farmers.

The following is a complete list of the meetings held, with the name of the chairmen:

Date.	Place.	Chairman.
1899.		
June 19	Moosomin	J. M. L. Young, President, Agricultural Society.
" 20	Whitewood	R. Nicholson, " "
" 21	Grenfell	R. D. Lake, M.L.A., " "
" 22	Wolseley	Dr. Elliott, M.L.A., " "
" 23	Indian Head	Angus Mackay, " "
" 24	Qu'Appelle	W. H. Henley, " "
" 26	Fort Qu'Appelle	A. Macdonald, " "
" 27	Regina	G. Spring-Rice, " "
" 28	Moose Jaw	Jno. Battle, " "
" 29	Fairmede	J. Clementson, " "
" 30	Glen Adelaide	Wm. Piggott, " "
July 1	Clare	J. L. Thompson, " "
" 3	Carlyle	Jno. Stewart, " "
" 4	Alameda	S. Miller, " "
" 5	Oxbow	D. W. Maitland, Secretary, "
" 6	Carnduff	Jno. Young, " "
" 7	Gainsborough	Wm. Taylor, President, "

After the Moosomin meeting we went by freight train to Whitewood, arriving there early in the morning of the 20th. The morning was spent in collecting plants

with Mr. T. N Willing. We took the evening train for Grenfell, where we were met by Mr. R. D. Lake, through whose kindness I was driven out to his home and had an opportunity of seeing the nature of the country and its condition as to the prevalence of weeds. The following morning further opportunities were afforded by a 15-mile drive round by the farm of Mr. T. Skilliter and back to Grenfell, where a very largely attended meeting was held, one of the best of the whole series. After the meeting I returned with Mr. Lake to Col. Lake's house, and the following morning was driven to Wolseley, where we held another good meeting in the new Court House. At Whitewood we were joined by Mr. F. Blakely, of the *Nor'-West Farmer*, who remained with us for all the subsequent meetings but the last. Owing to the much greater altitude, the crops from Moosomin to Grenfell and Wolseley were not nearly so forward as in Manitoba. Winnipeg is about 700 feet above sea level, while Grenfell is nearly 2,000. All crops, however, were in splendid condition and there was every prospect of an enormous yield, the land being, as a rule, clean and well worked.

We reached Indian Head on June 23, when I was met at the station and driven out to the Experimental Farm by Mr. Angus Mackay. During the morning the whole of our party was driven round the farm. Crops of all kinds were in the best of order, and a remarkable object lesson was here seen of the very great value of using harrows and weeders upon growing grain crops. These as a whole were much more advanced than at Grenfell, and those which had been harrowed showed this fact plainly by their greater vigour. The meeting in Indian Head in the afternoon was well attended, and, as was to be expected, summer-fallowing and the surface treatment of growing grain were much discussed. Mr. Mackay has probably taken a more active part than anyone else in the North-west in insisting upon the necessity of a proper system of summer-fallowing for the dry regions of the West, and, as a remarkable confirmation of the accuracy of his views, lands which ten or fifteen years ago were abandoned because it was stated they were too far west and too dry to produce paying crops of wheat, are at the present time selling at a higher price than any other lands in the North-west Territories.

On the morning of the 24th Mr. Mackay kindly drove me himself to Qu'Appelle station and on the way pointed out many features of agricultural interest. The meeting was held in the afternoon, and, like the next one at Fort Qu'Appelle on the following Monday, was particularly well attended, the large number of questions asked and free discussion of the addresses being noticeable features in both places.

On Monday morning June 26, through the kindness of Mr. Donald McKay, I was driven to Fort Qu'Appelle and had a chance to examine many growing crops on the way. This locality was of particular interest because it was from here that the first reports were received of the occurrence as crop pests of the Tumbling Mustard and Hare's-ear Mustard. After the meeting at Fort Qu'Appelle, I drove back to Qu'Appelle Station with Deputy Commissioner of Agriculture Peterson and Mr. Blakely through a torrent of rain and took the train at 20.20 o'clock for Regina.

The following morning was taken up by examining the barracks of the North-west Mounted Police and the successful experiments in cultivating trees and growing flowers which have been carried on for many years by Col. Herchmer. It is very seldom that one can see anywhere such beautiful sweet peas and other annuals, and as well grown vegetables as are produced at Regina in these grounds. A most successful meeting took place in the afternoon at which many prosperous farmers from the surrounding country, as well as several government officials, were present. A vote of thanks to the speakers was proposed by His Honour the Lieutenant Governor, and seconded by Mr. D. J. Goggin, the Superintendent of Education.

The next meeting was at Moose Jaw, and I was much pleased to have an opportunity of driving out both in the morning and in the afternoon to see the grand crops which are now being grown in this semi-arid district, and are due to the recent adoption of the best methods of farming for that section of country. The discussion at the meeting held in the afternoon was mainly upon the treatment of such annual weeds as the various kinds of mustard, several of which were prevalent through the district, the Spear-leaved Goosefoot *(Monolepis chenopodioides*, Moq.*)* and of such deep-rooted perennials as the White-stemmed Evening Primrose, Poverty Weed *(Iva axillaris*, Pursh*)*,

known here under the appropriate name of Smother Weed, and the Blue Lettuce (*Lactuca pulchella*, DC.).

Early on the morning of June 29 I left Moose Jaw with Mr. Blakely, and having been joined at Regina by the Hon. Mr. Bulyea, went on to Wapella, where a team was in readiness to take us to Fairmede, 18 miles distant, at which place we held the first of several successful meetings away from the railway, driving from place to place through the country. We were all much surprised at the fine agricultural hall and buildings at Fairmede, but this was soon explained by the prosperity of the farmers in this fertile district. We spent the night at the comfortable home of Mr. John Kidd, who moved out west from the Ottawa district many years ago.

The next meeting was at Glen Adelaide, 22 miles distant, and was reached after a delightful prairie drive in the afternoon. We spent the night at Cannington Manor, and leaving the next morning, were driven by Mr. McDiarmid, M.L.A., through the Moose Mountains and White Bear's Reserve, passing by Heart Hill, one of the highest mounds of these hills, to Arcola (16 miles), where we were hospitably entertained by Mr. J. L. Thompson. Mr. Thompson's farm lies at the foot of the Moose Mountains, with a magnificent stretch of level and extremely fertile land lying to the south of it. The prosperity of this section is clearly shown by the fine houses of the settlers, notwithstanding the long distance over which all produce has to be driven to market or to the railways. In the afternoon Mr. Thompson drove us 7 miles to the new village of Clare, where a meeting was held. A few farms in this district were found to be infested with Stink Weed (*Thlaspi arvense*, L.) and Hare's-ear Mustard [*Conringia orientalis*, (L.) Andrz.], which had been accidently introduced a year or two before, but which had been recognized and were being attended to. The Shepherd's Purse (*Capsella Bursa-pastoris*, Mœnch) and the Green Tansy Mustard (*Sisymbrium incisum*, Engelm., var *filipes*, Gray.) were also remarkably abundant in one or two places, and both plants were seen to be loaded with seeds. At the meeting stress was laid upon the importance of early summer-fallowing and of mowing down all weeds with ripe seeds before the summer-fallows are turned down. We afterwards drove back to Arcola with Mr. Thompson and remained with him until the morning of Monday, July 3.

Leaving at 8 o'clock on July 3, we drove 10 miles to Carlyle, where a large meeting was held in the afternoon, and subsequently 23 miles further to Alameda, on the Souris Branch of the Canadian Pacific Railway, where we were joined by Mr. Trant, and a splendid meeting took place in the afternoon, at which a great number of specimens were brought in by farmers and where there was a most useful discussion. After this meeting we walked to Oxbow, the next station along the railway, passing through the rich lands lying along the Souris River. As we neared the town of Oxbow, we found some crops of wheat in which the Prairie Rocket (*Erysimum asperum*, DC.) was very abundant, and, being such a conspicuous plant, it had naturally caused considerable anxiety among farmers who had recognized it as a member of the Mustard Family. This plant, however, is a biennial which seldom shows itself as abundantly as was the case this year, being a native plant which has never proved to be an aggressive crop pest and which besides is easily pulled up, the large plants never growing very closely together; it is not likely, therefore, to develop into a bad weed.

The meeting at Oxbow was equally successful with the preceding one. The next morning we drove to Carnduff, where we were joined by Mr. T. N. Willing. The farmers here were found to be much interested in the weed question, and the same was the case at the meeting held on July 7 at Gainsborough, many pertinent questions being asked and much interest being taken in the Hon. Mr. Bulyea's efforts to assist the farmers. From Gainsborough a 25-mile drive brought us to Melita on the evening of July 7. Here I finished my work for the North-west Government—three weeks of delightful travelling, in which a large tract of country quite new to me was traversed and in which I had enjoyed many opportunities of studying the insects and plants of the country passed through. I must here express my gratitude to the Hon. Mr. Bulyea for frequent modifications in his plans, which I know were made entirely on my account, so that I might see as much as possible of this interesting country and have every convenience to collect plants and insects, noxious and beneficial.

MANITOBA.

On July 8, in accordance with an agreement with the Manitoba Government, I went to Elkhorn, Man. and addressed a meeting of the Elkhorn Farmers' Institute. I remained at this place till the following day, when I took the train back to Winnipeg to assist in the arrangement of the exhibit of the noxious weeds of Manitoba, shown in the Weed Tent of the Provincial Government of Manitoba at the summer Industrial Fair. This exhibit was an unqualified success. Almost every kind of the noxious weeds of the province was shown, plainly labelled with its English and scientific names, and at all times of the day some officials of the department were in attendance to give such information as might be desired by the thousands of farmers who visited the exhibit every day from early morning till late at night.

BRITISH COLUMBIA.

On the morning of July 13, I left Winnipeg and proceeded westward to British Columbia by way of the Crow's Nest Pass, visiting the thriving and active towns of Nelson and Rossland on the way. I reached Vancouver on July 19, when I joined Mr. J. R. Anderson, the Deputy Minister of Agriculture for British Columbia. The afternoon was spent in admiring the colossal trees and other plants in Stanley Park. On the morning of the 20th New Westminster was visited, and we reached Victoria the same evening. The 21st was spent in the Department of Agriculture, examining the collections and answering correspondence forwarded from Ottawa. In the evening we went out by special train to South Saanich, where a largely attended meeting of the Victoria Farmers' Institute was held; the subjects treated of at this meeting were weeds of the farm and injurious insects. We returned to Victoria the same night, and on the morning of July 22 left for Duncan's, on the Esquimalt and Nanaimo Railway. We were met at the station by Mr. G. H. Hadwen and driven out to his fruit farm. We returned to Duncan's for a meeting of the Farmers' Institute held in the afternoon. The subject of main interest at this meeting was Hay and Pasture Grasses. Noxious Weeds and Agricultural Education were also discussed at some length. After the meeting a visit was paid to the grounds of Mr. W. C. Duncan to examine a patch, which he had had under cultivation for many years, of *Bromus virens*, Buckl. (*B. Hookerianus*, Thurb.), a grass of much promise closely resembling the Southern Brome grass (*Bromus Schraderi*, Kunth). We returned by the evening train to Langford and drove to a meeting of the Metchosin Farmers' Institute. This meeting had been well advertised and was largely attended. After the meeting we drove back to Victoria reaching there at 1.30 a.m.

On Monday morning, July 24, in company with Mr. Anderson, I started for the interior of Vancouver Island; we arrived at Nanaimo about noon and were joined by the Rev. G. W. Taylor, of that place. After lunch we drove 36 miles to Mr. R. F. Hickey's, at French Creek, and later in the evening back to McCarter's Hotel, where an evening meeting was held. This day's journey was full of interest on account of the wonderful forests with which this part of the island is clothed. Objects of great wonder were the enormous trees of *Arbutus Menziesii*, Pursh, many of them over 2 feet in diameter and some large specimens reaching even 3 feet. The next morning we started at 6 o'clock and drove 30 miles to Alberni, arriving there at 3 o'clock in the afternoon.

The drive past Cameron Lake and around the foot of Mount Arrowsmith is one of the most remarkable drives I have ever taken—the road magnificent, smooth and well gravelled the whole way, and through a most wonderful forest, a tract of two miles just past Cameron Lake on the Alberni side, particularly shows the Vancouver Island forests in perfection: gigantic Douglas Spruces, Hemlocks and Cedars—specimens of these trees from 6 to 8 feet in diameter being found by thousands—growing so close together, only 30 or 40 feet apart, that the straight trunks rise up over 100 feet before a branch is reached. The heads of these giants seem very small compared with their towering trunks. The undergrowth beneath these trees is remarkably sparse and consist almost entirely of mosses and ferns, with the beautiful and fragrant *Achlys triphylla*,

DC. The woods the whole way are characteristically mountain woods. The Salmon Berry (*Rubus spectabilis*, Pursh) with its luscious fruit, like enormous orange or maroon-coloured raspberries, was in full fruit, also the Red-berried Vaccinium (*V. parvifolium*, Smith), a most beautiful shrub with bright red fruit like yew-berries, borne singly and produced in such quantities as to bend down the slender branches. A noticeable feature along the road was that many introduced grasses and weeds were abundant which had been brought in either by the road-makers or in carrying hay over the road.

A meeting was held at Alberni in the evening and the following morning we started at 4.30 and drove back 30 miles to Little Qualicum, where we caught the steamer *Thistle* and went to Comox, reaching there at five o'clock in the afterncon. Thence we proceeded at once to Courtney, where we passed the night. The next morning an interesting drive was taken to the mining town of Union and to a beautiful lake three miles beyond. The heat was excessive, but a good meeting was held in the evening, the addresses being followed by animated discussions, the so-called Canada Thistle being the principal subject.

On the morning of July 28 we left by the 7.30 steamboat and reached Nanaimo at five o'clock in the afternoon and started at once with the Rev. G. W. Taylor for Cedars, where a small but enthusiastic meeting was held in the evening. We then returned to Nanaimo for the night. A meeting was to have been held at Salt Spring Island on Saturday the 29th, but we found that the steamboat had been taken off for some excursion, and it was impossible for us to reach the island. We therefore returned to Victoria and remained there until Sunday night, when we took the eleven o'clock steamboat for the mainland. Vancouver was reached by eight o'clock and New Westminster at eleven; we then took the steamer for Ladner's Landing, where our first meeting on the mainland had been advertised. Leaving Ladner's at five o'clock the next morning, we drove back and took the steamer opposite New Westminster for Langley. A good meeting was held in the afternoon, after which we proceeded by canoe to Port Haney and from that place walked to Hammond, where we passed the night. The next morning we took train for Abbotsford, where an informal meeting of farmers was held. In the evening we returned to Mission Junction, and the meeting at night was one of the best of this series, being well attended and much interest shown in the subjects discussed. On the morning of August 3, I walked to Hatzic with Mr. Tom Wilson, a member of the Provincial Board of Horticulture, and examined several fine orchards, many of which, however, were seriously injured by the attacks of the Pear Slug, against the injuries of which no steps seemed to have been taken. From Hatzic we proceeded by steamer to Chilliwack, where a most successful meeeting took place. Chilliwack is one of the most favoured spots in British Columbia and the meetings, being always well worked up, are invariably satisfactory. On the afternoon of the 3rd we drove out to inspect a currant plantation belonging to Mr. Ford, which was heavily infested by a downy scale insect, *Pulvinaria occidentalis*, Ckll, the western representative form of the well-known eastern Cottony Maple Scale, *Pulvinaria innumerabilis*, Rathvon. Leaving Chilliwack on the morning of the 4th, we reached Agassiz before noon. The afternoon was spent in examining critically the pastures of the Experimental Farm with a view to discover if possible any plants which might be the cause of the disease among cattle known as 'Red Water.' Nothing of importance was discovered, and none of the plants reputed to be the causes of this obscure disease were found in undue abundance, nor could it be seen that any of those which did occur had been eaten by stock which had fed there. A very successful meeting of the Farmers' Institute was held in the evening. This was well attended and was followed by a protracted discussion. In addition to Mr. Anderson and the writer, Mr. Thomas Sharpe delivered an address.

Starting at 4 o'clock on the morning of August 5, an expedition was made to the summit of Mount Ché-am for the purpose of collecting botanical and entomological specimens. We were accompanied by Mr. Allan Brooks, an enthusiastic ornithologist, and one guide, Jim Harris, a Ché-am Indian from Popcum, well acquainted with the mountain and an experienced climber, who was of great service to us. Notwithstanding the lateness of the season and the exceedingly unpropitious state of the weather which prevailed while we were on the mountain, we made large and valuable collections

both of plants and insects. As a result of the late season, we found on the summit banks of snow 75 and 100 feet deep, where last year at the same date we had seen deep ravines. On the morning of August 8, it began to rain at 6 o'clock, so we decided to descend at once, and at eight o'clock struck camp and began the descent of the mountain in a downpour of rain, which continued all day till we got to the base at 16 o'clock, drenched to the skin, but with all of our specimens safe, as we had wrapped them in waterproof covers before starting. At Popcum we took a hasty meal and crossed the Fraser River by 17.30 o'clock. The following morning was fully taken up attending to our specimens and in drying our clothes to be ready to leave for the upper country on the train at 15.47 o'clock.

We reached Sicamous on Shuswap Lake at 2.35 o'clock and waited there in pouring rain till 6 o'clock, when we took the Okanagan Valley train for Armstrong, arriving there at 9 o'clock. We had hoped to have collected many specimens in this locality, but it rained all day. Our time, however, was by no means wasted, for we examined a very interesting local collection of plants and insects made by Mrs. Walton, of Armstrong, and in the evening held one of the best meetings of our whole trip. This was of the Spallumcheen Farmers' Institute. Some of the worst weeds of the Northwest, including the Tumbling Mustard, False Flax and Ball Mustard, were found to have gained a foothold in this fertile valley, and the farmers were keenly interested in learning all that was to be known about them. The Prickly Lettuce (*Lactuca Scariola*, L.) and the Purslane (*Portulaca oleracea*, L.), both of gigantic dimensions worthy of the Pacific Province, were brought to the meeting. We left Armstrong at 9 o'clock on the morning of August 11, for Okanagan Landing, where we took the fine steamer *Aberdeen* for Kelowna, and reached there at 16 o'clock. After being shown over the new and up-to-date factory of the Kelowna Shipper's Union, where the now well known 'Flor de Kelowna' cigars are made, we were driven out to see the surrounding country by Mr. J. T. Davies, the President of the Okanagan Farmers' Institute. We first visited Lord Aberdeen's ranche at Guisachan, where we were shown fields of Smooth Brome grass. We then visited the extensive and successful tobacco plantations of Messrs. Collins and Holman, and finally accompanied Mr. Davies to his own home. The meeting at Kelowna was held at 20 o'clock in the evening and was, as is always the case at this bright active little town, well attended and very successful. We left this delightful place at noon on August 12 and reached Enderby at 18 o'clock the same evening ; there we left the train and drove across the country to Salmon Arm, arriving at 20.30 o'clock, just in time for the meeting of the Salmon Arm Farmers' Institute. This meeting, although not so largely attended as those at Armstrong and Kelowna, was full of interest, as this place is becoming a fruit growing centre of importance in the province. The addresses were attentively listened to and fully discussed.

This was the last of a series of sixteen useful and most enjoyable meetings held with Mr. Anderson in the best agricultural and fruit growing districts of British Columbia. Mr. Anderson's thorough knowledge, not only of the capabilities of his province, but also of its fauna and natural history, made him a most entertaining companion ; the careful arrangements he had made beforehand enabled me to take the fullest advantage of the expedition, which was of inestimable value to me in becoming acquainted with the conditions prevailing in the various localties visited, so that I might be of as much use as possible in the future to such farmers of British Columbia as may wish to correspond with the Division of Entomology and Botany.

We left Salmon Arm at 1.25 o'clock and reached Banff, Alta., by 17 o'clock on August 13. I remained there until the next day, when in company with Mr. W. C. McCalla of St. Catherine's and Mr. N. B. Sanson, Curator of the Government Museum at Banff, both enthusiastic botanists we sallied out, and, notwithstanding the torrents of rain which fell almost continuously, I added several desirable botanical specimens to my collections. On August 14, I left for home at 16.10 o'clock, reaching Winnipeg at 21 o'clock on the 15th, and Ottawa at 18 o'clock on August 17.

REPORT OF THE POULTRY MANAGER

(A. G. GILBERT.)

To Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have pleasure in herewith inclosing to you the twelfth annual report of the Poultry Department.

The work of the year embraced certain experiments, particulars of which are given in full under their distinguishing headings. Briefly outlined they are :—

Experiment in order to ascertain the laying qualities of old hens and pullets.

The placing of three groups, of five each, of Barred and White Plymouth Rocks and Silver Laced Cockerels in pens with limited runs attached, with the object of finding the relative value as flesh formers of rations composed of whole grains, another of ground grains and a third embracing both.

Penning up cross-bred cockerels and feeding them on ordinary rations with the view of noting flesh development.

The preservation of eggs, in order to find out the best means of doing so.

Artifical incubation.

An important feature of the year was the discovery of a fatal disease among turkeys, new in Canada but not in the United States. The disease Entero-Hepatitis has no doubt been the cause of the death of many turkeys throughout the country. A description of the disease and manner of its discovery will be found in its proper place.

Addresses on subjects kindred to my department were delivered during the year at different points in the country.

The increase in volume of correspondence and demand for literature on poultry keeping, as well as the erection of numerous houses by farmers and poultry plants by private individuals and joint stock companies, denote rapid development in poultry culture for profit.

It affords me pleasure to again testify to the zeal and energy of Mr. George Deavey, to whose proper handling of the rations, so much success in the production of eggs in winter and the rapid growth of the chickens in summer is due.

I have the honour to be, sir,

Your obedient servant,

A. G. GILBERT.

CENTRAL EXPERIMENTAL FARM,
OTTAWA, December 30, 1899.

The work of the past year differed from that of the previous years in so far that during the period of winter laying, which is one of the most important, the laying stock were divided into three sections, viz. :—

1. Old hens of three years of age and over.
2. Hens twelve months of age, known as yearling hens.
3. Pullets, always understood to be of that season's hatching.

The divisions were made for the purpose of experimental investigation into the laying merits of the hens of the different ages designated.

There has always been much speculation, but no satisfactory data, as to the egg-producing value of the older and younger stock. Each class had its votaries. There were those who contended that pullets were the best money makers, because they laid the most eggs. Again, there was the statement that while pullets might lay more eggs than the older hens, their eggs were not worth so much, because smaller in size. And a third party, whose contention is that the eggs of the two-year old hens were best to hatch chickens from, because the progeny were more likely to be strong and robust than offspring from eggs of pullets, which are immature fowls.

The claims of each party certainly embraced strong features and afforded scope for interesting investigation.

Accordingly, the fowls, on going into winter quarters during December of last year, were divided into three groups as described above.

Many of the old hens were three years of age, and some over that figure, so that good opportunity was afforded to make fair comparison.

The following table will show the results of the experiment, it being borne in mind that the object was to have eggs in winter, the season of high prices :—

TABLE showing comparative laying merits of Old Hens, Yearling Hens and Pullets.

Number.	Description.	December.	January.	February.	March.	April.	May.	June.	Total.	
	OLD HENS.									
13	White Leghorns	40	50	32	91	130	160	88	591	
10	Barred Plymouth Rocks	54	63	58	109	114	91	66	555	
9	Coloured Dorkings	76	46	65	48	51	26	30	342	
7	Black Minorcas	49	40	47	84	96	120	57	493	
39									1,981	
	HENS, ONE YEAR OLD.									
11	White Leghorns	83	38	83	106	131	115	55	611	
11	Barred Plymouth Rocks	72	49	72	135	111	83	36	558	
22									1,169	
	PULLETS.									
8	White Leghorns	41	106	90	84	98	119	67	605	Hatched June 11.
8	White Plymouth Rocks	23	106	101	117	105	74	34	560	" Apl. 25 and May 9.
8	Barred " "	91	119	88	131	116	103	52	700	" Apl. 30 and May 24.
8	Langshans	4	35	42	55	62	100	31	329	" May and early June.
8	Black Minorcas	25	39	102	77	91	94	24	452	" May 9 and May 26.
8	Brown Leghorns	18	81	77	104	87	114	47	528	" May 17.
48									3,174	

The fowls were kept under the same conditions, with the exception of food, of which the pullets received a greater quantity for reasons given further on.

Some of the points shown by the table, are :—

1. The pullets laid more eggs than either old or yearling hens, except in the case of seven old Black Minorca hens.

2. The eggs of the older hens were larger and in consequence worth more. Mr. Walter Paul, family grocer, of St. Catherine Street, Montreal, says in a letter, 'we pay more for the new laid eggs of large size.'

3. The laying of more eggs by seven Black Minorca old hens, than by eight pullets of the same breed, goes to show that the contention that the hens of the Mediterranean classes are good layers up to three years of age inclusive, is warranted in this case.

4. If eggs were sold by weight, the larger eggs of the older hens would be most in demand.

5. The late May and middle of June hatched Langshan pullets, did not lay half as many eggs as the same number of earlier hatched Barred Plymouth Rock pullets. There can be but one deduction and that is to have the pullets of the Asiatic and American breeds hatched as early as possible.

WEIGHT OF HENS AND PULLETS EGGS.

The weight of eggs of different breeds is given as follows :—

	Lbs.	Oz.
Barred Plymouth Rock hens, one dozen	1	11
" " pullets "	1	6
White Leghorn hens "	1	10
" pullets "	1	6
Brown Leghorn hens "	1	9
" pullets "	1	4
Light Brahma hens "	1	11
" pullets	—	—
Black Minorca hens "	1	11
" pullets "	1	7
Andalusian hens "	1	11
" pullets "	—	—
S. L. Wyandotte hens "	1	9
" pullets "	1	6

HOW TO HAVE EARLY HATCHED PULLETS.

Early hatched pullets may be secured in two ways, viz.:—

1. By using hens to hatch them.
2. By incubators and brooders, or brooding house.

The first method is more likely to be practised by the great majority of farmers, for the time being at any rate. But there are certain conditions in connection with hen-hatched chickens that the farmers must be acquainted with or desired results cannot be obtained. It must be borne in mind that in order to have early sitters, the hens of the sitting breeds should lay in winter. If they do not, as is too frequently the case, they will not become broody until they have laid their quota of eggs in spring, and this, with the further period of three weeks required for the hatching of the young birds, may mean the end of May or the beginning of June before the first chickens make their appearance. Past experience in our poultry department has shown that when Plymouth Rocks, Wyandotte or other hens of the sitting varieties lay, all winter, there are broody hens enough in March or early April to hatch out many chickens by first week in May ; and early May chickens, with proper care and food, have been found to grow rapidly. The weather is always a factor. Some seasons are milder and earlier than others. Early May hatched pullets, of the American breeds, should lay in late October, or early in November. In 1897, one of three Barred Plymouth Rock pullets hatched in our poultry department on March 11, laid her first eggs on September 20 following, (five months and nine days), and the others shortly afterwards. A year or two previous a Barred Plymouth Rock pullet hatched April 29, laid her first egg four months and

twenty-nine days later. She was the earliest pullet to lay in the history of the department. Early May hen hatched chickens, seem to grow best and give the most satisfactory results as flesh formers and layers. Earlier in the season the weather is too cold to permit a rapid growth, unless mother and brood are placed in a warm compartment, and the floor covered with earth. Or when the chicks have been taken away from the mother hen and placed in a properly constructed brooder, or brooding house. In the colder portions of the Dominion where ordinary facilities are at the disposal of the farmers, hen-hatched chickens of early May will be found to give the best satisfaction.

THE SECOND METHOD OF RAISING EARLY PULLETS.

But it may be said—indeed is often said by correspondents—that pullets are wanted to lay four or six weeks earlier than those which are hen hatched, or at the time when the older hens are in moult and eggs scarce and high in price. In such a case recourse must be had to the second method, viz.:—

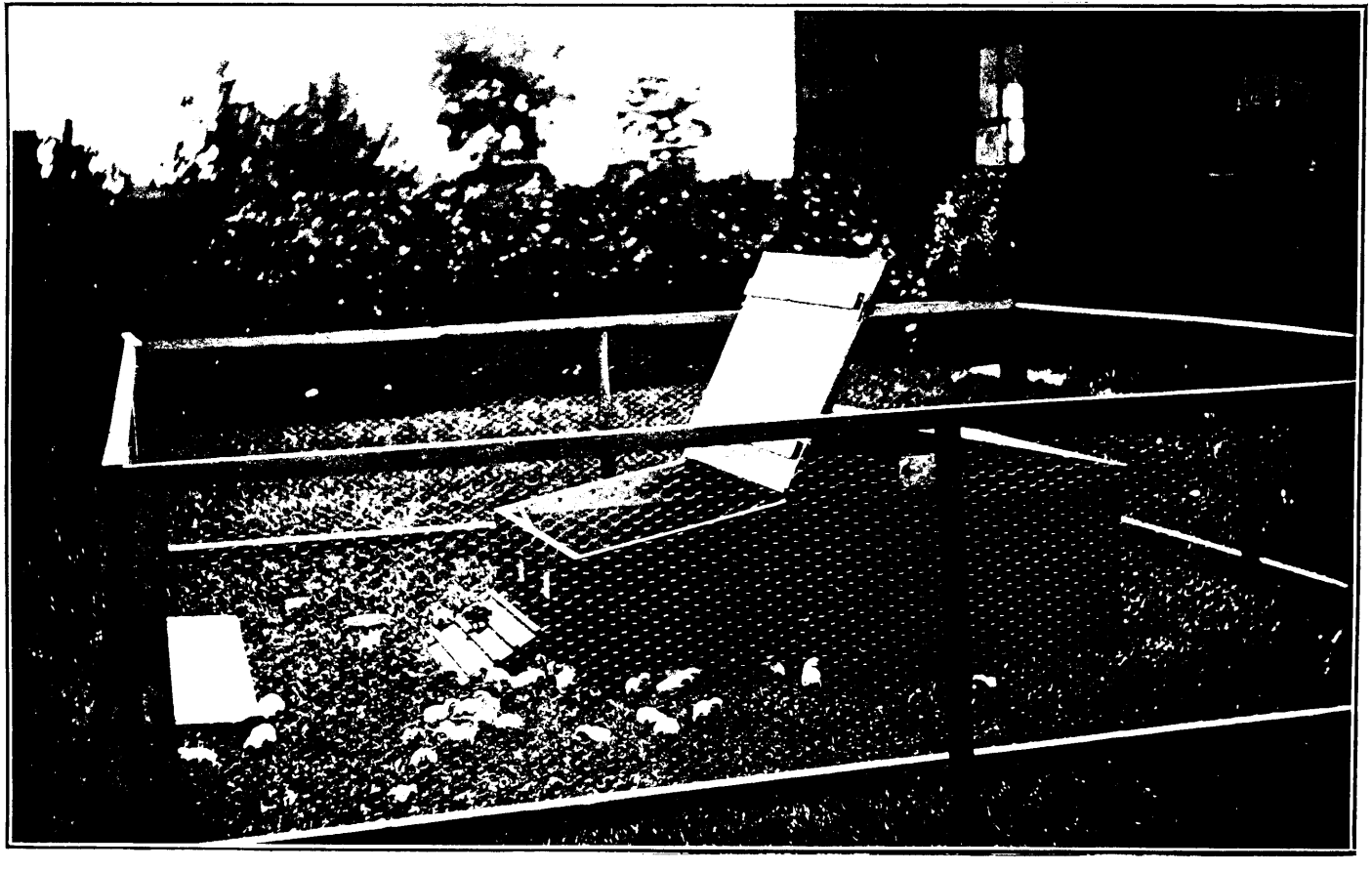
By incubators and brooders, or brooding houses. The early hatching and rearing of chickens by artificial means is becoming more in vogue because incubators and brooders have become more easy in operation and certain in results. It is certainly the only way by which one party, or a company of capitalists can hatch out a large number of chickens during the winter months or early in spring. If only a limited number of eggs are required for incubator use in late winter or early spring and the hens are also stimulated to lay eggs for sale in December and January and part of February, skill and experience are required in the handling of the laying stock, so as have a large percentage of the early eggs fertilized. In certain cases it may be advisable to keep a number of hens to lay eggs for incubator use only. Where chickens are wanted in comparatively small numbers a good brooder, or sectional brooder house, may be found sufficient, wherein to care for the chicks, until the weather permits of their being put in coops outside. But in large establishments where the artificial hatching and rearing of chicks for sale as early broilers is conducted on a large scale, an extensive brooding house is required. In such establishments a great number of hens are kept mated and managed so as to lay as large a percentage of fertile eggs as possible. Hatching by incubators begins in December or early January and the chickens do not leave the brooding house until put on the market, ten or twelve weeks later. Few eggs are sold for eating purposes, the aim of the management being to convert the dozen eggs, which for eating purposes are worth at city prices 35 or 40 cents, into broilers or early roasters worth at the proper season $1.25 to $1.50 per pair. A dozen eggs from which are hatched six or eight chickens, after making allowance for cost of rearing, affords at the figures mentioned a large margin of profit to the skilled and experienced managers. Speaking on the subject, Mr. A. F. Hunter, the well known proprietor of Cleft Rock Poultry Farm, South Natick, Mass., said 'while some persons are content to so manage their hens as to make only 40 cents per dozen on the city markets for their winter eggs, others by their skill in management and expert knowledge of artificial incubation make the dozen eggs worth to them four to five dollars. The margin of profit is there. It is only a matter of skill and perseverance to make it.'

There are several farmers in Canada who successfully use incubators and who are on the way to be specialists. They are found in the neighbourhood of the larger towns and cities. But the great majority of our farmers have yet to learn how to have their hens lay in winter and their energies meanwhile should be directed to

1. So managing their hens as to have eggs in winter.
2. And so have, not only a high price for their eggs, but early sitters to hatch out early chicks for market and pullets for early layers.

HOW THE OLDER HENS WERE FED.

Previous experience had shown that the same quantity of food given to the pullets with good results when fed to older hens made them too fat. Accordingly the older



Brooder in inclosure in Poultry Department, Ottawa, with Chickens Hatched with Incubator.

hens were fed rations, in such quantities, as past experimental work had shown was best for egg results and health of stock, viz :—

MASH, composed of ground grains, with ground clover, or vegetables mixed into it, in proportion of one quart to every fifteen hens. Fed three times per week, in morning and sometimes in afternoon.

CUT GREEN BONE, one pound to every fifteen or sixteen hens three times per week, or, at such times as the mash was not given.

WHOLE GRAIN, principally wheat. Fed for afternoon last ration, in quantity about 5 to 7 pounds to every 100 hens.

After morning ration, oats, sometimes millet seed, in small quantity were scattered in the litter on the floor of the pens to incite to exercise.

At 11 a.m. lawn clippings steamed were given. Vegetables, principally mangels, were before the layers all the time. Mica grit, crushed oyster shells and pure water were in constant supply. While cabbages were to be had they formed part of the green food.

HOW THE PULLETS WERE FED.

The pullets were fed more than the older hens. A little mash and a small quantity of cut bone were fed every day, but at different times.

Whole grain composed the afternoon ration.

The feeding of mash, cut green bone and whole grain actually represented three rations per diem.

As with the older hens, steamed lawn clippings, vegetables and the other essentials mentioned were regularly furnished.

Careful watch was kept on the birds in order to detect the slightest effect of this stimulating ration on their condition. At the end of January the Barred Plymouth Rock pullets showed symptoms of being overfat. Accordingly the rations of all the pullets were reduced to the same number and quantity as fed to the other hens. Meanwhile the output of eggs was most satisfactory, as the following table will show. It will be noticed that on several days, during mid-winter, that six eggs were obtained from a pen of eight pullets and more frequently five and four eggs, which is remarkably good laying. Particulars will be learned from the following :—

STATEMENT showing eggs laid per day by Pullets during December, January, February and March.

—	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
8 White Leghorns:—																																
December	..	..	..	..	..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	3	3	4	2	3	4	41
January	2	3	4	3	5	1	7	5	2	4	5	2	3	2	5	1	4	4	3	3	4	3	3	3	3	5	3	4	4	3	3	106
February	3	4	2	5	1	3	5	2	4	4	2	6	2	3	4	3	2	6	1	3	3	3	3	4	3	4	2	3	..	..	..	90
March	3	2	3	3	5	3	4	2	2	3	3	4	3	4	1	1	2	2	2	3	4	2	3	3	2	4	2	2	2	2	3	84
																																321
8 Black Minorcas:—																																
December	..	..	..	..	1	..	1	..	..	1	1	1	..	1	..	1	..	1	1	1	1	1	..	1	1	1	1	1	2	3	3	25
January	2	1	..	1	2	1	3	2	1	..	1	1	1	1	1	..	2	1	1	2	2	1	3	1	1	1	1	1	1	2	1	39
February	2	2	1	3	4	2	4	5	4	5	5	3	5	4	3	4	1	5	4	4	6	3	5	4	4	3	4	4	..	..	..	103
March	3	4	3	5	1	4	2	3	1	4	4	2	3	2	4	2	3	2	2	4	2	3	2	4	2	3	2	1	1	1	3	82
																																249
8 Langshans:—																																
December	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2	4
January	1	2	1	3	1	3	1	1	..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	..	1	1	1	2	1	35
February	1	2	..	..	1	1	3	..	2	2	1	3	2	1	2	2	2	2	1	2	1	1	1	2	1	1	4	1	..	..	..	42
March	1	2	1	2	3	2	2	1	2	2	2	2	2	2	2	3	2	2	2	2	1	1	1	2	2	1	1	3	1	2	2	56
																																137
8 Barred P. Rocks:—																																
December	..	..	1	1	1	1	..	2	3	2	2	5	2	4	5	4	5	4	3	3	4	4	4	4	4	4	3	4	5	4	3	91
January	4	3	5	4	4	4	3	5	3	5	4	4	3	2	3	4	3	4	3	4	5	3	4	5	6	2	6	3	4	3	4	119
February	3	4	3	3	3	3	2	5	2	3	2	4	2	3	4	4	3	4	3	4	2	1	2	3	3	4	5	4	..	..	..	88
March	5	4	5	4	5	5	3	5	4	5	4	4	5	4	3	4	3	5	3	4	5	4	4	4	4	4	5	4	5	3	4	130
																																428
8 White P. Rocks:—																																
December	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	1	1	1	1	1	3	1	2	2	3	3	23
January	1	3	3	2	4	3	2	3	4	5	4	3	4	2	4	4	2	3	3	4	3	4	6	3	5	4	5	4	4	3	4	108
February	6	3	5	4	2	3	6	4	5	4	3	4	3	4	4	2	4	2	4	3	3	3	2	3	3	3	5	4	..	..	..	101
March	4	4	4	4	5	4	3	4	4	4	3	4	4	3	4	4	3	4	3	4	4	4	4	4	4	4	4	4	3	3	3	117
																																949

8 Brown Leghorns:—																																
December	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	1	1	2	2	2	1	2	2	2	18
January	1	2	2	2	2	2	2	2	2	4	1	2	3	4	1	2	3	3	4	2	2	5	2	3	4	3	3	4	3	3	3	81
February	4	2	3	2	1	4	2	4	3	1	5	1	5	1	1	5	2	3	2	2	1	3	5	2	4	3	3	3	....	....	....	77
March	5	1	5	4	4	3	2	4	4	5	6	4	4	4	3	2	5	2	4	3	5	2	3	3	4	2	2	4	2	1	2	104
																																280

EXPERIMENT 2.—FATTENING OF PLYMOUTH ROCK AND WYANDOTTE COCKERELS ON WHOLE AND GROUND GRAIN, THE BIRDS HAVING LIMITED RUN.

On the 15th of August, 1899, three groups of five birds, in each group, of thoroughbred Barred and White Plymouth Rocks, and Silver Laced Wyandottes, were placed in separate pens with limited outside run. The birds wore legbands with distinguishing numbers.

Each group was fed on rations of different sorts.

No. 1 GROUP of five Barred Plymouth Rocks was fed solely three times per day, on whole grain consisting of two parts of wheat, one part barley, one part corn.

No. 2 GROUP of five White Plymouth Rock Cockerels were fed three rations per diem, on grains of same kind and in same proportions as fed to No. 1 group, but ground and mixed into mash.

No. 3 GROUP.—Five Silver Laced Wyandottes were fed the rations usually given to the growing chickens, viz., mash twice and whole grain once per day.

The amount of food given to each group of five birds per day was 12 oz., or 4 oz. three times per day, viz., morning, noon and afternoon. The value of the $\frac{3}{4}$ lb. ration per day was placed at 1 cent per day per group of five birds, or 3 cents per day for three groups of fifteen birds.

It had been observed after feeding several rations that no more food was consumed than the quantities named. It was consequently resolved not to increase the amount but to note the effect of these apparently limited quantities. The cost of food per day of 1 cent for the five birds is corroborated by the experiment with fifty hens, particulars of which are given in 1897 report, and in which it is shown that fifty hens were kept in winter at 10 cents per day and gave satisfactory results in eggs.

The following statement shows the weight development per bird per week :—

TABLE showing gain made by three groups of thoroughbred cockerels fed on whole grain, ground grain and a mixed ration respectively.

Description of Birds.	Weight on going into pens, Aug. 15, '99.	Weight at end of first week.	Weight second week.	Weight third week.	Weight fourth week.	Weight fifth week.	Weight sixth week.	Weight seventh week.	Weight eighth week.	Weight ninth week.	Weight tenth week.	Weight eleventh week.	Weight twelfth week.	Weight thirteenth week.	Weight fourteenth week.	Total gain in fourteen weeks.
5.—B. P. Rocks.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.
No. 41	2 14½	3 ½	3 2½	3 4⅝	3 8	3 12½	4 3½	4 6	4 12⅝	4 14½	5 5	5 8	6 ¼	6 ..	6 12½	3 14
" 59	2 8½	2 9	2 9⅝	2 11½	2 13½	3 ⅜	3 8⅝	3 11	3 11½	3 14⅝	4 1½	4 4½	4 10⅝	5 3	5 13⅝	3 6½
" 35	3 3¾	3 1⅝	3 3¾	3 6¼	3 9	3 15¼	4 7½	4 10⅜	5 1⅝	5 5	5 11¼	5 15¼	6 6¼	6 12	7 1½	4 1
" 70	2 7¼	2 8½	2 11⅝	2 13⅝	3 ½	3 6¼	3 13¼	3 14½	4 1⅝	4 5⅜	4 11	4 12	5 6	5 12	6 4⅝	3 13½
" 77	2 2	2 4½	2 6¼	2 8½	2 11½	2 15	3 4	3 5	3 9¼	3 12⅝	3 15	4 4	4 15½	5 9	5 12⅜	3 10¾
																18 12⅜
5.—W. P. Rocks.																
No. 39	2 2¼	2 6	2 9⅜	2 13	3 2	3 8½	4 ¼	4 2⅜	4 8	4 11	5 ..	5 1	5 10½	5 13	5 13½	3 11
" 31	2 ⅜	2 7¼	2 10⅜	2 13½	3 2½	3 9½	4 3½	4 9	4 12½	4 15½	5 1½	5 7½	5 12½	6 4	6 7	4 6½
" 60	1 3¾	2 10	2 12⅜	3 1⅜	3 4	3 8¼	3 15¼	4 3	4 8¾	4 12½	4 12⅜	4 12⅜	4 14½	4 14½	4 10¼	3 6½
" 51	2 1½	2 8¼	2 13⅜	3 1½	3 6	3 15	4 8¼	4 12⅜	5 4	5 6½	5 8½	5 9½	5 15	6 4	6 10¼	4 8¾
" 43	1 14½	2 4¼	2 7½	2 10⅜	2 15⅜	3 5⅜	3 14¼	4 1⅜	4 8¾	4 11⅜	4 15	5 4¼	5 9½	5 11	6 1	4 2½
																20 3¼
5.—S. L. Wyandottes.																
No. 36	2 9½	2 14½	3 ⅜	3 4½	3 8½	3 15	4 6	4 7½	4 10½	4 11½	4 15⅜	5 2½	5 8⅜	5 15½	6 ..	3 6½
" 33	2 7⅜	2 13¼	2 14	3 1¼	3 3½	3 11¼	4 1	4 4	4 6⅜	4 9	4 13	4 13½	5 5½	5 9	5 14⅜	3 7
" 83	1 13½	2 1⅜	2 3¼	2 5	2 8½	2 9¼	2 11	2 14½	3 4⅜	3 8	3 10⅜	3 11¼	4 2¼	4 5	4 11¼	2 13⅜
" 79	1 9½	1 14⅜	2 1	2 3½	2 6¼	2 9	2 15½	3 ⅜	3 4⅜	3 7½	3 10½	3 12½	4 ..	4 4½	4 9	2 15½
" 11	1 8¼	1 13⅜	1 15	2 1	2 4½	2 5½	2 10⅜	3 ¼	3 7	3 7⅜	3 11⅜	3 14½	4 4½	4 9½	4 11⅜	3 3½
																15 14½

* At the end of the tenth week the birds were allowed an unlimited run in a large field, and made in the majority of cases better progress than they did in the limited run.

EXPERIMENT 3—PROGRESS IN WEIGHT DEVELOPMENT MADE BY CROSS-BRED COCKERELS ON ORDINARY RATIONS.

On November 7 last, twelve cross-bred cockerels, as described further on, were put into small coops, each coop containing a single bird. The coops had a feeding trough in front of them, and were the same as used in the fattening of thoroughbreds experiment of the previous year.

The birds were fed on the ordinary mash giving to the laying stock.

The object of the experiment was to ascertain the weight development of these first crosses without any specially prepared food or special effort beyond cooping them up and feeding them three times per day.

The following are the crosses composing the dozen birds:—

Nos. 1 to 9—Cockerels of White P. Rock-white Leghorn cross.
No. 10—Cockerels of Light Brahma, P. Rock "
No. 11—Cockerels of White Wyandotte-Brahma "
No. 12—Cockerels of Andalusian "

The gain per week made by each bird is shown in the following table:—

Flesh Development of 12 Cross-bred Cockerels on Ordinary Rations.

Number	Description.	Weight on going into Coop, 7th Nov., 1899.		Weight 1st Week		Weight 2nd Week.		Weight 3rd Week.		Weight 4th Week.		Total Gain in 4 Weeks.		When Hatched.
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
1	W. P. R.—W. Leg Cross	3	11¼	3	12½	4	¾	4	5	4	9½	..	13¾	July 1, 1899.
2	" " "	3	3¾	3	7¼	3	10¾	3	14	4	½	..	12¾	"
3	" " "	3	4¾	3	12	4	2¼	4	5¾	4	9¼	1	4½	"
4	" " "	4	7½	4	11½	5	½	5	3	5	5½	..	14	"
5	" " "	3	15¼	3	10¾	3	12	4	2	4	13½	..	14¼	"
6	" " "	3	6½	3	10½	3	13¼	4	3¼	4	7½	1	1	"
7	" " "	3	13¼	4	1¼	4	8¾	4	14	5	4¾	1	7½	"
8	" " "	2	15¼	3	¾	3	7¼	3	10½	4	¼	1	1¼	"
9	" " "	4	5¾	4	9½	5	..	5	2¾	5	5	..	15¼	"
10	L. Brahma—P. R. Cross	4	6¼	5	1¼	5	10¼	5	15¼	6	6¾	2	½	June 2, 1899.
11	W. Wy.—L. Brahma "	4	2¼	4	3¾	4	11½	5	1¾	5	7¼	1	5	"
12	Andalusian Cockerel "	4	2¼	4	1¾	4	10½	4	14¾	4	15¾	..	13½	"

The progress made both before and after being put in fattening coop was very satisfactory. The highest weight development was made by Nos. 4, 7 and 9 of the Plymouth Rock-Leghorn first crosses. At end of 5 months and seven days these birds showed weight respectively of 5 lbs. 5½ oz.; 5 lbs. 4¾ oz. and 5 lbs. 5 oz., or a weight per pair of 10 lbs. 10¼ oz. A weight much greater than that of the ordinary market fowls.

The weight development of the Light Brahma-Plymouth Rock cross of 6 lbs. 6¾ oz. in six months and 5 days, is also satisfactory, and goes to show that with equal care and feeding the incubator hatched and brooder reared chickens do as well as the chicks hatched by hens.

But the experience of past years leads to the conclusion that while certain first crosses may do nearly as well as thoroughbred Plymouth Rocks, that it is better for farmers to make choice of thoroughbred fowls, in the first place, and keep no other kind. A first cross would necessitate the keeping of two breeds and unless made every year would quickly degenerate into nondescripts.

FARMERS AND THOROUGHBREDS.

Some time ago Mr. A. McPhadden, a farmer of Dominionville, Ont., was advised, in reply to a letter from him, to pen up a certain number of Barred Plymouth Rock cockerels and feed them on ground grains.

He did so, and recently wrote: 'I started two weeks ago (October 25) to fatten eight B. P. R. cockerels, as advised by you. I had not a suitable place, so I put them in crates. I fed the first week as directed, three parts oatmeal and one of pease. The second week cornmeal was added. The third week the cornmeal was increased. The result was:

Total gain first week, 7 lbs. or $\frac{7}{8}$ lb. per chick.
" second week, 4 lbs. or $\frac{1}{2}$ lb. per chick.
" third week, $2\frac{2}{8}$ lbs. or $\frac{1}{3}$ lb. per chick.

The cost of producing 1 lb. of flesh was $5\frac{2}{5}$ cents per lb. I am satisfied with my experience in fattening thoroughbreds, and would not keep any other fowls now but thoroughbred Barred Plymouth Rocks.'

Subsequently Mr. McPhadden sent a number of his fattened chickens for sale to certain customers in the city. The weights of some of the cockerels were as follows:— 6 lbs. $14\frac{3}{4}$ oz.; 6 $5\frac{1}{4}$; 6 $2\frac{3}{4}$; 6 $13\frac{1}{2}$; 6 $11\frac{1}{2}$; 5 14; 5 $13\frac{1}{4}$; 5 9. The birds sold at 10 cents per lb., plucked, but not drawn. They were certainly of a very superior quality.

Another well known farmer in the neighbourhood of Guelph, Ont., Mr. Laidlaw writes under date of October 17: 'I have raised a large number of barred and buff Plymouth Rocks and Silver Laced Wyandottes. They weigh at present without any special fattening $4\frac{1}{2}$, $5\frac{1}{2}$, 7 and 8 lbs. each, the latter being a few early ones.'

On October 28, Mr. Laidlaw wrote to say that 'the average weight of all my Plymouth Rock and Wyandotte cockerels was $5\frac{1}{2}$ lbs. each. Had they been penned up and specially fattened doubtless they would have weighed more. I have sold all my chickens to a buyer for shipment to the west, at much better profit than I could have made on the local market. Next season, all being well, I will get the names of the Montreal poultry dealers from you.'

It is satisfactory to note, in the latter case, to what weight the thoroughbred chickens attained, because cared for and fed properly from time of hatching. Before the first named farmer, Mr. McPhadden, had put his Plymouth Rock chickens into the fattening crates, they had made rapid flesh development, because they had also been carefully looked after and fed from time of hatching. It is well for the farmers of the country to bear in mind what has been said in previous reports, that a chicken neglected in the first five weeks of its existence seldom or never makes a satisfactory market chicken, or early layer.

The experiences of Messrs. McPhadden and Laidlaw are given to encourage those who have begun to breed the superior quality of poultry flesh, and to incite those who have not yet done so to make a beginning.

BREEDING PENS MADE UP.

On the 3rd of January the following breeding pens were made up:—

Breeds.	Cocks.	Cockerels.	Hens.	Pullets.
Coloured Dorkings	1	.....	6	.....
Langshans	1	.....	.....	12
Light Brahmas	1	.....	4	8
Andalusians	1	.....	7	3
Brown Leghorns	1	.....	.....	12
On March 1, following were mated up for producing crosses:—				
Leghorn Hens 3 / Coloured Dorking Hens 2 } B.P.R. Cockerel	.....	.....	.....	.....
On March 21, were mated Silver Laced Wyandottes	.....	1	7	.....

Male birds were with the Barred Rock, White Leghorn and Black Minorca hens all winter.

In several instances the early spring eggs were not as fertile as could have been desired. This may have been due to any of the following causes :—

Eggs from hens which had laid all winter.

Eggs from hens which had become overfat.

The effect of the long period of artifical life and treatment, in limited quarters, on the layers.

The subject has been already discussed at length in a previous chapter on how to secure early pullets. It is one of great importance, and is being made a matter of experimental investigation. Much seemingly depends upon any or all of the following :—

1. Kind, vitality and age of the laying stock.
2. Construction of building and temperature of same.
3. Composition of rations and quantities in which which they fed.
4. Condition of male and female breeding stock at time of mating.

DEMAND FOR EGGS FOR HATCHING NOT SO GREAT.

Eggs for hatching purposes were not in such demand last spring as in former years. This may have been partly owing to the greater number of farmers who sold eggs from their thoroughbred stock to other farmers. And it is a matter of congratulation that such is becoming the practice. The farmers of the country cannot over-estimate the value of thoroughbred stock to them for egg laying or flesh forming, as compared with the nondescript that is seldom good for either.

The following are the results from the eggs set under hens at the dates given. In some instances poor hatching was due to erratic and clumsy sitters, or to thin shells of the early eggs. In two instances eggs coming from a distance showed rough handling en route. In most instances the eggs were tested on the sixth or seventh day of incubation and their condition at the time is noted.

EGGS SET AND CHICKENS HATCHED UNDER HENS.

When Set.	Description of Eggs.	When Hatched.	No. of Chicks.
April 11..	13 B. P. Rock (partly thin eggs. Partly sitter)	May 2...	2
" 22..	13 " " "	" 13...	5
" 22..	13 Brown Leghorn (from Rigaud, Que.)	" 13...	1
" 22..	7 Barred Plymouth Rock, 6 White Plymouth Rock (chicks died in shell).	" 13...	4
" 22..	11 Silver Wyandottes, 2 White Wyandottes (8 eggs not fertile)	" 13...	4
May 1..	13 White Leghorn (1 egg broken, 2 unfertile)	" 22...	10
" 1..	13 White Minorca (1 egg unfertile)	" 22...	12
" 1..	13 Langshan (5 eggs tested out, 4 doubtful)	" 22...	3
" 1..	13 Black Minorca (9 pullets. 1 egg broken, 2 unfertile)	" 22...	9
" 1..	7 Indian Game, 6 White Wyandotte (on being tested all seemed O.K.)	" 22...	12
" 5..	13 White Plymouth Rock (from Carleton Place, Ont.)	" 26...	9
" 5..	13 " " "	" 26...	11
" 5..	13 B. R. Rock (from Carleton Place, Ont.)	" 26...	7
" 5..	13 " " "	" 26...	9
" 6..	6 W. Wyandotte, 6 S. L. Wyandotte	" 27...	10
" 10..	13 Andalusian	" 31...	3
" 10..	11 W. Wyandotte, 2 Langshan (Hen killed 8 chicks in nest)	" 31...	5
" 15..	11 L. Brahma (from U. S.)	June 5...	7
" 15..	9 W. P. Rock	" 5...	4
" 15..	13 Langshan	" 5...	7
" 20 ..	13 W. Wyandotte (from Carleton Place, Ont.)	" 10...	11
" 23..	13 Langshan (stock out of condition)	" 13...	3
" 23..	13 B. Leghorns (2 unfertile eggs, 1 chick crushed)	" 13...	10
" 23..	13 W. Minorca	" 13...	6
June 1..	13 B. " (7 eggs did not hatch)	" 13...	6
" 1..	13 Buff Leghorn (bad sitter)	" 13...	3
" 10..	13 P. R. Leghorn cross eggs (from New Edinburgh)	July 1...	10
" 10..	13 " " " "	" 1...	12
" 16..	13 Buff Leghorn (from Winchester, Ont	" 7..	5
	370 Eggs.		200

HOW THE CHICKENS WERE FED.

The chickens made rapid and satisfactory progress on the following food and treatment:—

First food after coming from nest, where they remained for twenty four hours after hatching: stale bread crumbs; stale bread soaked in milk and squeezed dry.

Second day. Stale bread soaked in milk. Granulated oatmeal. Milk or water for drink.

The same for three or four days longer, when finely crushed corn was given in moderate quantities.

At the end of ten or twelve days, mash composed of shorts, cornmeal, stale bread waste, broken crackers, boiled potatoes, was given two or three times in lieu of the bread and milk.

At end of fourteen days wheat was added to the bill of fare. It was fed in small quantities at first, principally at last ration for the day.

As the chickens grew their food was made as cheaply and wholesome as possible. The waste of table and kitchen may be put to good use in this way.

The chickens were fed a little food at a time, but frequently. Care was taken to avoid overfeeding in the earlier stages of life. It is better to feed only what the chickens can pick up cleanly at a meal, rather than to leave a quantity of food to turn sour and become filthy.

When sufficiently old to run about and obtain insect life the rations were reduced to three per day.

On the above rations the farmers will find their chickens grow vigorously. It is well to remember that any extra care and attention during the earlier stages of chicken life is well repaid afterwards in early maturity and increased weight.

The tables in connection with experiments 2 and 3 to be found on preceding pages will show the weight development made by cockerels of the heavier breeds and some crosses.

WHEN THE PULLETS BEGAN TO LAY.

The pullets commenced to lay in the following order:—

Brown Leghorn	pullet hatched	June 10,	laid first egg	November	15.
White Minorca	"	May 22,	"	December	10.
B. P. Rock	"	" 26,	"	"	12.
Langshan	"	" 22,	"	"	15.
Black Minorca	"	June 21,	"	"	15.
W. Wyandotte	"	May 27,	"	"	25.

THE MOULTING SEASON.

As in previous years every effort was made to get the hens through their moult as early and as quickly as possible. In order to accomplish this the cock birds were removed from the breeding pens during the first week in July and placed in small pens, in another building, with outside runs attached. The hens were then allowed to run in small fields (in rear of the poultry buildings) where they found grass, clover and insect life. They were so allowed to run until middle of August when they were given, three times per week, a mash composed of ground grains with a small quantity of linseed meal. By the middle of October the majority of the laying stock were in new feather.

WHEN WINTER LAYING COMMENCED.

The stock went into winter quarters in good health and condition. The season was unusually open, permitting the fowls to have outside run until the second week in December. Winter laying commenced about the 12th day of December. The first hens to lay were Brown Leghorns, Minorcas and Plymouth Rocks. The greatest number of eggs during the latter half of December, were laid by Brown Leghorn hens,

and Brown and White Leghorn pullets. The following shows the daily output of eggs by the number and description of hens given :—

9 BROWN LEGHORN PULLETS.

From December 11 to 31, inclusive :—5, 2, 3, 3, 3, 2, 5, 2, 4, 4, 3, 4, 4, 3, 4, 5, 3, 4, 4, 3, 3.—73.

8 WHITE LEGHORN PULLETS.

From December 10 to 31, inclusive :—3, 1, 1, 1, 3, 1, 1, 4, 2, 2, 3, 2, 2, 4, 3, 3, 3, 2, 5, 3, 4, 3.—56.

10 BROWN LEGHORN HENS.

From December 11 to 31, inclusive :—1, 1, 1, 2, 5, 2, 6, 4, 4, 4, 3, 5, 3, 5, 2, 5, 2, 4, 2, 2, 2.—65.

EGGS LAID DURING PAST YEAR.

The stock on hand at beginning of last season was 125 hens and 80 pullets. Among the hens were 50 or 60 old ones, which were kept over for sitters and breeding stock and also to take part in the laying test of old hens *vs.* pullets, particulars of which will be found in a preceding page :—

1898-9.

December	946
January	1,336
February	1,192
March	1,857
April	2,008
May	1,796
June	1,090
July	675
August	501
September	396
October	458
November	208
	12,463

STOCK ON HAND.

During late summer the great majority of the two and three year old hens were disposed of. As they were of superior quality they will make excellent breeding stock for a year or two more. The following is the number of stock on hand on the 11th of December, 1899 :—

Breed.	Hens.	Pullets.	Cocks.	Cockerels.
Barred P. Rock	12	13	2	3
White "	7	7	.....	4
White Wyandottes	10	8	2	7
Silver Laced "	5	1	.....	3
Light Brahmas	.....	3	1	3
Langshans	12	4	2	5
Coloured Dorkings	6	.....	.....	.....
White Leghorns	12	8	2	1
Brown "	9	9	.....	4
Buff "	1	5	.....	1
White Minorcas	5	8	2	3
Black "	8	9	2	1
Andalusians	3	3	.....	2
White Indian Games	1	4	1	.....
Crosses	8	18	.....	.....
	99	100	14	37

RATIONS OF PRESENT WINTER AND HOW FED.

The following are the rations of the present winter and the quantities in which they are fed :—

TO 100 HENS, ONE YEAR OLD.

Six and one-half lbs. ground grain made into mash with boiling water. The proportions are two parts shorts ; one part ground oats, barley or rye ; one part cornmeal. Varied by having clover meal or boiled roots mixed into it. Fed morning or evening three times per week.

Cut Green Bone.—Three times per week in proportion of 1 lb. to fifteen hens. Fed morning or evening when mash is not given.

Afternoon Ration.—5 to 7 lbs. of whole wheat, as may seem necessary, and when mash or cut bone is not fed.

No noon ration is given. Mangels or other roots are before the hens all the time. If they desire more food they can find it in the roots.

Mica grit, ground oyster shells and water were in regular supply.

When mash or cut ground bone is fed in the morning, a few handsfull of oats or a handfull of millet seed are scattered in the litter on the floor to incite the hens to exercise.

At 11 a. m. on days when clover meal is not mixed in the mash, steamed lawn clippings are given in limited quantity.

NINETY-NINE PULLETS.

The same rations as above and in same quantities are given to the pullets. For the reason that last winter a little mash and a small quantity of cut bone were given to the pullets every day, but was found too fattening and stimulating. This season the rations as described above are being tried. So far results have been satisfactory, as will be seen in a preceding page, which shows the number of eggs laid in latter half of December by nine brown Leghorn pullets, ten hens of the same variety, and eight white Leghorn pullets.

DISEASES OF POULTRY.

During the past year numerous letters were received describing the symptoms of different ailments, and asking for remedies. In most cases the sickness could be traced to overfeeding—especially in the case of old hens—and consequent fatal liver disease. In other cases the symptoms pointed to colds or roup, the latter frequently following the former. Ill ventilated and overcrowded quarters were also sources of ailment.

A FATAL TURKEY DISEASE.

Many letters had been received describing the symptoms of a disease which had been fatal to many turkeys in Ontario and the Eastern Townships. About the first of November last the following inquiry by a subscriber was received from the editor of *Farming*, Toronto, with the request for an immediate answer for publication :—

TO THE EDITOR OF FARMING.—Will you inquire for me through your paper how to treat sick turkeys. My turkeys are drooping. Their droppings are of a green and yellow colour at the time of their sickness, and they do not last long when they take sick.

FARMER'S DAUGHTER.

A reply was made to the effect that the symptoms pointed to liver disease, or acute dysentery, caused by eating improper substances, perhaps in the shape of decayed animal or vegetable matter, and recommending the use, in the soft food, of a good condition powder and the dropping of a small piece of alum into the drink water. The suggestion was also made that the farmer's daughter should send a turkey, which had just died, to the Bacteriologist, Ontario Agricultural College, to ascertain whether death was due to germ disease or not.

THE DISEASE LOCATED.

The farmer's daughter kindly complied with my request, and the result of her disinterested action was the discovery of a disease presumably new in Canada, and which probably, heretofore, has been the cause of death of many thousands of turkeys throughout the country.

The following letter from the bacteriologist at the Guelph Agricultural College will explain the nature of the disease :—

O. A. C., GUELPH, November 23, 1899.

DEAR MR. GILBERT.—I have this day examined a turkey received from some one in Fergus, who does not give any name. It is a case of Entero Hepatitis—described in a Washington publication entitled 'Infectious Diseases of Poultry.' This is, so far as I know, a new disease in Canada, the only account of similar cases being in the publication already mentioned. I believe it has also broken out at another farm in this neighbourhood, because I am told there are turkeys dying there with spots on their liver. I thank you for giving us an opportunity of examining the disease. I may say that my roup investigations are going on, and that I believe roup is caused by a somewhat similar organism as is the turkey disease. I shall always be pleased to examine birds.

Yours sincerely,

MALCOLM ROSS.

DESCRIPTION OF THE DISEASE.

The following extract from the full and elaborate description given by Dr. D. E. Salmon, chief of the bureau of animal industry, Washington, U.S., in the publication referred to by Prof. Ross, will be found interesting :—

'The external appearance of the turkeys affected with the disease do not seem to be constant, and this is not to be wondered at in view of the varying intensity of the changes found in the internal organs. In Rhode Island the disease is known as 'blackhead' owing to certain peculiar discolorations which take place at the height of the disease. While it might be well to retain this as a popular name we do not believe that all cases of blackhead have the specific disease herein described, nor do all turkeys affected with this disease manifest the appearances of blackhead. Among the symptoms which may be expected to appear sooner or later, diarrhœa occupies a prominent place. The disease of the cœca is responsible for this. * * * Emaciation was not constantly present in the cases dissected by me. The disease seems to attack turkeys when quite young. It seems moreover as if the disease were contracted only by the young, because in the examination of turkeys of different ages the oldest showed lesions of the oldest standing. * * * The most serious and extensive destruction of tissue was noticed in the turkeys in fall. In midsummer the disease was making most progress, that is, it was freshest and the microparasites present in great numbers. It is probable that the delicate tissues of the young are best adapted for the temporary habitat and rapid multiplication of this parasite. The primary seat of the disease are the cœca. From these the liver is invaded. Other organs are not attacked. * *
The appearance of the liver in the average case of this disease is very striking * * * Twice the normal size is probably near the truth. * * *
In the case of No. 2 the liver weighed 10·7 ounces. * * * The processes

of advancing disease and necrosis on death of tissue on the one hand, of repair on the other, seem to go on side by side, now one now the other, predominating. * *
The blood of many of the cases was examined before the bird was killed, in order to to detect any existing blood infection. No disease of the blood was observed except in the case of No. 16. * * *

The results of the examination of turkeys made thus far indicate that the disease may follow several courses.

(1.) After a certain period of disease regenerative processes begin which tend toward a permanent recovery.

(2.) The disease may proceed so rapidly from the very start that the affected turkeys die early in life.

(3.) The disease may come to a standstill, but the amount of dead tissue in the cœca and liver may be so great as to favour the entrance of bacteria which are responsible for the death of the bird late in the summer or fall.

As regards the spontaneous cure of infected birds, we may regard it as probable that only those in which the disease comes to a standstill before it has made much headway are likely to recover. In those in which much destruction of tissue has taken place complete recovery is impossible. * * *

SOME CONCLUSIONS.

Investigation so far leads to the conclusion that infection takes place early in life.

That the microparasite, discharged perhaps in an encysted stage from the sick bird, is taken up with the food and water by others and sets up disease directly.

By uninterrupted transmission the disease becomes perpetuated and diffused among neighbouring flocks.

If the theory that the disease is transmitted more or less directly from old to young should prove to be true, the remedy for such a state of affairs would appear to lie in two directions :

(1.) The disease might be allowed to go on and some remedy found which will check it and lead to a cure, or

(2.) The diseased flocks might be entirely destroyed and new birds obtained elsewhere, after a thorough cleansing and disinfection of the territory formerly occupied by the flocks.

TREATMENT.

All turkeys that droop, are unable to keep up with the movements of the flock, and even have diarrhœa may not be affected by the disease. Among 50 turkeys killed as suspicious cases none were found to have the protozoan disease. They were suffering from a variety of other affections, the causes of which, mentioned in their order of frequency were, lice, tapeworms, gapeworms, ticks, injury, and a diphtheritic disease of the cœca, not to be mistaken for the genuine protozoan disease.

The success which quinine has had in combating malaria leads to the suggestion of its use.

Disinfection of coops and other structures which have sheltered the birds and other poultry, is recommended to be carried on as for bacterial disease.

The following disinfectants are given as strong enough to kill spores of bacteria and likely to destroy the various stages of the protozoa :

1. Corrosive sublimate, 1 oz. in about 8 gallons of water. The water should be put into wooden tubs or barrels and the powered sublimate added to it. The whole should stand for 24 hours so as to permit of sublimate being entirely dissolved. Apply with spray pump, broom or mop. All dirt and manure should be removed before spraying. Being very poisonous the solution should be carefully handled and well guarded. The manure should be covered with lime.

2. Chloride of lime, 5 oz. to 1 gallon of water. To be applied in the same way.

3. Ordinary slaked lime is very useful and should be used more particularly on infected soil.

TROUBLE FROM LICE.

Lice infested fowls and poultry houses are the sources of annoyance and loss to many farmers and poultry keepers throughout the country. The following is a case in point. A few weeks ago a farmer of Kings, N.S., wrote that for two years past his hen house has been infested with a white louse or spider which it seems impossible to exterminate. The insect is very minute and is found in great numbers in every part of the house. They seem to hurt the hens, which do not lay, look pale in their combs and are light in weight. Death has occurred in some cases." A reply was made that the trouble was doubtless red mites, which when they make lodgment, swarm in cracks and crevices of the wood work of roost, platform and walls of the house. They do their work at night when they get, in great numbers, on to the flesh of the fowls and suck their life blood. Hens are weakened, become emaciated and do not lay. In some instances death follows. The remedy advised was to place the fowls in temporary quarters and then to remove all portable wood-work, old nests and contents, roost, &c., and to burn them. Then make up the following solution :

Corrosive sublimate	4 oz.
Common Salt	4 "

Dissolve in two to four quarts of water. When completely dissolved, dilute to 25 gallons.

With this solution every crevice, nook and corner of the house was to be carefully sprayed. Care was advised in the handling of the solution as it is highly poisonous. It would not only be found a sure way of getting rid of the mites but of all disease germs. A thorough whitewashing was then advised, as was also the removal of any lice that might be on the hens, before returning the hens again to their quarters.

The same remedy recommended, in a similar case but in a different part of the country was said to have been as successful as could be desired.

ARTIFICIAL INCUBATION.

In the month of April last an incubator of 220 egg capacity and a brooder were purchased from the Cyphers Incubator Co., of Wayland, N. Y. The incubator was placed in a small room at end of the main poultry building and the brooder on the grass in front of the house.

In the same room was a Prairie State incubator of 100 eggs capacity and another called the 'Best' from London, Ont., and of same capacity as second named. The latter seemed to have been injured in transit to such an extent that it could not hold the heat and it was not operated.

The first two attempts in early March and April with the Prairie State were not successful. In the latter case only eight chicks were hatched of which five survived and attained full growth. The eggs were tested at the proper time and the unfertile ones removed. Examination of the remaining eggs in both cases showed embryo chickens in different stages of advancement from 10th to 15th or 16th day, between which dates life seemed to have ceased. This was more noticeable in the second attempt.

Eggs which were under hens about same time as second experiment was going on and which did not hatch were examined and showed chicks also dead in the shells. This pointed to the eggs being at fault and showed the difficulty of having early fertile eggs from hens which had been confined to limited quarters and stimulated to lay during the winter months.

It was thought that the eggs from hens which had been kept under the same conditions during the winter months and only commenced to lay in late February, or

early March, would not only be more fertile, but that the germs would be stronger. But such did not seem the case. This was attributed to the long term of winter confinement in comparatively limited quarters and the stimulating rations.

Against the foregoing is the experience of three years ago, when a broody hen was set on February 20, on thirteen eggs, from a pen of Barred Plymouth Rock hens, which had laid well from November previous; were mated in early February and from which thirteen eggs, eleven lively chicks were hatched.

On one occasion four settings of eggs were obtained early in the season from a farmer, twenty miles from the city and put into an incubator. Results were same as noted above. Later eggs were obtained from leading breeders and put under hens. Results were very little different. Both from farmer and breeders the eggs had to come to the city by express and might have been to a certain extent injured in carriage. One of the breeders said his eggs were from hens which had laid all winter. On being tested, they were mostly all found unfertile.

The whole subject affords good ground for careful experimental investigation.

The Cyphers incubator was not put into operation until May 12, when 120 eggs of different breeds were put into it. Thirty unfertile eggs were tested and out of the remaining ninety fertile eggs, sixty chicks were hatched. Of this number five were weaklings and died. Later five others succumbed. The remainder made rapid and vigorous growth in the brooder. When too large for the brooder they were placed in coops in a field. From first to last their progress was satisfactory.

EXPERIMENTS IN THE PRESERVATION OF EGGS.

The following experiments, in the way of finding out the best egg preservative, made by Mr. F. T. Shutt, M.A., chemist to the Experimental Farms, will be found interesting and useful. Much inquiry is made from time to time as to the best means and methods of keeping eggs in good condition for longer or shorter periods. An important factor, sometimes overlooked, is the certainty that the eggs are strictly fresh at time of placing in the preservative. Mr. Shutt was kind enough to associate me with himself in the experimental work, and so allow me opportunity to note progress, from the inception of the different tests until their conclusion. The results are given by himself in the following pages:—

THE PRESERVATION OF EGGS.

(By FRANK T. SHUTT, M.A., F.I.C., F.C.S.)

In the autumn of 1898, we instituted a series of experiments to ascertain the relative value of certain solutions as egg preservatives. The eggs used in this investigation were quite fresh, being supplied by the Poultry Department of the Experimental Farm, Ottawa, and taken from the nest within a few hours, at most, of being laid. The liquids employed were (1) a saturated solution of lime-water, and (2) a ten per cent. solution of "water glass" (sodium silicate).

The eggs were treated during the first week of October, 1898, and tested March 2, 1899. Those eggs which were not kept throughout this term in either of the preservatives, together with the untreated eggs, were placed in a rack within a drawer in the laboratory. The eggs in the solutions were also in the laboratory, and consequently all were at a temperature of about 70 degrees F. throughout the winter. The examination consisted of noting the appearance on breaking and the colour, odour, taste, etc., after poaching.

TREATMENT AND RESULTS.

No. 1. *Untreated.*—The 'yolk' was stuck to the side of the shell and was much shrunken, having lost its globular form.

The 'white' had taken on a slightly yellow tint, which was more pronounced on boiling.

The 'air-space' was very large, occupying about $\frac{1}{3}$ of the shell, showing shrinkage from evaporation.

There were no signs of decay and the eggs might be pronounced as free from odour and apparently good.

On boiling, a faint "stale" odour and taste was developed.

No. 2. Kept under lime-water 2 days and then put in rack in drawer.

The yolk was not stuck to the shell and was more globular than in the untreated, though not so globular as that in the fresh egg.

The 'white' was similar to that in the untreated.

The 'air-space' was only about one half the size of that in the untreated, showing less shrinkage.

Apparently quite good, but developing a slight 'stale' odour and flavour on boiling.

No. 3. Kept under Lime Water Seven Days and then placed in rack.

Apparently quite good; somewhat less shrinkage, perhaps, of the yolk than in No. 2, but in all other particulars giving practically the same results.

No. 4. Kept in Lime-Water continuously throughout period of testing.

Apparently quite good, but the 'white,' as before, turning slightly yellow and a faint stale odour developing on boiling.

Yolk almost, or quite, globular. 'Air-space' no larger than in fresh egg.

No. 5. Kept in Silicate of Soda twenty four hours and then placed in rack.

Apparently quite good; the "white" had taken on a faint yellow tinge. Yolk slightly stuck to shell and shrunken; "air-space" larger than in Nos. 2 and 3.

On boiling, the 'white' became slightly yellower, and the 'stale' odour before mentioned was developed.

No. 6. Kept in Silicate of Soda three days and then placed in rack.

Apparently good, but yolk slightly stuck to shell. In all respects very similar to No. 5.

No. 7. Kept in Silicate of Soda seven days and then placed in rack.

Apparently good, but yolk stuck to shell. 'Air-space' somewhat similar to Nos. 5 and 6.

On boiling, was similar to Nos. 5 and 6, as to colour and odour. Shell did not break on boiling.

No. 8. Kept in Silicate of Soda continuously throughout testing period.

Apparently quite good and no shrinkage. 'Air-space' not larger than in fresh egg. Yolk globular.

On boiling, the "white," as before, assumed a faint yellowish tinge and the egg had a slight "stale" or musty flavour. Shell broke on boiling, but not so as to allow contents to escape.

CONCLUSIONS.

1. In no instance, either of treated or untreated eggs, were any 'bad' eggs found.

2. In all cases where the eggs were not kept covered with the preservative solution, shrinkage of the contents had taken place, as shown by the larger air-space and the less globular form of the yolk. The eggs treated for seven days and less with lime-water showed somewhat less shrinkage than those treated a similar length of time with silicate of soda.

3. From the experiments here recorded, it would appear that lime-water and "water glass" used continuously, as in Nos. 4 and 8, are equally efficacious in preventing shrinkage. They may also be said to have practically the same results as regards both external and internal appearances, flavour, etc., of the eggs preserved. Since silicate of soda is more costly and more disagreeable to use than lime-water, we could not from the present results recommend it as the better preservative.

4. The albumen or 'white' in all the preserved eggs was very faintly yellow (though not to the same degree in all eggs), the tint becoming deeper on boiling.

5. No offensive odour was to be perceived from any of the eggs when broken, but in all instances a faint but peculiar musty or stale odour and flavour developed on poaching.

6. It is probable that no preservative will prevent the loss of flavour possessed by the fresh egg, but those which wholly exclude the air. (and thus at the same time prevent shrinkage from evaporation) will be the most successful. Continuous submergence is evidently better than treatment for a few days.

It is, of course, essential that eggs to be preserved should be perfectly fresh when treated.

In order to learn the effect of keeping these eggs a still longer period, a number of those treated in October, 1898, were retained under their respective conditions, or in other words, the experiment was continued until December 28, 1899, a fourteen months test, when an examination was made with the following results:—

No. 1 Untreated:—Completely dried up; the solid contents of the shell had a faint musty odour, but no marked decomposition was apparent to the eye.

No. 2 Kept under lime-water two days and preserved in rack in drawer. The "white' or albumen had taken a yellow tint, a partial drying up of contents was observed, the yolk in many cases adhering to the shell.

No. 3 Kept under lime-water seven days and preserved in rack in drawer. Nothing offensive about contents, but 'white' was discoloured and yolk slightly hardened. Not quite so much evaporation as in No. 2.

No. 4 Kept in lime-water continuously. 'White' somewhat discoloured. Yolk of normal shape and size and quite firm. Apparently in excellent state of preservation No marked odour. Poached well and quite sweet.

No. 5 Kept in silicate of soda twenty-four hours and then placed in rack. Contents completely dried up, but no offensive odour or appearance of decomposition.

No. 6 Kept in silicate of soda three days and then placed in rack. 'White' discoloured and more fluid than normal Yolk considerably hardened, faint alkaline smell. Of the four eggs tested, one was rotten; the other, partly dried out.

No. 7 Kept in silicate of soda seven days and then placed in rack. Similar to No. 6.

No. 8 Kept in silicate of soda continuously. Further trials, using other fluids were commenced in June of this year. The examination of the eggs was made on December 28, with the following results:—

Common salt, 10 per cent solution.—'White' quite limpid, yolk reduced in size, hardened, turned red and globular. Contents had an unpleasant smell; the boiled eggs tasted distinctly of salt. The eggs had materially increased in weight, owing to absorption of salt.

Lime-water and 10 per cent solution of common salt.—External appearance good. 'White' or albumen slightly discoloured. Poached egg had very fair taste with a suspicion of salt.

Saturated Lime-water.—Eggs placed in solution June 9, 1899. Excellent external appearance. No appreciable change in weight. Contents: 'white' only slightly tinted, no smell; on poaching, quite eatable, though not equal in flavour to fresh egg.

Coated with paraffin and kept in bottle.—Dipped momentarily in melted paraffin on June 26, 1899. Eggs coated thickly with mould. Albumen quite fluid. Yolk turned greenish-white; very offensive; thoroughly bad.

Glycerine 5 per cent.—Immersed continuously since June 5, 1899. Very offensive smell to both eggs and fluid. Contents of egg entirely fluid and badly decomposed.

Glycerine 10 per cent.—Immersed continuously since June 5, 1899. Contents quite fluid with very offensive smell.

Distilled water.—Immersed continuously since June 26, 1899. Floating, slimy matter in fluid and covering the eggs. Three of the four eggs under trial were bad, contents being very offensive.

Conclusions.—This further investigation strongly confirms the results obtained with the first series of experiments as regards the value of saturated lime-water as an egg preservative. As far as our experience goes, no other fluid is its equal, the eggs from this preservative being far and away superior to those kept by the other methods here stated.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF R. ROBERTSON, SUPERINTENDENT.
NAPPAN, N.S., November 30, 1899.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit to you, herewith, my second annual report, that for 1899, being the twelfth annual report of the operations on the Experimental farm for the Maritime Provinces at Nappan N. S.

WEATHER.

December 1898, came in somewhat mild and continued so until the eighth, when the thermometer registered 18° above zero. The temperature continued to fall until the 12th, when 2° above zero was reached, being the coldest up to that time. On the 12th, snow fell, continuing until the night of the 13th, making sleighing, which was good until the 17th. On the 14th the thermometer reached 7° below zero, cold weather continuing until the 16th when 21° below zero was reached. The temperature rose on the 17th, with rain on the 18th, but on the 19th cold weather again set in, and continued until the 22nd. There was a light snow storm on the 21st, but not enough to make sleighing. The weather was mild with light frosts until the 28th, when cold weather set in. The thermometer registered 6° below zero on the 29th, but the weather again moderated on the 30th, with rain followed by snow on the 31st, with the temperature gradually falling.

January came in cold with a snow storm and high north wind. The temperature was 14° below zero on the 2nd, and on the 3rd 7°, and 5° below on the 4th. It then moderated on the 4th and continued milder with slight frost and some snow until the 10th and 11th, when the temperature was 7° and 8° below zero respectively. High winds continued on the 9th, 10th and 11th, and on the 13th 8° below zero was registered, followed by milder weather. On the 20th, 6° below zero was reached, moderating again on the 22nd, and keeping quite mild until the 28th, when it fell to 4° be ow zero and kept cold until the end of the month. On the 15th there was wind and snow which drifted badly and a heavy fall of snow on the 17th. The remainder of the month was fine, with the exception of the 25th, when a considerable quantity of rain and snow fell.

February continued cold, with no moderation until the 16th. The thermometer registered 9°, 13°, 3°, 13°, 1°, 6°, 3° below zero on the 1st, 2nd, 4th, 5th, 10th, 11th and 12th respectively. The 4th was stormy, with heavy snow and wind storms on the 9th, 10th and 14th. The remainder of the month continued fine, with no very cold weather.

March came in quite mild and continued so until the 10th and 11th, when 3° and 2° below zero respectively was registered. The 12th was mild, followed by a cold snap,

and on the 15th 6° below zero was registered. From the 19th to the end of the month the weather continued mild; snow storms occurred on the 8th, 13th, 16th and 25th, and a sleet storm on the 19th. April was quite mild, the temperature was not lower than 11° of frost except on the 7th, when 14° was registered. The month was a fine one, having little bad weather except on the 12th, when there was a snow storm; a rain storm occurred on the 18th. The first seeding was done on the 25th, but none after that until May 6.

May came in cold, with snow on the 3rd and 4th. Seeding commenced on the 6th and continued uninterrupted to the end of the month with the exception of a few wet days.

June began with fine weather, but soon turned dark and cold with considerable rain, which continued through the whole remainder of the month. On the 1st the thermometer registered 83°, with 76° and 74° on the 2nd and 3rd respectively, but did not reach these points again except on the 14th and 20th, when 76° was recorded.

July registered 82°, 83°, 81° and 80°, on the 3rd, 6th, 11th and 27th respectively, which were the highest temperatures that month. There was much gloomy and wet weather until the 23rd, when good haying weather was had, which continued until the end of the month. The first clover hay was cut on the 20th

August came in fine and registered 79° on the 2nd and 3rd and 80° on the 20th, as the highest for the month. This was an exceptionally fine month for harvesting; the first spring sown grain was cut on the 14th. Fall rye was cut on the 11th.

September was also a fine month. The first frost was on the 24th, when there was 6° of frost. After that date there was no frost again until October 2. A very severe windstorm swept over the province on the 6th and 7th, doing considerable damage to corn crops and grain where ready to cut, also to the apple crop.

On October 2 the thermometer registered 2° of frost with none again until the 16th and then 3°, 5° and 8°, on the 20th, 23rd and 24th respectively, this was an exceptionally fine and open month.

November was fine and open until the 13th, when it set in cold, on the 14th snow fell and good sleighing continued for a few days. The remainder of the month was not very cold, and there was no very mild weather. On the whole the growing season was decidedly cold, considered the most so for many years. The weather was very unfavourable for the corn crop, but not at all unsuitable for the grain crops, which were exceptionally good. Roots have been a fair average crop. Hay at least up to the average, and pasture good. Very little pasture is available on the experimental farm, with the exception of the rough and wooded land, at the back part, where young cattle were kept, these, however, came in, in the fall very thin in flesh. A system of rotation of crops has been instituted with the cultivated land at present available, which has been divided into four parts, with a view to carrying on a four year rotation with manure for one crop in each four years, and clover with as many of the other crops as possible. First year grain on clover sod, 2nd year roots with manure, 3rd grain, 4th clover.

Considerable new land is being brought under cultivation each year, which being exceedingly poor, a special effort is being made to feed all the stock possible with a view to increase the manure pile. Different experiments are also carried on with the object of increasing the fertility of the soil. One of these, green manuring was undertaken with a field of seventeen acres, which was very poor and much infested with a small weed called spurry. In the treatment of the land, the killing of the weeds was also in view. It was ploughed in the fall of 1898 and sown with pease this spring, the intention being to plough down two crops. The first crop was fairly heavy, and was ploughed under early in July, a second being immediately sown.

When this was from four to six inches high, the pea aphis was seen to infest the plants and in a very short time they almost destroyed the crop, the remnants of which were ploughed under. It is expected that the one crop ploughed under will be of considerable value to the land. A very deep interest has been taken in the dairy herd experiment, and also in that with the beef steers, and in the experiments with swine. More interest is being taken each year in the experimental work carried on, as evidenced by the increased number of visitors from year to year. Sixteen picnic parties visited

the farm during the past summer, many of the visitors expressing themselves pleased and benefitted by their visit. It affords me much pleasure to acknowledge the services, cheerfully rendered by the farm foreman, Thos. Coates, under whose special care all the uniform test plots of cereals and roots were carried on, and records taken, and also those of the herdsman, Robt. Donaldson, who had special charge of all the live stock, and of the experiments carried on with the same, and kept careful records of the work.

I have the honour to be, sir,

Your obedient servant,

R. ROBERTSON,

Superintendent.

EXPERIMENTS WITH OATS.

Seventy-two varieties of oats were sown on May 8 and 9, in plots of one-fortieth of an acre each. The soil was a clay loam in a fairly good state of fertility, having been well manured in the spring of 1896 for a turnip crop, and the following year was in oats, bone meal and complete fertilizer at the rate of 250 pounds per acre and also 100 pounds nitrate of soda having been supplied for that crop. In 1898 a heavy crop of clover was grown and a second crop ploughed under in the fall. This was worked up once with the disc harrow, once with the spring-tooth harrow, and once with the smoothing harrow before sowing. The grain was sown on May 8 and 9 with the Wisner seed-drill at the rate of 1¾ bushels per acre, with Mammoth Red Clover at the rate of 10 poumds per acre. Complete fertilizer was applied to this land in the proportion of 200 pounds per acre.

There was very little rust or smut on any of these plots. The crop of straw was extra heavy, and only in a few instances was it lodged. Those varieties which lodged the worst were Salines, American Beauty, Black Mesdag, Hazlett's Seizure and Scottish Chief. The following results were obtained :—

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, Per Acre.	Yield per Acre.	Weight Per Bushel.
			In.		In.		Lbs.	Bush. Lbs.	Lbs
1 California Pro. Black Imp.	Aug. 30	113	38	Medium	8½	Sided	7,200	104 24	34
2 Oderbruch	" 30	114	48	Stiff	8	"	8,600	98 28	41½
3 Siberian O. A. C.	Sept. 4	118	46	Medium	8	Branching	5,720	96 16	37½
4 Cream Egyptian	Aug. 29	113	50	Stiff	9	Sided	7,600	95 10	38
5 White Russian	" 30	114	46	"	8	Branching	6,400	94 4	39
6 Early Golden Prolific	" 30	114	46	"	8	"	5,520	94 4	37½
7 Black Tartarian, Imported	Sept. 2	116	48	"	9	Sided	5,400	94 4	36
8 Wallis	Aug. 29	113	47	"	8	Branching	6,920	92 32	39
9 Lincoln	" 29	113	50	"	7½	"	6,480	92 32	38
10 Abyssinia	" 29	113	50	"	9	Sided	6,680	91 26	39
11 New Zealand	Sept. 5	119	46	"	9	"	8,200	91 26	35
12 Mennonite	Aug. 31	114	47	"	7½	Branching	4,920	91 26	39
13 Salines	Sept. 4	118	46	Medium	8	"	5,880	91 26	35
14 Wide Awake	" 4	119	46	Stiff	8	"	6,520	90 20	40
15 Milford	" 4	118	46	"	9	Sided	5,600	90 20	38

OATS—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw. Per Acre.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs
16 Miller	Aug. 30	114	44	Stiff	8	Branching	7,400	89	14	38½
17 American Beauty	Sept. 2	117	44	"	8	"	6,520	89	14	40
18 Olive	" 2	116	46	Stiff	9	Sided	8,080	89	14	38
19 Kendal	" 4	118	46	"	8	"	5,320	89	14	38
20 Danish Island	" 4	118	46	Medium	7½	Branching	5,080	89	14	36
21 White Giant	" 4	118	45	"	8	"	4,800	89	14	34
22 Rennie's Prize White	Aug. 22	106	40	"	9	"	7,080	88	8	42½
23 Abundance	" 30	114	44	Stiff	8	"	6,000	88	8	38
24 Early Blossom	" 29	113	50	"	9	Sided	6,920	87	6	40
25 Banner	" 30	114	45	"	8	Branching	6,200	87	6	39
26 Rosedale	" 30	114	46	"	8	Sided	7,800	87	6	40
27 Holland	Sept. 9	123	46	"	8	"	5,080	87	6	34
28 Pense	" 2	116	46	"	9	"	7,000	85	30	30
29 Doncaster Prize	Aug. 31	115	46	Medium	8½	Branching	6,280	85	30	38
30 Early Gothland	" 30	114	46	Stiff	8	Sided	7,600	83	18	40
31 Improved Ligowo, Imp	Sept. 4	118	46	Medium	8	Branching	4,960	83	18	39
32 White Maine	" 4	118	46	"	8	"	5,200	83	18	36
33 Imported Irish	Aug. 22	106	40	"	9	"	7,160	82	12	42
34 Black Tartarian	" 28	112	50	Stiff	9	Sided	7,160	82	12	38
35 Holstein Prolific	Sept. 2	117	44	Medium	8	Branching	6,400	82	12	37
36 Thousand Dollar	Aug. 29	112	48	Stiff	8	"	5,760	81	6	39
37 Columbus	" 29	113	43	Weak	8	"	6,600	81	6	34
38 Golden Beauty	" 30	114	43	Medium	8	"	5,880	81	6	34½
39 White Schonen	" 30	114	45	Stiff	8	"	5,840	81	6	35½
40 Welcome	" 30	113	48	Medium	8	"	6,080	81	6	39
41 Newmarket	Sept. 2	116	44	"	7	"	4,480	81	6	39
42 Improved American	" 4	118	44	Stiff	7	"	5,040	81	6	34
43 Golden Giant	" 9	123	46	"	9	Sided	4,720	81	6	34
44 Master	" 2	116	46	"	8	Branching	4,720	80	..	40
45 Victoria Prize	Aug. 30	113	46	"	8	"	5,880	80	..	40½
46 Early Archangel	" 29	113	46	Medium	8	"	5,880	77	22	40
47 Poland White	" 26	110	43	Stiff	7	"	7,040	76	16	42
48 Prize Cluster	" 26	110	48	"	8	"	5,920	76	16	41
49 Improved Ligowo	" 30	114	45	"	7	"	5,880	76	16	37
50 Golden Tartarian	Sept. 9	123	46	"	9	Sided	4,600	76	16	34
51 King	" 4	119	44	"	7	Branching	5,080	75	10	39
52 Black Mesdag	Aug. 24	107	40	Weak	8	Branching	5,320	75	10	39
53 Bavarian	" 30	114	44	Stiff	7	"	5,480	75	10	38½
54 Hazlett's Seizure	" 30	114	44	Medium	7½	"	5,680	74	4	40
55 Oxford	Sept. 4	118	46	"	8	"	5,680	74	4	37
56 American Triumph	" 5	119	50	Stiff	9	"	5,680	74	4	34
57 Buckbee's Illinois	" 2	116	44	Medium	8	"	4,600	74	4	37
58 Flying Scotchman	Aug. 28	112	50	Stiff	9	"	6,120	71	26	40
59 Mortgage Lifter	" 29	112	44	Weak	8	"	6,000	71	26	41½
60 Joanette	Sept. 1	115	36	Medium	7	"	4,280	71	26	35
61 Russell	" 4	118	46	"	9	"	5,000	71	26	38½
62 Coulommiers	" 9	123	45	"	8	"	4,680	71	26	35
63 Early Dawson	Aug. 29	112	42	Weak	7	"	4,400	71	26	38½
64 Medal	Sept. 4	118	44	Medium	8	"	5,200	70	20	37
65 California Prolific Black	Aug. 29	113	48	Stiff	9	Sided	5,600	69	14	36½
66 Cromwell	Sept. 2	116	46	"	8	Branching	4,400	69	14	39
67 Scottish Chief	Aug. 29	113	45	Weak	9	"	5,360	67	2	42½
68 Bonanza	" 30	114	43	Medium	8	"	5,000	67	2	40
69 Brandon	Sept. 4	118	43	"	8	"	5,400	65	30	35
70 Winter Grey	Aug. 31	115	43	Weak	8	"	4,520	64	24	41½
71 White Wonder	" 29	113	42	Stiff	8	"	4,680	62	12	43

EXPERIMENTS TO PREVENT SMUT IN OATS.

According to instructions received, experiments were carried on with six different treatments for the prevention of smut in oats. Three varieties of very smutty grain were used in each case. A check plot was also sown in each series with untreated seed. The seed was sown May 12, in plots 33 by 3 feet and a record was taken when headed of the number of heads affected, also the number of those free from smut.

The results are given in the following table:

OATS TREATED FOR SMUT.

Name of Variety.	How Treated.	Material Used.	Good Heads.	Smutty Heads.
Imported Irish	Soaked 1 hour	Formalin 4½ oz. to 10 gall. of water.	2,286	None.
"	" 15 minutes	" " " "	2,538	18
"	" 5 "	" " " "	2,238	12
"	Sprinkled	" " " "	2,106	48
"	"	Formalin 9 oz. to 10 gall. "	2,664	6
"	"	Massel Powder	2,442	66
"	Check		2,748	168
Rennie's Prize White	Soaked 1 hour	Formalin 4½ oz. to 10 gall. water	2,256	None.
" " "	" 15 minutes	" " " "	2,658	24
" " "	" 5 "	" " " "	2,508	24
" " "	Sprinkled	" " " "	2,382	36
" " "	"	" 9 oz. to 10 gall. "	2,808	None.
" " "	"	Massel Powder	2,898	54
" " "	Check		3,332	96
Doncaster Prize	Soaked 1 hour	Formalin 4½ oz. to 10 gall. water	2,814	None.
" "	" 15 minutes	" " " "	3,354	36
" "	" 5 "	" " " "	3,480	360
" "	Sprinkled	" " " "	3,060	342
" "	"	" 9 oz. to 10 gall. "	3,342	18
" "	"	Massel Powder	2,904	738
" "	Check		2,784	966

FIELD CROPS OF OATS.

Two varieties of oats were tested in field crops covering 5½ acres of marsh soil, which had grown hay for at least ten years, without having received any kind of fertilizer. It was ploughed in the fall of 1898 at an average depth of 6 to 7 inches. In the spring it was worked up twice with the spade harrow, and twice with the spring tooth harrow. On May 13, the grain was sown by hand, broadcast at the rate of 3 bushels per acre, it was then harrowed and sown with timothy and clover seed (Timothy 12 pounds, Mammoth Red Clover 6 pounds, and Alsike 4 pounds) sown broadcast, after which the ground was gone over with the smoothing harrow. No fertilizer was used. There was neither rust nor smut, growth medium and even, all standing well, both were cut September 2. The yields were:

	Bush.	Lbs.	
Banner, 1 acre	50	—	per acre.
Imported Irish, 4½ acres	44	15	"

FIELD CROPS OF MIXED GRAIN COMPARED WITH OATS ON LAND UNMANURED.

With a view of throwing some light on the advisability of sowing mixed grain, two fields of 5 acres each were chosen for the purpose. One half of each was sown with a mixture of, oats, 2 bushels, barley, 1 bush and pease ½ bushel, mixed together and sown at the rate of 2½ bushels per acre. The other half was sown with oats alone (Abundance). The soil was sandy loam, having been in pasture for many years. The land was ploughed in the fall of 1898 at a uniform depth of about 5 inches, and the following spring was disc-harrowed twice, harrowed once with the spring-tooth harrow and

once with the smoothing harrow before seeding. Sown June 2 at the rate of 2½ bushels per acre with the Wisner seed drill with grass seed attachment, sowing also 10 pounds of clover seed per acre. There was no rust or smut. Growth medium and even, very little lodged. Cut September 16, making the time to mature 104 days. There was no fertilizer of any kind used on this land. The yield per acre was:

	Bush.	Lbs.
Mixed grain	38	14
Abundance oats	36	—

MIXED GRAIN ON LAND MANURED.

Mixed grain composed of oats 2 bushels, barley 1 bushel, and pease ½ bushel, were mixed together and sown at the rate of 2½ bushels per acre on a field of 3 acres which had lain in pasture for at least ten years. In the summer of 1898 it was ploughed and pease sown on it, which crop was ploughed under early in the autumn of 1898. In the winter of 1898 and 1899 it was given a dressing of marsh mud at the rate of eighty two-horse loads per acre. The soil varied from white sand to clay, with black muck and clay loam in places. The crop running across each of the various kinds of soil. It was well worked up with disc and spring-tooth harrow and sown June 3. There was no rust or smut the crop being considerably lodged, particularly on the black muck. The yield per acre was 47 bushels 13 pounds.

MIXED GRAIN SOWN IN DIFFERENT QUANTITIES.

Another experiment was carried on with mixed grain in acre plots on 3 acres of land, sown in different quantities, to gain information in regard to the quantity of seed to sow per acre to get the heaviest yield. The land varied very much in quality, having irregular strips of heavy clay, black muck, white sand and clay loam extending across the field, the grain plots running lengthways over the different kinds of soil. This land had lain uncultivated for many years in pasture. In the fall of 1897 and spring of 1898 (part each), thirty one-horse loads of stable manure per acre were spread on the sod and ploughed under in the spring of 1898. On this a crop of Indian corn was grown. The land was ploughed in the fall of 1898 at an average depth of 6 inches, and cultivated thoroughly the following spring with disc and spring-tooth harrows before sowing. Sown June 3 with the seed drill with fertilizer attachment, sowing 200 pounds of fertilizer per acre. There was also sown with the grain timothy seed 12 pounds and mixed clover seed 10 pounds per acre. The mixed seed consisted of oats 2 bushels, barley 1 bushel, pease half a bushel, which was sown in the quantities mentioned below. There was no rust or smut, the crop in each case being heavy and more or less lodged.

Harvested September 16, when the following yield was obtained:—

	Bush.	Lbs.
One acre sown, 3 bushels per acre	62	2
" 2½ bushels per acre	62	22
" 2 bushels per acre	53	8

EXPERIMENTS WITH BARLEY.

Fifty-two varieties of barley, of which twenty-one were two-rowed sorts and thirty-one six-rowed, were sown in plots of $\frac{1}{40}$ acre each. The land selected for this crop was a light clay loam, which was ploughed in the fall of 1898, and in the spring of 1899 twice harrowed with the spring-tooth and once with the smoothing harrow before sowing. The previous crop was turnips, the land having been manured for that crop at the rate of twenty thirty-bushel cart loads of barn-yard manure, also, 200 pounds of complete fertilizer and 200 pounds of bone meal each per acre. The grain was sown on May 11 by the seed drill, at the rate of 2 bushels per acre, with timothy seed 12 pounds and mixed clover seed 10 pounds per acre, 200 pounds of fertilizer per acre was also drilled in with the grain. There was an extra heavy crop of straw, and some of the plots were considerably lodged. The straw was free from rust, and very little smut was seen. The following table shows the results obtained:—

Scene on Experimental Farm, Nappan, N.S., during Grain Harvest.

Barley, Two-rowed—Test of Varieties.

No.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
1	French Chevalier	Aug. 23	104	37	Weak	3	6,680	64	8	48
2	Newton	" 24	105	42	Medium	2½	5,600	57	24	50½
3	Beaver	" 22	103	46	"	3	5,040	55	40	51
4	Harvey	" 23	104	44	"	3¼	6,200	53	16	49
5	Jarvis	" 24	105	48	Stiff	3¼	6,080	51	32	47
6	Nepean	" 24	105	44	Medium	3	5,400	50	40	49
7	Clifford	" 24	105	48	"	3	4,520	50	40	49½
8	Canadian Thorpe	" 23	104	38	"	3	4,760	50	40	49½
9	Danish Chevalier	" 24	105	38	"	3	5,200	49	8	51
10	Monck	" 24	105	45	Stiff	2½	5,800	47	24	50
11	Victor	" 24	105	42	Medium	3	4,800	47	24	48
12	Dunham	" 24	105	44	"	3½	5,208	45	40	49
13	Logan	" 24	105	43	"	3	5,080	44	8	48½
14	Kinver Chevalier	" 24	105	40	Weak	3½	4,120	44	8	48
15	Leslie	" 24	105	43	Medium	3	4,680	44	8	49
16	Fulton	" 24	105	46	"	2½	4,680	44	8	48
17	Bolton	" 22	103	41	"	3	4,720	44	8	50
18	Sidney	" 24	105	42	"	3	4,360	43	16	49
19	Prize Prolific	" 24	105	40	"	3¼	4,280	42	24	48
20	Thanet	" 24	105	38	Weak	3	4,120	41	32	48½
21	Pacer	" 24	105	42	"	3	5,080	40	40	48

Barley, Six-Rowed—Test of Varieties.

No.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				Inches.		Inches.	Lbs.	Bus.	Lbs.	Lbs.
1	Argyle	Aug. 17	98	46	Medium	2½	6,400	59	8	48
2	Blue Barley	" 16	97	37	"	2½	5,800	56	32	45
3	Baxter	" 16	97	43	Stiff	2½	6,400	55	40	49
4	Mensury	" 17	98	40	Medium	3	6,080	55	40	49
5	Garfield	" 17	98	38	"	2¾	5,280	55	..	48
6	Mansfield	" 18	99	42	Stiff	2½	5,280	50	40	47
7	Yale	" 21	102	38	"	2	5,200	50	40	48
8	Brome	" 22	103	38	Medium	2½	5,200	50	..	49
9	Vanguard	" 17	98	42	"	2½	5,400	47	24	48
10	Kirby	" 22	103	36	Stiff	2½	5,280	50	..	49
11	Odessa	" 16	97	43	"	2½	5,800	45	40	48
12	Claude	" 22	103	36	"	2½	4,600	45	40	48
13	Petschora	" 17	98	36	Medium	2⅓	4,680	45	..	46
14	Nugent	" 22	103	35	Stiff	2	6,600	45	..	48
15	Stella	" 22	103	36	"	2	4,600	45	..	48
16	Rennie's Improved	" 17	98	38	Medium	2	4,400	44	8	50
17	Albert	" 18	99	36	"	2½	4,800	44	8	49½
18	Oderbruch	" 21	102	35	"	2½	5,280	43	16	49
19	Surprise	" 22	103	35	Stiff	2	4,800	42	24	47
20	Summit	" 22	103	36	"	2	4,520	41	32	48
21	Hulless Black	" 18	99	29	Weak	1¾	4,400	40	40	60
22	Empire	" 22	103	35	Medium	2¼	4,680	39	8	48
23	Trooper	" 21	102	36	Stiff	2¼	4,600	38	16	48
24	Royal	" 17	98	35	Medium	2¼	4,880	36	32	48
25	Champion	" 14	95	44	"	2½	4,600	32	32	41
26	Success	" 14	95	42	"	2	4,200	35	40	40½
27	Pioneer	" 21	102	36	Stiff	2½	5,000	35	40	49½
28	Phœnix	" 16	97	41	Medium	2½	4,600	35	40	48
29	Hulless White	" 15	96	37	"	3	5,600	35	..	56½
30	Common	" 16	97	40	Stiff	2¼	4,600	34	8	47½
31	Excelsior	" 15	96	44	Medium	2½	4,400	26	32	39

EXPERIMENTS TO PREVENT SMUT IN BARLEY.

According to instructions received, experiments were carried on, with three varieties of barley, using very smutty seed in six different treatments for the prevention of smut. One extra plot being sown with each variety untreated. The seed was sown May 12 in plots 33 x 3 feet. The heads were counted and a record of the smutty and good heads taken Aug. 19, with results as follows :—

BARLEY TREATED FOR SMUT.

Name of Variety.	How Treated.	Materials Used.	Good Heads.	Smutty Heads.
Bolton, 2-rowed	Soaked 1 hour	Formalin 4½ oz. to 10 galls. water.	2,892	54
" "	" 15 minutes	" "	3,144	54
" "	" 5 "	" "	3,222	54
" "	Sprinkled	" "	2,586	48
" "	"	" 9 oz. to 10 galls. water.	3,222	None.
" "	"	Massel powder	2,958	15
" "	Check		3,246	30
Baxter, 6-rowed	Soaked 1 hour	Formalin 4½ oz. to 10 galls. water.	2,634	48
" "	" 15 minutes	" "	2,862	60
" "	" 5 "	" "	2,586	72
" "	Sprinkled	" "	2,742	126
" "	"	" 9 oz. to 10 galls. water.	2,346	24
" "	"	Massel powder	2,154	54
" "	Check		2,478	72
Royal, 6-rowed	Soaked 1 hour	Formalin 4½ oz. to 10 galls. water.	2,490	54
" "	" 15 minutes	" "	2,976	30
" "	" 5 "	" "	2,838	48
" "	Sprinkled	" "	2,358	138
" "	"	" 9 oz. to 10 galls. water.	3,312	18
" "	"	Massel powder	2,406	18
" "	Check		3,168	90

EXPERIMENTS WITH SPRING WHEAT.

Fifty-four varieties of spring wheat were grown on one-fortieth acre plots, the soil was a light clay loam which was ploughed in the fall of 1898. The previous crop was mangels, for which manure was applied at the rate of twenty thirty-bushel cart loads of barn-yard manure and 200 pounds each of complete fertilizer and bone meal per acre. The seed was sown on May 6, with the seed drill at the rate of 1¾ bush. per acre 12 pounds timothy seed and 10 pounds mixed clover seed was also sown with the grain. This grain made good growth and was quite free from rust, the yield was above the average, and the grain filled out well. Owing to the heavy crop of straw, a few plots were somewhat lodged. The following results were obtained :—

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. lbs.	Lbs.
1	Hungarian	Sept. 2	119	43	Stiff	3½	Bearded	6,720	48 40	61
2	Roumanian	" 4	121	45	Medium	2½	"	5,600	48 40	61
3	Wellman's Fife	" 5	122	48	Stiff	3¼	Beardless	5,440	45 ..	59
4	White Fife	" 5	122	48	"	3	"	6,520	44 40	60½
5	Laurel	" 4	121	44	Medium	3	"	5,200	44 40	59
6	Huron	" 1	118	46	Stiff	3	Bearded	5,280	44 ..	60
7	Goose	" 1	118	46	Medium	2½	"	5,680	44 ..	61
8	Herisson Bearded	" 1	118	44	"	3	"	6,280	44 ..	60½
9	Vernon	" 4	121	44	"	3	"	6,000	42 ..	60
10	Clyde	" 1	118	46	"	2¾	Beardless	6,200	42 ..	61
11	White Connell	" 2	119	44	Stiff	3	"	6,400	41 20	60½
12	Pringle's Champlain	" 2	119	46	"	3	Bearded	5,840	40 40	60½
13	Blenheim	" 1	118	45	"	3	"	5,080	40 40	60
14	Plumper	" 1	118	44	Medium	2½	"	5,080	40 40	61
15	White Russian	" 5	122	46	Stiff	3	Beardless	6,280	40 ..	60
16	Beaudry	" 1	118	45	Weak	2½	Bearded	4,920	40 ..	60½
17	Rio Grande	" 1	118	48	Stiff	3	"	4,880	40 ..	60½
18	Colorado	Aug. 31	117	46	Medium	2½	"	6,080	39 20	62
19	Advance	Sept. 2	119	44	Stiff	3	"	5,280	39 20	60
20	Byron	Aug. 31	117	42	"	3	"	6,480	38 40	60
21	Golden Drop	" 31	117	44	Medium	2½	Beardless	6,440	38 40	62
22	Monarch	Sept. 5	122	46	Stiff	3	"	6,000	38 40	61
23	Percy	" 1	118	47	"	2½	"	6,120	38 40	60½
24	Captor	" 2	119	46	"	3	"	5,600	38 40	60
25	Norval	Aug. 31	117	42	Medium	2½	Bearded	6,400	37 20	62
26	Preston	Sept. 2	119	44	Stiff	2¾	"	4,960	37 20	61
27	Red Fife	" 2	119	47	"	3	Beardless	5,680	37 20	60
28	Alpha	" 1	118	46	Medium	2½	Bearded	6,000	36 40	61
29	Dions	" 2	119	46	Stiff	3	"	4,880	36 40	60
30	Progress	" 1	118	46	"	3	Beardless	5,280	36 ..	61
31	Admiral	Aug. 31	117	44	"	3	"	6,080	35 20	61½
32	Early Riga	" 28	114	37	Weak	2¼	"	4,920	34 40	59
33	Crawford	Sept. 4	121	40	Medium	2½	"	4,840	34 40	60
34	Dawn	" 1	118	40	"	3	"	4,080	34 40	60
35	Mason	" 2	119	42	Weak	2¼	"	4,080	34 ..	60
36	Crown	" 4	121	43	Medium	3	Bearded	4,680	34 ..	60
37	Red Swedish	" 2	119	42	Weak	3	"	4,080	34 ..	59
38	Blair	" 1	118	42	Medium	2½	Beardless	3,880	34 ..	60
39	Ebert	" 4	121	36	"	2¼	"	4,080	34 ..	60½
40	Dufferin	Aug. 31	117	44	Stiff	2	Bearded	5,400	33 20	61
41	Fraser	Sept. 2	119	42	Medium	2¼	"	4,280	33 20	61
42	Weldon	" 2	119	46	"	3	Beardless	5,480	33 20	60
43	Polonian	" 8	125	46	Stiff	4	Bearded	4,400	33 20	59
44	Stanley	" 2	119	44	"	3	Beardless	5,080	32 40	60
45	Campbell's White Chaff	" 1	118	44	Medium	2½	"	5,200	32 ..	60
46	Beauty	" 2	119	44	Stiff	3	"	4,840	32 ..	60
47	Black Sea	Aug. 26	112	42	"	2½	Bearded	5,480	32 ..	60½
48	Countess	Sept. 2	119	46	"	2½	Beardless	4,480	31 20	61
49	Emporium	" 2	119	46	"	3	Bearded	5,000	31 20	60
50	Harold	" 1	118	38	Weak	2	"	3,800	31 20	60
51	Red Fern	" 2	119	46	Stiff	3	"	3,880	30 ..	60½
52	Old Red River	" 2	119	44	"	2¾	Beardless	4,400	28 40	60
53	Rideau	" 1	118	45	Weak	2½	Bearded	4,080	27 20	59
54	Ladoga	Aug. 26	112	44	Stiff	2½	"	5,200	25 20	60½

EXPERIMENTS WITH PEASE.

Fifty-eight varieties of pease were included in this test, all sown in plots of one fortieth of an acre each.

The soil was a clay loam in good state of fertility, the previous crop having been clover with a second crop turned under in the fall of 1898. The pease were sown on May 10 and made a vigorous growth and gave good promise of being an extra fine crop. About August 1, when the pods were forming on most of the varieties, an insect was noticed to be infesting the crop, which turned out to be the Pea Aphis, *Nectarophora destructor*. This aphis increased in numbers very rapidly, and in a short time the plots were very much injured by them. Some plots were worse affected than others, which

must have made a material difference in their relative positions in the test as to yield. Remedies were tried in an adjoining field of pease similarly infested. A solution of tobacco water, made by soaking 10 pounds of tobacco stems in a barrel of water for twenty-four hours was applied in the form of a spray. Another plot was sprayed with a solution of kerosene and water made into an emulsion with soap. Twenty parts of water was used to one of oil. While doubtless many of the plant lice were killed, yet they appeared in such numbers that no material benefit could be noticed.

Many visitors to the farm reported a similar attack on their pease, showing that this pest was more common than was at first suspected.

PEASE—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre.	Weight per Bushel.
					In.	In.	Bus. Lbs.	Lbs.
1	Nelson	Sept. 7..	120	Strong....	48	1¾	35 20	62
2	English Grey	" 8..	121	Medium..	40	2	34 40	60
3	Centennial	" 10..	123	" ..	38	2½	30 40	60
4	Early Britain	" 8..	121	Strong....	50	2	29 20	59
5	Oddfellow	" 7..	120	Medium..	36	2½	29 20	63
6	German White	" 7..	120	Strong....	46	2	28 40	60½
7	Canadian Beauty	" 8..	121	"	50	2	28 40	62
8	Maple	" 18..	131	"	44	2	28 40	55
9	French Canner	" 7..	120	"	44	2¼	28 ..	60½
10	Vincent	" 17..	130	"	46	3	28 ..	60
11	Chancellor	" 7..	120	Medium..	44	1½	27 20	61
12	Arthur	" 7..	120	Strong....	45	2	27 20	61
13	Agnes	" 8..	121	"	47	2	27 20	61
14	New Potter	" 9..	122	"	48	2	27 ..	60
15	Archer	" 9 .	122	"	48	2	26 40	62
16	Carleton	" 10 .	123	Medium..	43	2	26 ..	61
17	Pride	" 6..	119	Strong....	48	2	25 20	61
18	Alma	" 15..	128	"	46	2¼	25 20	59
19	Duke	" 18..	131	"	46	2¼	25 20	62
20	Elephant Blue	" 15..	128	"	44	2	25 20	62
21	Fenton	" 6..	119	"	50	2	24 40	60
22	Pearl	" 18..	131	"	48	2¼	24 40	61
23	Crown	" 10..	123	"	42	2	24 40	61
24	Kent	" 18..	131	"	46	2	24 40	60
25	Lanark	" 6..	119	"	46	2	23 20	61
26	Mummy	" 7..	120	"	46	2	23 20	61
27	Picton	" 8..	121	"	44	2	23 20	61
28	King	" 18..	131	"	46	2¼	23 20	60
29	Field Grey Spring	" 18..	131	"	42	1½	22 40	58
30	Paragon	" 18..	131	" ..	48	2¼	22 40	62
31	White Wonder	" 7..	120	Medium..	40	2	22 40	61
32	Dan. O'Rourke	" 6..	119	Strong....	50	2½	22 ..	60
33	Mackay	" 18..	131	"	44	2	22 ..	61
34	Black Eyed Marrowfat	" 8..	121	" ..	46	2¼	22 ..	60
35	Large White Marrowfat	" 15..	128	" ...	46	2¼	21 20	61
36	Bruce	" 15..	128	"	48	2¼	20 40	60
37	Dover	" 18..	131	"	46	2	20 40	62
38	Cooper	" 7..	120	"	46	2	20 ..	61
39	Prussian Blue	" 5..	118	"	50	2	20 ..	62
40	Victoria	" 15..	128	"	50	2¼	20 ..	60
41	Perth	" 5..	118	"	48	2¼	18 40	59
42	Gregory	" 9..	122	" .. .	48	2	18 40	60
43	Macoun	" 13..	126	"	48	2	18 40	60
44	Harold	" 18..	131	" ...	46	2	18 40	63
45	Prince Albert	" 9..	122	"	46	2	18 ..	62
46	Elder	" 13..	126	"	47	2	18 ..	63
47	Elliott	" 15..	128	"	42	2½	17 20	61
48	Field Grey Winter	" 18..	131	"	42	1½	17 20	61
49	Multiplier	" 6..	119	"	48	2	17 20	60½
50	Fergus	" 10..	123	"	42	1¾	16 40	61
51	Bright	" 15..	128	" ...	48	2¼	16 40	62
52	Bedford	" 18..	131	"	46	2	16 40	63
53	Harrison's Glory	" 10..	123	Medium..	44	2	16 40	61
54	Trilby	" 13..	126	Strong....	48	2	16 40	62½
55	Golden Vine	" 9..	122	"	44	2	16 ..	61
56	Creeper	" 10..	123	Medium..	42	1¾	13 20	63
57	Chelsea	" 7..	120	" ..	40	2	13 20	62
58	Wisconsin Blue	" 9..	122	Strong....	50	1½	13 20	60

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

The sowing of grain at different periods to test the relative value of early, medium and late sowings was again carried on this year with two varieties each of oats, barley, wheat and pease, on plots of one-fortieth of an acre each.

The soil was light clay loam in a good state of fertility. The previous crop was corn, for which crop manure at the rate of twenty one-horse cart loads with 300 pounds complete fertilizer, and three barrels of wood ashes per acre was applied. The land was ploughed in the fall previous. The first series of plots were sown April 25, the remainder being sown at intervals of a week until six sowings had been made. Commercial fertilizer also at the rate of 200 pounds per acre was drilled in with the grain in each case. This part of the field being very weedy, especially with couch grass, these plots were considerably affected by these weeds.

The following tables show the results obtained.

The grain was all free from rust except the last three sowings of spring wheat, and these sowings of both varieties were slightly rusted.

OATS—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.	In.	Lbs.	Bush.	Lbs.	Lbs.
Banner	April 25..	Aug. 21..	118	46	9	6,400	74	4	41
"	May 2..	" 26..	116	46	8½	6,800	81	6	40
"	" 9..	" 30..	113	48	8½	6,800	95	10	36½
"	" 16..	Sept. 5..	112	44	8½	6,480	76	16	35
"	" 23..	" 9..	109	42	8½	5,000	62	12	35
"	" 30..	" 15..	108	42	8	5,080	60	..	35
Abundance	April 25..	Aug. 22..	119	45	7	5,200	55	10	39
"	May 2..	" 26..	116	43	7½	6,200	69	14	40
"	" 9..	" 30..	113	44	7½	6,400	78	28	36
"	" 16..	Sept. 5..	112	42	7½	6,280	75	10	35
"	" 23..	" 9..	109	40	7	4,000	56	16	35
"	" 30..	" 15..	108	41	7	4,400	51	26	35

SPRING WHEAT—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Red Fife	April 25..	Aug. 30..	127	43	2½	6,000	33	20	61
"	May 2..	Sept. 2..	123	42	2½	4,680	30	40	59
"	" 9..	" 4..	118	42	2½	4,880	31	20	57
"	" 16..	" 11..	118	40	2½	3,400	22	40	58
"	" 23..	" 16..	116	40	2½	4,200	24	40	58
"	" 30..	" 22..	114	40	2¼	4,360	21	20	56
Stanley	April 25..	Aug. 26..	123	43	2¾	5,400	32	..	61
"	May 2..	" 30..	120	42	2¾	5,000	25	20	60
"	" 9..	Sept. 2..	116	42	2½	5,200	31	20	58½
"	" 16..	" 9..	116	42	2½	5,080	22	..	57
"	" 23..	" 13..	113	40	2¼	4,080	22	40	58
"	" 30..	" 19..	112	40	2¼	4,120	20	40	57

BARLEY—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.	In.		Lbs.	Bush.	Lbs.	Lbs.
Canadian Thorpe	April 25	Aug. 14	111	36	3	2-rowed.	5,200	45	40	48
"	May 2	" 19	109	37	3	"	4,680	45	40	49
"	" 9	" 25	108	37	3	"	4,120	40	..	48
"	" 16	" 31	107	36	3	"	4,400	35	..	48½
"	" 23	Sept. 6	106	35	3	"	3,800	36	12	48
"	" 30	" 13	106	36	2⅞	"	4,000	30	40	48
Odessa	April 25	Aug. 12	109	32	2¼	6-rowed.	4,600	41	32	49
"	May 2	" 17	107	33	2¼	"	4,480	40	40	48
"	" 9	" 23	106	36	2	"	4,520	42	24	48
"	" 16	" 30	106	35	2	"	4,000	40	..	47
"	" 23	Sept. 6	106	35	2	"	3,200	28	16	46
"	" 30	" 11	104	34	2	"	3,840	25	40	46

PEASE—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.	Lbs.	Bush.	Lbs.	Lbs.
Mummy	April 25	Sept. 1	129	36	3,600	25	20	62
"	May 2	" 5	126	37	3,400	18	40	62
"	" 9	" 9	123	36	3,880	18	..	62
"	" 16	" 13	120	38	4,120	19	20	60
"	" 23	" 18	118	38	5,400	18	..	59
"	" 30	" 24	117	36	3,400	22	..	57
Golden Vine	April 25	" 1	129	40	3,400	17	20	62
"	May 2	" 5	126	34	2,400	13	20	62
"	" 9	" 9	123	36	3,880	22	..	62
"	" 16	" 13	120	36	3,880	22	..	60
"	" 23	" 18	118	36	3,400	23	28	58
"	" 30	" 24	117	36	3,400	22	40	57

EXPERIMENTS WITH CORN.

Thirty-two varieties of Indian corn were grown during 1899 side by side on fairly uniform land, which was in a good state of fertility.

The soil was clay loam and the previous crop was clover.

In the fall of 1898, barn-yard manure, at the rate of twenty one-horse cart-loads per acre, was spread on the surface. This was ploughed under at an average of six inches deep. In the spring it was well worked with disc and smoothing harrows, then marked off into rows of three feet apart, and hills three feet each way, into which bone-meal and commercial fertilizer, 100 pounds each per acre, was sown. The corn was planted by hand and covered with the smoothing harrow on May 31.

The plants, although looking fairly healthy, made very slow growth, the season being unusually cold and not at all suitable for this crop.

On September 7 a very severe wind storm passed over this section, breaking down the corn crop very badly. After this date no improvement was made. It was cut on September 26, after having been rather badly frozen on Sept. 24.

The yields per acre have been calculated from the weight of crop obtained from two rows each 66 feet long, and were as follows :—

Corn—Test of Varieties.

Number.	Name of Variety.	Height.	When Tasselled.	In Silk.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		In.				Tons.	Lbs.	Tons.	Lbs.
1	Red Cob Ensilage	90	.....	.....	No ears.	19	1,050	18	850
2	Early August	60	.....	.....	"	15	1,350	11	1,100
3	Canada White Flint	80	Aug. 25	Aug. 31	Late milk	14	1,700	11	1,100
4	Giant Prolific Ensilage	78	.....	.....	No ears.	14	600	14	1,150
5	Iowa Silver Mine	76	.....	.....	"	14	600	14	600
6	Early Mastodon	96	.....	.....	"	14	50	12	200
7	Sanford	80	Aug. 30	.....	"	14	50	12	1,850
8	Pride of the North	80	" 30	.....	"	13	950	11	550
9	Angel of Midnight	73	" 25	.....	Early milk	12	1,300	11	1,650
10	King of the Earliest	80	" 30	.....	No ears.	12	750	16	450
11	Selected Leaming	84	.....	.....	"	12	750	14	600
12	Evergreen Sugar	76	.....	.....	"	12	200	12	200
13	White Cap Yellow Dent	86	Aug. 30	.....	"	12	200	13	950
14	Mammoth Cuban	90	.....	.....	"	11	1,650	12	1,850
15	Compton's Early	76	Aug. 25	Aug. 31	Early milk	11	1,650	11	....
16	Early Huron Dent	76	" 28	.....	No ears.	11	1,100	12	750
17	Rural Thorobred White Flint	80	.....	.....	"	11	1,100	14	1,150
18	North Dakota White	76	Aug. 28	.....	"	11	1,100	15	800
19	Black Mexican	64	.....	.....	"	11	1,100	11	550
20	Longfellow	72	Aug. 25	Aug. 31	Early milk	11	550	9	750
21	Kendall's Giant	70	" 25	.....	"	11	....	13	950
22	Mitchell's Extra Early	70	" 16	.....	Glazed	11	...	11	550
23	Early Butler	82	" 30	.....	No ears.	10	1,450	11	550
24	Champion White Pearl	96	.....	.....	"	10	900	9	1,800
25	Cloud's Early Yellow	78	Aug. 30	.....	Watery ears.	10	350	11	550
26	Iowa Gold Mine	70	.....	.....	No ears.	9	1,800	11	550
27	Extra Early Szekley	74	" 22	.....	Soft glazed	9	1,800	9	700
28	Pearce's Prolific	75	" 25	.....	Early milk	9	1,250	11	1,100
29	Country Gentleman	70	.....	.....	No ears.	9	1,250	11	...
30	Mammoth Eight-rowed Flint	86	Aug. 28	.....	"	9	1,250	12	1,300
31	Yellow Six Weeks	60	" 20	.....	Glazed	6	1,750	5	1,000
32	Early Yellow Long Eared	85	" 28	.....	No ears.	6	1,200	7	850

Indian Corn Sown in Rows at Different Distances.

Three varieties, Champion White Pearl, Longfellow and Selected Leaming were chosen for this test. The corn was planted in rows at the following distances apart:—14, 21, 28, 35 and 42 inches respectively. The object being to gain information in regard to crop grown at these distances. The yields were as follows:—

Variety.	Distances.	Yield per Acre.	
	In.	Tons.	Lbs.
White Pearl	14	6	56
"	21	10	1,450
"	28	11	440
"	35	12	750
"	42	14	1,200
Longfellow	14	6	144
"	21	10	460
"	28	14	1,040
"	35	12	750
"	42	11	1,700
Selected Leaming	14	6	760
"	21	11	110
"	28	14	1,700
"	35	12	1,630
"	42	12	1,800

Field Crops of Corn.

Four acres of corn were grown in a field alongside of that used for the uniform test plots. The soil was about the same nature and received the same treatment.

The seed used was a mixture of six of the best of the varieties used for the test plots, with horse beans added, at the rate of one bushel of horse beans to three bushels of corn. They were harvested together, the total yield from the field being 46 tons 1,055 pounds. This was cut on September 27.

EXPERIMENTS WITH TURNIPS.

During the past season there were tested twenty-six varieties of turnips, sown side by side on soil that was of a similar character. It was a clay loam which was ploughed in the fall of 1898 after barn-yard manure, at the rate of fifteen one-horse loads had been spread. The previous crop was wheat, which had been seeded with clover at the rate of ten pounds per acre, and of which there was a fair growth when turned under.

In the spring it was well worked up with disc harrow, and a second application of manure made at the rate of fifteen one-horse cart loads, per acre, and ploughed crosswise and again worked with disc and spring tooth harrows. Two hundred pounds each of bone meal and complete fertilizer was sown broadcast and harrowed with smoothing harrow. The land was then made up into drills two feet apart. Two sowings were made of each variety, the first on May 23, the second on June 7. The plants were thinned out to about one foot apart and the roots were pulled on October 25.

The roots were all sound excepting those of Webb's Renown, among which there were some specimens rotten.

The yield per acre has been estimated from the weight of roots gathered from two rows, each 66 feet long.

Turnips—Test of Varieties.

No.	Name of Variety.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
		Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
1	Halewood's Bronze Top	37 250	1,237 30	25 1,950	866 15
2	Perfection Swede	37 250	1,237 30	30 1,875	1,031 15
3	Hardy Goliath	36 1,755	1,229 15	28 1,750	962 15
4	Webb's Renown	36 600	1,210 ..	25 1,950	866 15
5	Prize Purple Top	36 105	1,201 45	31 370	1,039 30
6	Monarch	36 105	1,201 45	31 1,195	1,053 15
7	Hall's Westbury	34 1,300	1,155 ..	28 1,750	962 30
8	Mammoth Clyde	33 1,650	1,125 30	28 1,750	962 30
9	Selected Purple Top	33 1,650	1,125 30	27 450	907 30
10	Shamrock Purple Top	33 1,650	1,125 30	25 1,950	866 15
11	Champion Purple Top	33 1,650	1,125 30	26 1,625	893 45
12	Hartley's Bronze	33 825	1,113 45	27 1,605	925 45
13	East Lothian	33 825	1,113 45	30 225	1,003 45
14	Imperial Swede	33 825	1,113 45	28 1,750	962 30
15	Bangholm Selected	33 825	1,113 45	30 1,050	1,017 30
16	West Norfolk Red Top	32 845	1,080 45	30 225	1,003 45
17	Prize Winner	32 505	1,075 5	29 905	981 45
18	Marquis of Lorne	32 350	1,072 30	26 800	880 ..
19	New Arctic	31 1,525	1,058 45	30 225	1,003 45
20	Jumbo	31 700	1,045 ..	28 595	943 15
21	Skirving's	30 555	1,009 15	29 200	970 ..
22	Carter's Elephant	30 555	1,009 15	30 225	1,003 45
23	Giant King	30 555	1,009 15	25 1,975	866 15
24	Selected Champion	27 1,605	926 45	26 800	880 ..
25	Drummond's Swede	27 450	907 30	26 800	888 ..
26	Sutton's Champion	26 1,625	893 45	25 655	844 15

FIELD CROPS—TURNIPS.

Three acres of field turnips were grown. The soil was a sandy loam, in a rather poor state of fertility, the previous crop having been Indian corn on a clover sod, with very little fertilizer used. It was ploughed in the fall of 1898. In the spring it was disc harrowed well, and thirty one-horse cart-loads of barn-yard manure per acre, was spread on the surface and ploughed under. The land was then cultivated well, and salt, at the rate of 200 pounds per acre, sown broad-cast on all the 3 acres.

Different brands of commercial fertilizer was applied to each separate acre, as follows:—No. 1, Albert Thomas Phosphate, 100 pounds per acre; No. 2, Bowkers' Square Brand fertilizer, 100 pounds per acre, and No. 3, Pigeon fertilizer, 100 pounds. The field was then harrowed with the smoothing harrow, and put up in drills, 2 feet apart and sown with a turnip seed sower, sowing two drills at a time.

Sown June 8 and 9, the plants were thinned out to about one foot apart in the rows and the roots were pulled from October 26 to 31.

The whole crop on the three one-acre plots, was weighed and the results were as follows:—

	Bush.	Lbs.
No. 1	879	5
No. 2	867	55
No. 3	810	50

EXPERIMENTS WITH MANGELS.

Twenty varieties of mangels were sown side by side, on land adjoining the turnip plots, which was similar in character, and received the same treatment, the only difference being that the drills in this instance were rolled before seeding, as well as after.

Two sowings were also made of each variety, the first on May 23, and the second on June 7. The sowing was by hand, the seeds being put in clumps of from three to five seeds, into holes made by a marker at that distance. The land roller was used after seeding to cover the seed.

The weather immediately after the first sowing was cold and wet; the plants came up very weak, and were infested with the flea beetle, causing quite a few blanks, as the plants increased in size, the insects did no further injury. The roots of both sowings were pulled October 10, and the yield per acre was calculated from two rows, each 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Yellow Intermediate	30	1,875	1,031	15	26	1,625	893	45
2	Yellow Intermediate	30	225	1,003	45	29	905	981	45
3	Norbitan Giant	29	1,400	990	..	29	1,400	990	..
4	Gate Post	28	1,750	962	30	30	555	1,009	15
5	Mammoth Yellow Intermediate	27	1,275	921	15	26	1,625	893	45
6	Ward's Large Oval Shaped	27	450	907	30	30	225	1,003	45
7	Golden Fleshed Tankard	26	1,365	893	45	21	1,725	728	45
8	Warden's Orange Globe	25	1,975	866	15	23	1,025	783	45
9	Mammoth Oval Shaped	25	325	838	45	29	1,400	990	..
10	Mammoth Long Red	22	1,375	756	15	21	1,725	728	45
11	Selected Mammoth Long Red	21	1,725	728	45	28	925	948	45
12	Prize Mammoth Long Red	21	75	701	15	22	550	742	30
13	Giant Yellow Half Long	20	1,250	687	30	27	1,605	926	45
14	Lion Yellow Intermediate	20	1,250	687	30	30	225	1,003	45
15	Canadian Giant	20	1,250	687	30	21	900	715	..
16	Champion Yellow Globe	18	1,125	618	45	17	1,475	591	15
17	Gate Post Yellow	18	1,125	618	45	17	1,475	591	15
18	Red Fleshed Tankard	18	1,125	618	45	20	1,250	687	30
19	Giant Yellow Globe	17	650	577	30	20	425	673	45
20	Yellow Fleshed Tankard	16	1,825	563	45	20	95	668	15

FIELD CROPS—MANGELS.

Three varieties of mangels were grown in field plots of one acre each. The soil was a clay loam in a fair state of fertility, the previous crop having been wheat and barley, which had a light dressing of barn-yard manure in the season of 1897, when a root crop was grown on it.

This soil was ploughed in the fall of 1898, and worked up in the spring with the disc and spring-tooth harrows, after which barn-yard manure was spread on the surface, at the rate of 30 one-horse cart-loads per acre, when the land was again ploughed and cultivated.

Bone meal, commercial fertilizer and salt, 200 pounds of each per acre, was then sown broadcast and harrowed in with the smoothing harrow. The land was then run up into drills, 2 feet apart, and the seed sown in clumps, of from three to five seeds, in small holes, 1 foot apart. Sown May 26, and 27. Harvested October 13, to 16. The yields per acre were as follows :—Mammoth Long Red, 690 bush. 30 pounds, Yellow Intermediate, 337 bush. 35 pounds, Giant Yellow Globe, 616 bush. 5 pounds.

EXPERIMENTS WITH CARROTS.

Twenty varieties of carrots were also sown in plots adjoining the turnips. Two sowings were made of each sort, on land of a like character and similarly treated as to preparation and manuring.

Sown May 23 and June 7, and all pulled October 11. The yield was calculated from the weight of roots obtained from two rows, each 66 feet long.

CARROTS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Half-long White	23	1,025	783	45	17	1,805	596	45
2	Improved Short White	22	1,375	756	15	17	650	577	30
3	New White Intermediate	22	1,375	756	15	18	795	613	15
4	Iverson's Champion	21	1,725	728	45	17	805	596	45
5	Giant White Vosges	21	1,725	728	45	18	795	613	15
6	Mammoth White Intermediate	21	900	715	..	16	175	536	15
7	Ontario Champion	17	1,475	591	15	13	1,225	453	45
8	Green Top White Orthe	17	650	577	30	15	1,845	530	45
9	Long Yellow Stump-rooted	16	1,000	550	..	13	1,555	459	15
10	White Belgian	13	400	440	..	10	295	338	15
11	Long Scarlet Altringham	12	1,575	426	15	10	295	338	15
12	Guerande or Ox Heart	12	1,575	426	15	18	300	605	..
13	Early Gem	12	1,575	426	15	16	1,000	550	..
14	Carter's Orange Giant	11	1,925	398	45	11	605	376	45
15	Half-long Chantenay	11	1,000	385	..	13	400	440	..
16	Long Orange or Surrey	11	1,000	385	..	10	1,945	365	45
17	Yellow Intermediate	11	275	371	15	10	955	349	15
18	White Vosges Large Short	11	275	371	15	12	1,245	420	45
19	Scarlet Nantes	10	1,450	357	30	9	1,305	221	45
20	Scarlet Intermediate	10	625	343	45	9	1,305	321	45

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were also tested, two sowings being made of each sort, on land adjoining and of a similar character to that used for the plots of turnips, mangels and carrots. The first sowing was made May 23 and the second June 7.

All were pulled October 11. The yield has been calculated from the weight of roots obtained from two rows, each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Danish Improved Red Top	26	800	880	..	25	325	838	45
2	Red Top Sugar	24	1,500	825	..	23	1,355	789	15
3	Vilmorin's Improved	22	550	740	30	17	1,475	591	15
4	Wanzleben	19	1,600	660	..	21	75	701	15
5	Improved Imperial	18	1,125	618	45	17	155	569	15
6	Danish Improved	17	1,475	591	15	18	1,125	618	45

EXPERIMENTS WITH POTATOES.

One hundred and nineteen varieties of potatoes were tested during the past season.

The soil was a heavy clay loam, the previous crop was oats, pease and vetches, which were cut green for summer food for cows.

The land was in rather a poor state of fertility, having had no manure since 1892.

In the fall of 1898, barn-yard manure at the rate of 25 one-horse cart-loads was spread on the surface and ploughed under. In the spring of 1899 the land was well cultivated with spring-tooth and disc-harrows and again ploughed. Drills were marked out, and covered with the drill plough, 2½ feet apart. Potato-fertilizer, at the rate of 500 pounds per acre, was sown in the drills. The seed was cut, and from two to three eyes left on each piece, and planted one foot apart in the drills. The plants made a very vigorous growth. They were sprayed with Bordeaux mixture in August, which, however, may have been rather late, as some few spots were already somewhat affected with blight, the early varieties in particular.

The plots consisted of two rows each 66 feet long. They were dug from September 22 to 25, and the following yields were obtained :—

POTATOES—TEST OF VARIETIES.

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Market-able.		Yield per Acre of Unmar-ketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Country Gentleman	565	24	554	24	11	..	444	24	88	..	Long, pink and white.
2	Seedling No. 230	550	..	534	36	15	24	477	24	57	12	Round, white.
3	Bovee	534	36	523	36	11	..	457	36	66	..	Long, pink.
4	American Giant	514	28	470	28	44	..	477	28	33	..	Long, white.
5	Pride of the Market	506	..	385	..	121	..	308	..	77	..	Long, pink and white.
6	Irish Cobbler	501	36	472	24	28	36	418	..	55	..	Long, white.
7	Great Divide	492	48	462	..	30	48	429	..	33	.	" "
8	American Beauty	492	48	492	48	..	..	429	..	63	48	" "
9	Everett	484	..	484	..	..	.	385	..	99	..	Flattish, pink.
10	Penn-Manor	477	24	477	24	..	..	345	24	132	..	Long, pink.
11	Vanier	473	..	457	36	15	24	385	..	72	36	" "
12	Hale's Champion	473	..	448	48	24	12	396	..	52	48	Long, white.

POTATOES—TEST OF VARIETIES—*Continued.*

No.	Name of Variety.	Total Yield per Acre.	Yield per Acre of Sound.	Yield per Acre of Rotten.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.	Form and Colour
		Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	
13	Holborn Abundance	473 ..	473 ..	.. ..	444 24	28 36	Round, white.
14	Flemish Beauty	462 ..	447 12	15 24	380 36	66 ..	Long, flat, pink.
15	Wonderful Clay Rose	457 36	442 12	15 24	396 ..	46 12	Round, pink.
16	Columbus	455 24	411 24	44 ..	378 24	33 ..	Long, pink white
17	McKenzie	453 12	409 12	44 ..	358 36	50 36	Long, white.
18	General Gordon	453 12	424 36	28 36	330 ..	94 36	Oblong, pink.
19	Early Harvest	451 ..	431 12	19 48	365 12	66 ..	Oval, pink and white.
20	Empire State	448 48	442 12	6 36	396 ..	46 12	Oval, white.
21	Reeve's Rose	433 24	367 24	66 ..	308 ..	37 24	Long, pink.
22	Early Six Weeks	433 24	378 24	55 ..	309 ..	59 24	Oblong, pink.
23	Enormous	429 ..	429 ..	.. ..	402 36	26 24	Long, white.
24	Irish Daisy	429 ..	422 24	6 36	356 24	66 ..	Round, white.
25	Gem of Aroostook	424 36	424 36	.. ..	325 36	99 ..	Oblong, white.
26	Early Rose	424 36	374 ..	50 36	308 ..	66 ..	Long, pink.
27	Reading Giant	424 36	424 36	.. ..	358 36	66 ..	Oval, pink.
28	Record	422 24	422 24	.. ..	367 24	55 ..	Long, light red.
29	Carman No. 1	420 12	413 36	6 36	354 12	59 ..	Flat round, white
30	Hopefull	420 12	407 ..	13 12	374 ..	33 ..	Oblong, white.
31	New Variety No. 1	418 ..	374 ..	44 ..	330 ..	55 ..	Round, light pink
32	Quaker City	413 36	413 36	.. ..	347 36	66 ..	Round, white.
33	Lizzie's Pride	411 24	356 24	55 ..	308 ..	48 24	Long, pink.
34	Burnaby Seedling	409 12	374 ..	35 12	336 36	37 24	
35	I. X. L	409 12	393 48	15 24	316 48	77 ..	Long pink and white.
36	Early Michigan	409 12	409 12	.....	299 12	100 ..	Long white.
37	Troy Seedling	407 ..	391 36	15 24	310 12	81 24	Round white.
38	Clarke's No. 1	407 ..	374 ..	33 ..	312 12	52 48	Long pink.
39	Prolific Rose	407 ..	407 ..	.....	341 ..	66 ..	"
40	Seattle	402 36	385 ..	17 36	330 ..	55 ..	Long white.
41	Good News	402 36	396 ..	6 36	308 ..	88 ..	Long pink.
42	Earliest of All	402 36	345 12	57 12	264 ..	81 24	"
43	Algoma	402 36	378 24	24 12	312 24	66 ..	Long white.
44	Burpee's Extra Early	424 24	336 36	63 48	297 ..	39 36	"
45	Early Sunrise	396 ..	332 24	61 36	264 ..	70 24	Long pink.
46	Early Pride	393 48	393 48	.....	338 48	55 ..	"
47	20th Century	391 36	382 48	8 48	325 36	57 12	Long white.
48	American Wonder	391 36	325 36	66 ..	237 36	88 ..	Round white.
49	Early Gem	387 12	358 36	28 36	292 36	66 ..	Long pink.
50	Bill Nye	385 ..	345 24	39 36	308 ..	37 24	Round white.
51	Rural Blush	380 36	347 36	33 ..	290 24	57 12	Round pink.
52	Green Mountain	380 36	380 36	.....	363 ..	39 36	Oval white.
53	Polaris	380 36	363 ..	17 36	316 48	50 26	Long white.
54	Early Ohio	380 36	358 ..	28 36	319 ..	33 ..	Long pink.
55	Russell's Seedling	378 24	327 48	50 36	250 48	77 .	Oval white.
56	Early Norther	376 12	215 36	160 36	165 ..	50 36	Long pink and white.
57	Victor Rose	374 ..	334 24	39 36	319 ..	15 24	Oblong pink.
58	Wonder of the World	371 48	336 36	35 12	259 36	77 ..	Long pink and white.
59	Northern Spy	369 36	354 12	15 24	312 24	41 48	Round red.
60	Rochester Rose	367 24	347 36	19 48	314 36	33 ..	Oblong pink.
61	Freeman	367 24	341 ..	26 24	264 ..	77 ..	Round dark pink
62	Early St. George	367 24	338 48	28 36	266 12	72 36	Oblong pink.
63	Harbinger	365 12	354 12	11 ..	231 ..	123 12	Round pink and white.
64	Sir Walter Raleigh	363 ..	303 36	59 24	281 ..	22 ..	"
65	Lightning Express	360 48	272 48	88 ..	253 ..	19 48	Long white.
66	Orphans	360 48	360 48	.....	286 ..	74 48	Round white.
67	Seedling No. 7	354 12	354 12	.....	288 12	66 ..	Oval pink.
68	Lee's Favorite	349 48	272 48	77 ..	228 48	44 ..	Round white.
69	Vick's Extra Early	347 36	316 48	30 48	277 12	39 36	Oval pink and white.
70	Pearce's Prize Winner	345 24	314 36	30 48	266 12	48 24	Long white.
71	Satisfaction	343 12	343 12	.....	297 ..	46 12	Oval white.

POTATOES—TEST OF VARIETIES—*Concluded.*

No.	Variety.	Total Yield Per Acre.		Yield Per Acre of Sound.		Yield Per Acre of Rotten.		Yield Per Acre of Market-able.		Yield Per Acre of Unmar-ketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
72	Ideal	341	..	259	36	81	24	226	36	33	..	Oblong pink.
73	Dakota Red	336	36	327	48	8	48	297	..	30	48	Round red.
74	Rose No. 9.	336	36	336	36	.....		314	36	22	..	Oblong l't. pink.
75	Stourbridge Glory	334	24	334	24	.....		235	24	99	..	Oval white.
76	London	334	24	268	12	66	..	195	48	72	36	Long pink.
77	Dreer's Standard	332	12	332	12	.....		297	..	35	12	Round white.
78	State of Maine.	330	..	330	..	.....		297	..	33	..	"
79	Brown's Rot Proof	327	48	327	48	.....		246	24	81	24	Oval white.
80	World's Fair	325	36	288	12	37	24	257	24	30	48	Oblong pink and white.
81	Brownell's Winner	325	36	319	..	6	36	281	36	37	24	Long pink.
82	Uncle Sam	325	36	310	12	15	24	248	36	61	36	Oblong white.
83	Delaware	325	36	325	36	.....		279	24	46	12	Round white.
84	Early White Prize	323	24	286	..	37	24	215	36	70	24	"
85	Houlton Rose	323	24	279	24	44	..	220	..	59	24	Long pink.
86	Crown Jewel	321	12	288	12	33	..	226	36	61	36	Long, pink and white.
87	Henderson's Late Puritan	321	12	288	12	33	..	237	36	50	36	Long, pink and white.
88	Ohio Junior	319	..	275	..	44	..	220	..	55	..	Round, pink.
89	Cambridge Russet	316	48	294	48	22	..	250	48	44	..	" white.
90	Seedling No. 214	314	36	303	36	11	..	226	36	77	..	Long, pink and white.
91	Early Puritan	312	24	290	24	22	.	255	12	35	12	" " " "
92	Vigorosa	312	24	299	12	13	12	281	36	17	36	" " " "
93	Money Maker	308	..	286	..	22	..	241	..	44	..	Long, white.
94	Peerless Junior	299	12	286	..	13	12	242	..	44	..	Round, white.
95	Table King	294	48	294	48	..	..	235	24	59	24	" "
96	Harvest King	292	36	277	12	15	24	255	12	22	..	" "
97	King of the Roses	290	24	275	..	15	24	220	..	55	..	" "
98	New Queen	288	12	250	48	37	24	200	12	50	36	Oblong, pink.
99	Beauty of Hebron	286	..	270	36	15	24	220	..	50	36	Round, pink and white.
100	Pearce's Extra Early	283	48	268	24	15	24	231	..	37	24	Long, pink.
101	Charles Downing	281	36	264	..	17	36	198	..	66	..	Oblong, pink.
102	Chicago Market	275	..	209	..	66	..	165	..	44	..	Long, red.
103	Rural No. 2.	272	48	268	24	4	24	244	12	24	12	Round, white.
104	Livingston's Banner	272	48	272	48	..	..	237	36	35	12	" "
105	Prize Taker	264	..	250	48	13	12	184	48	66	..	" "
106	Thorburn	264	..	220	..	44	..	165	..	55	..	Oblong, pink and white.
107	Maggie Murphy	261	48	248	36	13	..	220	..	28	36	Long, pink.
108	Daisy	259	36	231	..	28	36	176	..	55	..	" pink and white.
109	Monroe County	259	36	200	12	59	24	132	..	68	12	Oblong, red.
110	Queen of the Valley	253	..	224	24	28	36	191	24	33	..	Long, pink.
111	Bruce's White Beauty	250	48	244	12	6	36	169	24	74	48	Long, white.
112	Honeoye Rose	250	48	202	24	48	24	176	..	26	24	Oblong, pink.
113	Sharpe's Seedling	248	36	211	12	37	24	167	12	44	..	Round, pink and white.
114	Early Market	235	24	235	24	..	..	193	36	41	48	Round, pink.
115	Livingston's	231	..	215	36	15	24	160	36	55	..	" white.
116	Carman No. 3	220	..	202	24	17	36	165	..	37	24	" "
117	Fill Basket	211	12	189	12	22	..	162	48	26	24	Oval, pink.
118	Maule's Thoroughbred	211	12	167	12	44	..	138	36	28	36	Oblong, pink.
119	Pride of the Table	184	48	140	48	44	..	99	..	41	48	Round, pink and white.

EXPERIMENTS WITH SOJA AND HORSE BEANS SOWN AT DIFFERENT DISTANCES APART.

Experiments with Soja and Horse Beans, sown at different distances apart, were again carried on the past season. The object of these experiments being to gain information as to weight of crop obtainable when sown at different distances apart and under similar conditions. The soil was a heavy sandy loam, partly clay, of good quality, which had been well manured in the season of 1896. The crop of 1898 was clover, with a second crop of the same ploughed under in the early fall. This was well worked up in the spring, and commercial fertilizer applied at the rate of 400 pounds per acre. The seed was sown in plots of one fortieth of an acre each, on May 18, in rows of 24, 30 and 36 inches apart with each variety. The outside row not being included in making the estimate of yield per acre.

SOJA BEANS.

Distance apart.	Yield per acre.	
In.	Tons	Lbs.
24	6	....
30	5	1,000
36	5	

HORSE BEANS.

Distance apart.	Yield per acre.	
In.	Tons.	Lbs.
24	8	1,000
30	10	1,200
36	7	1,600

EXPERIMENT WITH SUNFLOWERS.

One-quarter of an acre of sunflowers were sown on land adjoining that used for the uniform test plots of corn, the soil being of a similar character.

The previous crop was clover, the second crop having been ploughed under in the fall. In the spring the land was well cultivated with disc and spring-tooth harrows and sown in drills 3 feet apart. Complete fertilizer, at the rate of 200 pounds per acre, was applied before sowing.

Sown June 1; harvested, October 26 to 28. Yield of heads, 4 tons 1,200 pounds per acre.

EXPERIMENTS WITH FLAX.

An experiment was carried on with flax in plots of one-fortieth of an acre. The object in this instance was to gain information as to the best time for sowing and the quantity of seed which should be sown to give the heaviest crop. The soil was a sandy loam of fair quality, the previous crop was potatoes, for which crop 500 pounds per acre of commercial fertilizer was used, on land that had, the year previous (1897), been well fertilized with barn-yard manure

The land was ploughed in the fall of 1898 about 7 inches deep, and in the following spring was worked up once with the disc and once each with spring-tooth and smoothing harrows before sowing.

Four sowings were made in each case, a week apart, and two plots sown at each time, one with seed at the rate of 40 pounds per acre, the other at 80 pounds per acre. The first plots were sown May 11.

EXPERIMENTS WITH FLAX.

Seed sown Per Acre.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				Lbs.	Bush. Lbs.	Lbs.
No. 1, 80 pounds per acre	May 11..	Aug. 16..	97	3,900	17 30	53
" 1, 40 "	" 11..	" 16..	97	3,360	13 30	54
" 2, 80 "	" 18..	" 21.	95	5,800	21 30	53
" 2, 40 "	" 18..	" 21..	95	4,600	18 20	54
" 3, 80 "	" 25..	" 26..	93	5,000	19 10	52
" 3, 40 "	" 25..	" 26..	93	4,000	17 30	53
" 4, 80 "	June 1..	Sept. 3..	95	4,000	21 30	50
" 4, 40 "	" 1..	" 3..	95	3,200	18 20	51

SPECIAL EXPERIMENTS WITH FERTILIZERS.

With a view to gain further information with regard to the relative value of the fertilizers commonly used for field crops, some special experiments were begun this season.

The plots laid out for this purpose were one-eighth of an acre each, 38 x 143¼ feet for each kind of fertilizer. This series of plots was again sub-divided into ten strips of 14 feet each, running lengthwise over all the different fertilizer plots, on which were sown ten different kinds of crops, namely, potatoes, mangolds, turnips, corn, mixed grain (oats barley and pease), making 140 plots in all, a margin of 2 feet was left between each plot, and 1 foot between each crop plot.

It is proposed to continue this experiment from year to year, using the same fertilizers in the same quantities on the same plots each year. Two plots are sown without any fertilizer, as check plots.

The soil was a clay loam in a good state of fertility (perhaps the best on the farm). It was well fertilized with barn-yard manure, and also commercial fertilizer, in the season of 1896, for roots, and received a dressing of nitrate of soda in 1897, when it was cropped with oats. In 1898 a heavy crop of clover was grown, and the second crop was ploughed under in the fall.

The soil, however, was not quite uniform, and as a consequence the results this year are somewhat variable. The fertilizers used have probably not been solely responsible for the differences in yield.

Each of the crops were sown at about the same dates as the uniform test plots of that particular crop, with about the same amount of seed per acre, and cultivated in much the same manner.

The following table will show the yield per acre of each of the various crops, with the exception of pease, which were so badly destroyed (particularly in spots) by Pea Aphis (*Nectarophora destructor*) as to make the result in this case of no practical value :

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Quantities of Fertilizers used per Acre.	Barley, Duckbill.		Oats, Banner.		Wheat, Colorado.		Mixed grain—Oats, Barley and Peas.		Corn, mixed—Mammoth, White Flint, White Cap.		Turnips.		Mangels.		Carrots.		Potatoes—Delaware and State of Maine.		Potatoes, rotten.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Manure, 30 tons	70	40	111	26	46	40	114	24	15	500	29	....	24	1,500	15	1,800	356	40	20	..
Manure, 15 tons, and complete fertilizer, 250 lbs.	75	..	88	8	45	..	102	32	15	1,000	28	1,700	25	500	19	500	398	20	26	40
Complete fertilizer, 1,000 lbs.	56	12	88	8	41	40	97	2	13	500	27	1,000	20	1,000	23	1,500	380	..	16	40
Complete fertilizer, 500 lbs.	58	16	85	6	40	..	88	8	12	500	25	1,300	21	1,200	23	1,300	396	40	26	40
Check (no fertilizer)	58	16	91	6	40	..	73	18	10	1,000	23	300	19	700	21	500	383	20	23	20
Bone meal, 1,000 lbs.	56	12	88	8	36	40	79	14	10	1,500	23	700	24	500	19	1,300	330	..	13	20
" 500 "	62	24	88	8	35	..	73	8	10	1,700	21	500	20	1,300	18	700	301	40	11	40
Ashes, 2,500 "	52	4	82	12	36	40	67	22	9	1,500	19	1,500	18	1,700	19	1,300	346	40	36	40
Manure, rotted, 20 tons	54	8	97	2	38	20	76	16	10	1,000	27	1,700	19	1,500	18	1,200	476	40	26	40
Check (no fertilizer)	35	20	79	14	28	20	52	32	8	1,500	19	....	11	1,500	15	1,500	253	40	6	40
Land plaster, 500 lbs.	43	36	91	6	31	40	70	20	9	500	18	1,700	13	1,000	16	700	275	..	11	40
Salt, 500 "	62	24	100	..	30	..	73	8	10	....	22	1,700	18	1,500	19	1,600	363	20	11	40
Marsh mud, 100 tons	58	16	105	30	33	20	76	16	11	1,500	25	1,700	19	....	19	700	325	..	10	..
Manure, 20 tons (green)	56	12	97	2	35	..	82	12	13	....	27	1,000	19	500	19	1,700	378	..	16	40

EXPERIMENTS WITH BUCKWHEAT.

Four varieties of buckwheat were sown June 14 on $\frac{1}{20}$th acre plots on clay loam soil, in rather a poor state of fertility. The previous crop was millet. The land was ploughed in the fall of 1898 about 7 inches deep, was well worked the following spring with disc and spring-tooth harrows and sown with the seed drill. Commercial fertilizer at the rate of 400 pounds per acre was sown broadcast at the same time. All the varieties made a good growth, and were cut September 6 and 9. The following table shows the yield per acre and time to mature :—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Yield per Acre.		Weight per Bushel.
				Inches.	Bush.	Lbs.	Lbs.
Tartarian or Siberian	June 14	Sept. 6	84	38	41	42	51
Japanese	" 14	" 6	84	36	34	18	41
Silver Hull	" 14	" 6	84	36	30	..	48½
Rye Buckwheat	" 14	" 9	87	40	22	24	52

EXPERIMENTS WITH FIELD BEANS.

Four varieties of field beans were tested. The land used for this crop was a clay loam, in a good state of fertility, the previous crop having been clover with a second crop of the same turned under in the fall of 1898. They were all sown in one-twentieth acre plots in rows two feet apart May 18, and harvested September 30. All gave a fairly good growth. Mexican Tree did not ripen; the others all matured well. The following results were obtained :—

	Yield per acre.	
	Bush.	Lbs.
White Field Medium	19	20
California Pea Bean	18	20
White Marrowfat	16	40
Mexican Tree	13	20

EXPERIMENT WITH CANARY SEED.

One-twentieth acre plot of canary seed was sown. The soil was clay loam, the previous crop was potatoes.

This land was ploughed in the fall of 1898, well worked up in the spring following, and sown on May 12 with hand seed drill in rows 7 inches apart. The crop was cut on September 2, and the yield was at the rate of 21 bushels and 40 pounds per acre.

EXPERIMENTS WITH SORGHUM.

Two varieties of Sorghum were sown June 1 in a field of clay loam, which was in rather a poor state of fertility, previous crop was horse beans.

Complete fertilizer, at the rate of 500 pounds per acre, was drilled in with the seed, in rows 24 inches apart. Early Amber Sugar Cane started fairly well, but made very poor growth all through the season, particularly the early part. Early Orange Sugar Cane sown on same soil, with the same treatment, made a very poor start, not more than one-eighth of the seed germinating. Both were at the tasseling stage September 24, when they were very badly frozen.

The weight of crop was :

	Tons.	Lbs.
Early Amber Sugar Cane	3	1,000
Early Orange Sugar Cane	3	

EXPERIMENT WITH BROOM CORN.

Two plots of broom corn were sown June 2. The soil was sandy loam, from which a crop of horse beans had been taken the previous year, and was in poor condition. Five hundred pounds of fertilizer per acre was drilled in with the seed. It made poor growth, partly on account, no doubt, of the exceptionally cold season. Heavy frost on September 21, when the corn was in the tasseling stage, froze it so badly that the results were of little value.

HAY.

The upland in clover hay, was 4½ acres, from which 9 tons 685 pounds of hay was cut.

Thirty-eight acres of marsh gave 77 tons 1090 pounds of timothy, couch and clover hay mixed. Six acres of marsh gave 11 tons 255 pounds of timothy and broad-leaf mixed, making a total of 98 tons 30 pounds of hay harvested.

SEED GRAIN DISTRIBUTION.

A distribution of the most promising kinds of seed grain and potatoes was again made this spring in three-pound bags. These were mailed to farmers on application, one sample to each applicant.

The following were the samples sent :—

Oats	393
Barley	108
Wheat	47
Pease	61
Rye	1
Buckwheat	7
Potatoes	289
Total number of samples sent	906

LIVE STOCK.

HORSES.

Of the seven horses at present on the farm, four are used exclusively as team horses, two as general purpose (single or double) horses, and one as a driver. The horses are the same as were mentioned in the last report, with the exception of one got in exchange during the year, for one sixteen years old. All are perfectly sound and in good condition.

CATTLE.

The herd of dairy cattle have done fairly well during the past year. It is now composed of thirty-two cows, seven one-year-old heifers, two heifer calves, two bull calves, one yearling bull and one four-year-old bull. The six pure bred cows dropped two Guernsey bull calves, two Ayrshire heifer calves, one Holstein bull calf, and one Holstein heifer calf.

The two one-year-old Guernsey bulls from the two Guernsey cows last year were sent in May to the Central Farm at Ottawa.

Experiments were again carried on with the dairy herd, similar to those of last year, with results, on the whole, much the same.

An experiment with twenty steers was also conducted with a three fold object in view of 1st, comparison of feeding qualities of leading beef-breeds; 2nd, converting the raw material of the farm into a finished product; 3rd, to determine comparative profit of feeding beef cattle, as compared with dairy cows. Another lot of twenty steers was bought in November, 1899, for experimental purposes during the winter of 1899–1900.

The cattle now on the farm are as follows:

2 Guernsey cows.
2 Ayrshire cows.
2 Holstein cows.
26 well graded milch cows.
2 Holstein yearling heifers.
2 Ayrshire " "
5 Grade heifers.
1 Guernsey bull, 4 years old.
1 Ayrshire bull, 1 year old.
1 Holstein bull calf.
1 Guernsey bull calf.

EXPERIMENTS WITH MILCH COWS.

A similar experiment to that made in 1898 was carried on during the past year with the dairy herd, the purpose of which was to demonstrate whether a fairly good dairy herd would, at current prices, pay for feed consumed and leave a balance on the credit side. The experiment was begun on November 28, 1898, and continued until November 27, 1899.

The prices of both product and feed were higher than last year. The meal feeds fed, most of which were bought, cost,—wheat-bran, $18 per ton; pea-meal, $27 per ton; corn-meal, $24 per ton; chop (oats, barley and peas) $22.50 per ton, the whole averaging, as per proportion fed to cows, 1⅛ cents per pound. Roots were estimated as worth 5 cents per bushel, and corn ensilage at $1.66 per ton, and hay at $5 per ton. The daily ration for cows in full milk in winter was:—Ensilage and roots, 30 pounds, 2½ cents, hay 20 pounds, 5 cents. Bran and meal 8 pounds, 9 cents, making a total cost of 16½ cents per cow per day. When not milking in winter they were charged $2 per month.

Different quantities were fed to different cows, according to their feeding and producing capacity.

Nineteen were in full milk when the experiment began, the remainder coming in fresh at various times until spring.

They were kept in the stable from November 1, 1898, until June 1, 1899, except on occasional fine days, when they were allowed out in the yard.

They were fed twice each day only, and had water before them all the time. The temperature of the stable was kept as near 60° Fahrenheit as possible, and the temperature of the water, which was run into a tank in the stable, and allowed to stay there from ten to twelve hours before using, was about 39° Fahrenheit which was about 4° warmer than if run fresh from the spring.

They were fed, cared for, and milked by the same persons as regularly as possible all the time.

They were put to pasture on June 1, and from this date until July 15, they were out night and day.

From July 15 until September 1, they were in the stable during the day, and in the pasture at night. From September 1 until November 1 they were in the stable at night and in pasture during the day.

After June 15, the pasture was practically done, and the cows were fed on clover, in the stable until July 15, after that they were fed on a mixture of green oats, pease and vetches, sown at intervals of one week apart for that purpose. They were fed the green feed twice each day after June 15, consuming two acres of clover the first month and two acres of green feed the second month, being an average of three cows on the acre of feed for the soiling season of five months, there being thirty cows fed off the two acres in each case. They were charged $1.50 per month while milking in the summer, and $1 per month while dry, when they were turned back in the bush pasture.

The milk from each cow was weighed every day, and a careful record kept of the number of pounds given. A test of each cow's milk was made from time to time by means of the Babcock tester.

The weight of butter was determined on the basis that 84 pounds butter-fat produces 100 pounds marketable butter.

The milk was sent to the Nappan Dairy Station, and the cows were credited with the butter produced, at the prices paid to all patrons of that station, which averaged for the year 20 cents per pound, less 4 cents per pound for manufacturing butter and hauling milk. The skim-milk was fed to calves and pigs, and credited to the cows at the rate of 15 cents per 100 pounds. While the meal fed during the year cost more than it did the previous year, the average price of butter, was better than it was during 1898, and the cost of manufacturing butter and hauling milk was reduced from 4½ cents to 4 cents.

The following table will show the results obtained :

No. 21 was sent to the butcher during the winter, and so was dropped out of the test.

The fact that No. 22 aborted in September, 1898, will account for the poor showing during the year.

TEST OF DAIRY HERD.

Number.	Breed.	Days Milking.	Lbs. Milk.	Per cent B. Fat.	Lbs. Butter.	Value Butter at 20c.	Value Skim Milk.	Total Credit.	Cost of Feed.	Cost of Making Butter at 4c. per lb.	Total Cost.	Profit for Year.
						$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
2	Holstein	260	9,373	3·3	368·225	73 64	9 37	83 1	40 46	14 72	55 18	27 83
3	Ayrshire Grade	259	8,053	3·7	354·83	70 96	8 5	79 1	38 14	14 9	52 23	26 78
8	Sh. Ayrshire Grade	280	6,380	4·2	319 00	63 80	6 8	70 18	31 48	12 76	44 24	25 94
23	Ayrshire Grade	287	6,838	4·0	325·52	65 10	6 83	71 93	33 50	13 2	46 52	25 41
6	"	337	8,655	3·6	370·92	74 18	8 65	82 83	43 46	14 83	58 29	24 54
9	"	364	8,118	3·6	347·91	69 58	8 11	77 69	39 53	13 91	53 44	24 25
28	Jersey Grade	308	6,240	3·8	282·28	56 45	6 24	62 69	32 77	11 29	44 6	18 23
31	"	364	5,872	4·5	314·57	62 91	5 87	68 78	39 53	12 58	52 11	16 67
27	Jersey Sh. Grade	259	5,633	4·0	268·35	53 67	5 63	59 30	31 94	10 73	42 67	16 63
10	Ayrshire Grade	343	6,711	3·7	295·60	59 12	6 71	65 83	37 48	11 82	49 30	16 53
32	"	343	7,406	3·4	299·76	59 95	7 40	67 35	39 53	11 99	51 52	15 83
19	"	224	4,767	4·1	232·67	46 53	4 76	51 29	26 22	9 30	35 52	15 77
25	Guernsey	238	4,686	4·4	246·64	49 32	4 68	54 00	28 37	9 86	38 23	15 77
1	Holstein	273	7,259	3·5	302·45	60 49	7 25	67 74	40 46	12 9	52 55	15 19
11	Ayrshire	266	6,756	3·6	289·54	57 90	6 75	64 65	39 3	11 58	50 61	14 4
12	Ayrshire Grade	231	4,588	3·9	213·51	42 60	4 58	47 18	25 3	8 52	33 55	13 63
17	"	252	6,670	3·4	269·97	53 99	6 67	60 66	36 88	10 79	47 67	12 99
7	Sh. Ayrshire Grade	294	6,035	3·4	244·27	48 85	6 3	54 88	32 98	9 77	42 75	12 13
15	Ayrshire Grade	211	5,762	3·7	253·80	50 76	5 76	56 52	34 44	10 15	44 59	11 93
30	Guernsey	273	4,463	4·4	233·77	46 75	4 46	51 21	30 48	9 35	39 83	11 38
5	Ayrshire Grade	281	6,689	3·4	270·74	54 14	6 68	60 82	38 78	10 82	49 60	11 29
29	"	210	4,523	3·9	209·99	41 99	4 52	46 51	27 88	8 39	36 27	10 24
14	"	252	5,151	3·6	220·75	44 15	5 15	49 30	30 52	8 83	39 35	9 95
24	"	252	5,487	3·8	248·26	49 65	5 48	55 13	35 98	9 93	45 91	9 22
13	"	315	6,077	3·4	245·97	49 19	6 7	55 26	36 25	9 83	46 8	9 18
26	"	359	5,154	3·4	208·61	41 72	5 15	46 87	29 70	8 34	38 4	8 83
18	"	252	4,549	4·2	227·45	45 49	4 54	50 3	32 94	9 9	42 3	8 00
4	"	266	4,785	4·2	239·25	47 85	4 78	52 63	36 40	9 57	45 97	6 66
16	Ayrshire	245	5,147	3·7	226·71	45 34	5 14	50 48	35 29	9 6	44 35	6 13
20	Ayrshire Grade	280	4,444	4·3	228·68	45 73	4 44	50 17	35 98	9 14	45 12	5 5
22	"	252	4,920	3·6	210·85	42 17	4 92	47 9	35 98	8 43	44 41	2 68
21	* "											

*This cow was fattened and sold to butcher.

STEER FEEDING EXPERIMENTS, 1898–1899.

A comparative breed and feed experiment of grade steers was carried on from December 1, 1898, to March 15, 1899.

The object of the experiment was to show the relative feeding qualities of the typical grade steers of the leading beef-breeds, as compared with scrubs, and at the same time, to demonstrate the advisability of converting the raw material of the farm, into a finished product.

Four animals of each of the following breeds were bought at Compton, Que. (the nearest point at which Hereford and Polled Angus steers could be got), two three year olds and two two year olds of each: Polled Angus, Herefords, Shorthorns and Scrubs, the latter animals showing no pronounced beef breeding. With a view to having when finished, a carload, so as to command a better price, a duplicate lot of Shorthorns was bought here (at Nappan, N. S.), making twenty animals in all.

They were all typical representatives of the breeds mentioned and exceedingly uniform as regards lots.

The few days that the steers were in the stable, previous to December 1, constituted a preparatory period, during which time they were fed on broad-leaf hay and turnips.

In the Polled Angus and Hereford lots one steer in each being thinner in flesh than others, was given extra food, this extra amount being deducted from the food given to

remainder of same lot. By this treatment all were ready for the butcher at the same time. Each lot got precisely the same feed and treatment, as nearly as possible.

The weights of the steers were ascertained by weighing them at 8.30 each morning of the weighing day, the animals having fasted from 7 p.m. the previous day, in every case. They were fed twice only each day, morning and evening.

Water was kept before them practically all the time, in buckets fastened in the corner of each manger, and left full after each time of watering, morning and evening. They were tied with chains and kept in the stable all the time, except on occasional fine days, when they were let out in the yard for one hour. This period of exercise averaged about twice a week.

The rations for the first month of the test consisted of hay, 18 pounds; meal, 6 pounds; turnips, 40 pounds, and ensilage, 4½ pounds; costing 15½ cents per steer per day. The ensilage being fed once each week only, 30 pounds at a feed. For the second month it consisted of: hay, 15 pounds; meal, 8 pounds; turnips, 30 pounds; ensilage, 4½ pounds (fed as in previous month), costing 16⅔ cents per steer per day. During the remainder of the test their daily ration was hay, 15 pounds; meal, 8 pounds; straw at will, ensilage and turnips, 4½ pounds each; the ensilage and turnips being fed in two feeds of 30 pounds each, once each week. The average daily cost of feed per steer for the entire period of 105 days was 15½ cents.

The meal fed consisted of different quantities of wheat-bran, corn-meal, pea-meal, cotton-seed-meal, chop (oats, barley and pease), and was valued at the uniform price of 1¼ cents per pound. Ensilage $1.66 per ton, turnips 5 cents per bushel, hay (being mostly broad-leaf), $4 per ton.

It was not possible to buy the steers of the several breeds referred to in Nova Scotia, hence they were purchased at the nearest point, viz.:—Compton, Que., where the price paid was somewhat in advance of actual market value. This was unavoidable, when special animals of the different breeds had to be bought to secure uniformity of breed, weight, age and quality in the test. The price paid for the animals at Compton was 4 cents per pound live weight, which, with freight and expense of buying added, amounted to 4½ cents per pound. It would not, however, be fair, in estimating the proceeds obtainable from feeding, to place the cost of such animals beyond their actual market value. Hence the price paid for the four shorthorns, the only breed which could be had here, the individuals of which were of equal quality with the other breeds, has been taken as the basis for the calculation. A corroboration of this price being the highest market value for that quality of animal, is that this season November, 1899, twenty steers of first class quality were bought for that figure, 3¾ cents per pound. While it will be noticed that lot No. 4 (scrubs) made nearly as good gains as the average of the others, yet the difference in the price received for them (1 cent per pound for their total weight of 4,790 pounds) plainly indicates that it pays better to feed a better class of animal. No. 4 in No. 2 lot of Shorthorns unfortunately, for some unknown reason, made an exceedingly bad showing the last two weeks of the test, materially changing the returns from that lot.

The aggregate weight of the 20 steers was, on December 1, 23,605 pounds, which, taken at their fair market value, at 3¾c.	$885 19
Cost of feeding 20 steers for 105 days at 15½c	325 50
Total cost of 20 steers	$1,210 69

They were sold on March 16 to A. McIntosh, Esq., of Montreal, for export. The Polled Angus, Herefords and two lots of Shorthorns commanded the price of 5¼ cents per pound live weight. The four scrubs, 4¼ cents per pound live weight. They were all weighed here on same shrink as during the test.

The aggregate gain of 20 steers for 105 days was:—

3,950 pounds at 5¼c	$207 90
Less the difference in price of 755 pounds (Scrubs) at 4¼c.	7 55
Total value of gain.	$200 35

After having consumed $325.50 of feed, the result shows an apparent loss o $125.15.

This loss, however is more than offset, by the increased value of the original weight of the steers, 23,605 pounds.

Increase in value of 23,605 pounds at 1½c. per pound.....	$355 07
Less 1 cent per pound on 4,035 pounds (Scrubs).....	40 35
Gain from improved quality of original weight.....	$314 72
Less apparent loss in feeding, of.....	125 15
Would leave a balance of	$189 57

This would be the result with steers bought at their fair market value, assuming the labour to be offset by the manure.

EXPERIMENTS WITH STEERS—BREED—FEED TEST.

No.	Breeding.	Age.	Weight, Dec. 1.	Weight, Dec. 31.	Gain.	Weight, Jan. 30.	Gain.	Weight, Mar. 1.	Gain.	Weight, Mar. 16.	Gain.	Total individual gain.	Total breed gain.
		Yrs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	Polled Angus ..	3	1,295	1,380	85	1,480	100	1,540	60	1,560	20	265	
2	"	3	1,335	1,420	85	1,490	70	1,565	75	1,570	5	235	
3	"	2	1,095	1,170	75	1,260	90	1,310	50	1,340	30	245	
4	"	2	1,100	1,185	85	1,260	75	1,285	25	1,320	35	220	
													965
1	Herefords.....	3	1,270	1,350	80	1,390	40	1,435	45	1,460	25	190	
2	"	3	1,105	1,195	90	1,270	75	1,315	45	1,345	30	240	
3	"	2	1,275	1,335	60	1,405	70	1,445	40	1,465	20	190	
4	"	2	1,245	1,300	55	1,365	65	1,405	40	1,430	25	185	
													805
1	No. 1 Shorthorns...	3	1,370	1,455	85	1,535	80	1,595	60	1,615	20	245	
2	" ...	3	1,215	1,300	85	1,370	70	1,405	35	1,420	15	205	
3	" ...	2	1,245	1,300	55	1,325	25	1,370	45	1,390	20	145	
4	" ...	2	1,245	1,300	55	1,335	35	1,385	50	1,410	25	165	
													760
1	Scrubs...	3	1,125	1,200	75	1,270	70	1,305	35	1,315	10	190	
2	"	3	1,060	1,135	75	1,215	80	1,250	35	1,250	0	190	
3	"	2	940	1,005	65	1,070	65	1,090	20	1,115	25	175	
4	"	2	910	970	60	1,050	80	1,085	35	1,110	25	200	
													755
1	No. 2 Shorthorns...	3	1,315	1,380	65	1,460	80	1,500	40	1,515	15	200	
2	" ...	3	1,195	1,275	80	1,315	40	1,335	20	1,355	20	160	
3	" ...	2	1,130	1,205	75	1,240	35	1,260	25	1,280	15	150	
4	" ...	2	1,135	1,220	85	1,265	45	1,320	55	1,300	-20	165	
													675

SWINE.

An average of from fifty to sixty pigs have been kept on the farm during the past year. Experiments were carried on with different lots. The herd on the farm at present is composed of:—One Tamworth boar, two Tamworth sows; one Yorkshire boar, one Yorkshire sow; one Berkshire boar, two Berkshire sows; three grade Yorkshire brood sows, and from forty to fifty grades and crosses.

EXPERIMENTS WITH SWINE.

Table I.

With a view to determine the value obtainable for skim-milk, when fed to pigs under existing markets for feeds and products, three lots of pigs were fed during the last year.

Lot 1 were fed an average of 20 pounds skim-milk per pig per day, and lots 2 and 3 an average of 25 pounds skim-milk per pig per day. A daily average of 2 pounds wheat shorts was also fed to each pig. Lots 1 and 3 were valued at $2 each pig, and lot 2 at $3 each at the beginning of the test. The results were as follows:—

SKIM-MILK TEST.

Lots.	Breeding.	No. Swine	Age.	Weight at Start.	No. of Days Fed.	Weight at Finish.	Dressed Weight.	Value.	First Cost.	Cost Meal Feed	Value per 100 lbs. Milk.
			months	Lbs.		Lbs.	Lbs.	$ cts.	$ cts.	$ cts.	$ cts.
1	Berkshire.	3	1	77	110	435	369	22 14	6 00	6 60	14 45
2	" ..	3	2	216	125	369	558	30 69	9 00	7 50	15 13
3	Yorkshire	4	1	132	165	900	720	43 20	8 00	13 20	17 77

Table II.

Another experiment was conducted, with a view to ascertain which was the most profitable to feed, of the four following easily obtainable and commonly used rations, namely wheat-shorts, buckwheat, also corn-meal and crushed oats in the ratio of 2 to 1, and pea-meal and crushed oats in the ratio of 2 to 1.

Four pens were devoted to this for the entire year.

The pigs were weighed when put under test, in lots of four from the same litter, one to each pen, at the age of three months.

The pigs in each pen were fed one of the above mentioned rations at the uniform rate of 3 pounds of meal per pig per day, with 5 pounds of skim-milk per pig per day.

Lots of four, i. e., one from each pen, were sent to the market from time to time, always being replaced by four of another litter, thus keeping a uniform number in each test throughout the year. Their gains were ascertained from the increase in live weight of each pig, after having fasted for 12 hours.

They were dressed for market on the farm, and the percentage of dressed weight ascertained.

No very definite information was received from the different packing houses, except in regard to firmness. Corn-meal and pea-meal both making firm pork; rather in favour of corn-meal. Buckwheat being decidedly soft.

A record was also kept of the breeding of the different pigs used, the results are given in the following table:

TEST PEN No 1.—Feed 1 : 2 lbs. Corn Meal, 1 lb. Crushed Oats and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
		Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
1	Tamworth	56	213	157	107	1·46	80·25
2	Tamworth (s) Berkshire (d) cross	46	245	189	110	1·71	81·70
3	Berkshire (s) Tamworth (d) cross	42	220	178	110	1·61	81·62
4	Yorkshire (s) Chester (d) cross	37	217	180	140	1·28	80·00
5	Duroc-Jersey	27	195	168	156	1·07	78·00
6	Chester	56	127	71	76	·93	78·75
7	Tamworth	84	184	100	76	1·31	79·94
8	Yorkshire	93	213	120	95	1·26	78·32
9	Chester	66	128	62	64	·96	76·01
10	Tamworth	68	135	68	64	1·06	79·50

TEST PEN No. 2.—Feed 1 : 2 lbs. Pea Meal, 1 lb. Crushed Oats and Skim-milk.

1	Tamworth	64	214	150	107	1·40	79·75
2	Tamworth (s) Berkshire (d) cross	46	215	169	110	1·53	81·00
3	Berkshire (s) Tamworth (d) cross	42	205	163	110	1·48	79·95
4	Yorkshire (s) Chester (d) cross	37	213	176	140	1·25	78·60
5	Duroc-Jersey	37	200	163	156	1·04	76·29
6	Chester	62	149	87	76	1·14	79·00
7	Tamworth	66	140	78	76	1·02	79·27
8	Yorkshire	90	185	95	95	1·00	77·32
9	Chester	57	130	73	64	1·14	77·55
10	Tamworth	75	157	82	64	1·28	80·70

(s) Sire. (d) Dam.

TEST PEN No. 3.—Feed : 3 lbs. Wheat Shorts and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. Days Fed.	Daily Gain.	Per cent Dressed Weight.
		Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
1	Tamworth	68	200	132	107	1·23	80·00
2	Tamworth (s) Berkshire (d) cross	52	200	148	110	1·34	81·28
3	Berkshire (s) Tamworth (d) cross	42	178	136	110	1·23	81·64
4	Yorkshire (s) Chester (d) cross	28	217	189	140	1·35	79·65
5	Duroc-Jersey	31	196	165	156	1·05	77·40
6	Chester	57	137	80	76	1·05	79·94
7	Tamworth	75	163	88	76	1·15	79·81
8	Yorkshire	98	195	97	95	1·02	77 68
9	Chester	62	142	80	64	1·25	77·24
10	Tamworth	66	160	94	64	1·46	80·25

TEST PEN No. 4.—Feed : 3 lbs. Buckwheat, ground, with Skim-milk.

1	Tamworth	68	197	129	107	1·20	79·86
2	Tamworth (s) Berkshire (d) cross	43	220	177	110	1·60	81·97
3	Berkshire (s) Tamworth (d) cross	44	205	161	110	1·46	81·12
4	Yorkshire (s) Chester (d) cross	34	233	199	140	1·42	79·58
5	Duroc-Jersey	28	200	172	156	1·10	77·29
6	Chester	66	163	97	76	1·27	78·68
7	Tamworth	68	161	93	76	1·22	81·00
8	Yorkshire	100	198	98	95	1·03	77·46
9	Chester	56	120	64	64	1·00	78·93
10	Tamworth	84	180	96	64	1·50	82·00

(s) Sire. (d) Dam.

SHEEP.

The sheep were again pastured in the same 10-acre field as in 1898, the object being to raise the fertility of that 10 acres without any additional fertilizer. Two acres of this field was ploughed in June, and sown with rape, for feeding the sheep in the latter part of the season. An estimate of the value of feed consumed by them in winter was made and lambs were exchanged for that amount of feed. The wool was exchanged for feed fed while in pasture in summer, to supplement pasture. While they were by no means better fed than they were in 1898, 50 per cent more sheep were kept in the same field. The stock at present consists of 34 sheep and 4 lambs.

POULTRY.

Four varieties of fowls are kept on the Nappan Experimental Farm. These are Barred Plymouth Rocks, Black Minorcas, White Leghorns and White Wyandottes. The hen house fitted up last summer, above the cow stable, with a view to utilizing animal heat for warming the pens, gave entire satisfaction. The temperature was kept at from 45° to 50° Fahrenheit all the time. The pens were made up as follows :—

No. 1. 7 Black Minorca hens.
No. 2. 7 Barred Plymouth Rock hens.
No. 3. 7 White Leghorn hens.
No. 4. 1 White Wyandotte hen.

Through the winter they were fed a warm corn-meal and cut green bone mash in the morning, and whole grain in the afternoon, the whole grain being scattered on the floor. They had access to water all the time and oyster shells occasionally. The eggs laid by the different breeds were as follows :—

7 Barred Plymouth Rocks	458
7 Black Minorcas	550
7 White Leghorns	359
1 White Wyandotte	49

The hens were allowed the freedom of the fields after August 1.

BEES.

In the fall of 1898, four colonies of bees were put in the cellar of the superintendent's house on December 1, weighing respectively 58½ pounds, 52½ pounds, 38 pounds and 36½ lbs. A compartment in the corner farthest from the door was fitted up, without windows or floor, the object being to furnish a place where there would be very little variation of temperature and no light. The temperature ranged from 32° to 40° during the winter. The hives were placed on a shelf 2 feet from the ground, resting on two benches. The tops of the hives were covered with a cushion, 4 inches thick, made of chaff, the sides unprotected, and the fronts open. They were placed on their summer stands on April 7, weighing respectively 48½ pounds, 30 pounds, 46 pounds, and 51 pounds in an apparently healthy and vigorous condition. The first night out, turning suddenly cold, one hive was found to be chilled and dead next day. The season throughout was very unfavourable for honey gathering, the bees gathering barely enough for self support. Two swarms only were captured during the summer, although probably some were lost. On December 7, five hives weighing respectively 52 pounds, 28 pounds, 56 pounds, 40 pounds and 46½ were again placed in the same quarters and under similar conditions to those of 1898.

WATER SUPPLY.

The water supply put into the buildings last year has proven ample, and has given satisfaction in every respect.

EXHIBITIONS ATTENDED.

At the International Exhibition, St. John, N.B., from September 11 to 20, and at the Provincial Exhibition, Halifax, N.S., from September 23 to 30, the farm produce was exhibited, arranged in a pyramidal trophy, occupying a floor space of 9 x 13 feet.

Other exhibitions made application for this exhibit, but it was found impossible to comply with their requests.

I also attended the Sussex, N.B., exhibition on October 3, 4, and 5, and the Westmoreland County Exhibition, at Sackville, N.B., on October 12 and 13.

MEETINGS ATTENDED.

During the year I attended and adressed the following meetings:—January 17th, Westville, N.S; 20th, Point-de-Bute, N.B. February 1, Andover, N.B.; 2nd, Kincardine, N.B.; 3rd, Arthurette, N.B.; 4th, New Denmark, N.B.; 5th, Florenceville, N.B.; 7th, Centerville, N.B.; 8th, Richmond Corner, N.B.; 9th, Millville, N.B.; 10th, Keswick, N.B.; 11th, Douglas, N.B.; 14th, Gagetown, N.B.; 15th, Sheffield, N.B.; 23rd, Annapolis, N S. March 1, Sussex, N.B.; 21st, Steam-mill Village, N.S.; 21st, Canning, N.S.; 22nd, Delhaven, N.S.; 23rd, Canard, N.S.; 28th, Fredericton, N.B. April 3rd, Amherst N.S.; 28th, Pugwash, N.S. July 6, Truro, N.S. November 23, Waterford, N.B.; 24th, Sessonville, N.B., Collingwood Corner, N.S.

CORRESPONDENCE.

Besides the distribution of reports and circulars, there were 1,663 letters received and 1,381 sent out.

METEOROLOGICAL RECORD.

MAXIMUM and Minimum Thermometer Readings for the year beginning with December 1, 1898, and ending November 30, 1899.

Month.	Maximum.	Minimum.
1898.		
December	46 degrees above zero on 23rd	21 degrees below zero on 16th.
1899.		
January	49 " " 5th	14 " " 2nd.
February	42 " " 18th	13 " " 2nd & 5th.
March	45 " " 6th	6 " " 15th.
April	71 " " 29th & 30th.	18 " above zero on 7th.
May	75 " " 13th	25 " " 6th.
June	83 " " 1st	41 " " 23rd.
July	83 " " 6th	40 " " 24th.
August	80 " " 20th	42 " " 11th.
September	75 " " 3rd & 27th.	26 " " 24th.
October	74 " " 26th	24 " " 24th.
November	66 " " 1st	12 " " 15th.

I have the honour to be, sir,

Your obedient servant,

R. ROBERTSON.

Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. BLAIR.)

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith a report of some of the work carried on in the Horticultural Division of the Maritime Experimental Farm for the year 1899.

The apple crop in the Maritime Provinces except in sections was not large, and even in the Annapolis and Cornwallis valleys the report is that some sections had a large crop while others only fair. The fruit was generally large and of excellent quality. The fall was very suitable for winter fruit, which coloured well. The season has favoured wood growth, which seems to have ripened up well. The plum crop is reported poor in many places, and some have reported a fair crop. Strawberries were a large crop, and the wet weather at the time of ripening greatly prolonged the season. The varieties of English gooseberries were a good crop, but the American varieties were a failure. Currants were a fair crop. Rapberries a good crop but were soft and poor in quality.

Some of the apple trees on the experimental farm were sprayed with kerosene emulsion on May 20 and again on the 27th for the oyster-shell bark louse, the young of which were then hatched. The solution used was made according to the Hubbard-Riley formula and was diluted to the proportion of one part of oil to ten parts of water. This very materially reduced the number of the insects, but did not completely destroy them. The trees were sprayed just before blossoming with Bordeaux mixture; again after the blossoms had fallen, to which solution Paris green for the apple worm was added, and again ten days later with the same mixture. The pears and cherries were sprayed with Paris green and water, July 29, for the Pear Tree Slug. The plums and pears were also sprayed with Bordeaux mixture in the early spring.

Experiments were again conducted with different varieties of vegetables and small fruits and some of the data obtained is presented in this report.

The ornamental trees and shrubs have made good growth and a list of the sorts permanently planted this season is here given, many of the *Pinus ponderosa* (heavy-wooded pine) planted in the shelter belt in 1898 died and were this spring replaced by additional trees from the Central Experimental Farm, some of which have since died. This pine seems extremely difficult to transplant.

The annual and perennial flowering plants presented an interesting display of bloom, and some particulars bearing upon some of the annual plants grown are included in this report.

The dates that different varieties of fruits grown on the farm commenced to bloom and the time when the trees were in full bloom, were again furnished the Horticulturist of the Central Experimental Farm.

I beg to acknowledge the receipt of a number of scions of the 'Merritt' seedling apple from G. W. Fox, Esq., Lower Gagetown, N.B. Some of these scions were sent to the Central Experimental Farm, and some to different parts of this province, while many were here root grafted on the Martha Crab seedling stock.

During the past season there has been put up for the Paris Exhibition samples of the different varieties of small fruits as well as varieties of pease and beans grown on the farm. These were put in pint and quart bottles, and antiseptic fluids were used as preservatives. Some apples were also put up for the same purpose at the same time. Duplicate lots were put up for local exhibitions, and were shown at St. John, N.B., and Halifax, N.S. These have all been shipped to Paris.

SHRUBS AND TREES.

The following varieties of ornamental trees and shrubs have this year been set in permanent places on the lawn, and make quite an interesting addition to those already planted, lists of which have been given in previous reports. The additional species and varieties now planted were forwarded from the Central Experimental Farm.

The shrubs and trees are with few exceptions making good growth, and are yearly becoming a greater source of interest to visitors.

Alnus incana laciniata.—Cut, leaved hoary alder.
Berberis Aquifolium murrayana.
Berberis Hybrid No. 2 (B. Thunbergi X.B. vulgaris foliis purpurcis).
Betula alba pendula elegans.
Betula alba pendula Youngi—Young's Weeping Birch.
Caragana pygmaea aurantiaca.
Catalpa cordifolia.—Hardy Catalpa.
Catalpa Kaempferi.—Japan Catalpa.
Celastrus articulatus.—Japanese bitter-sweet.
Cornus alba fol. argenteis variegatis elegans.
Cornus alba sibirica Spœthii.
Cornus Mas fol. argenteis marginatis.
Cotoneaster laxiflora.
Cratœgus Oxyacantha flore rubro pleno.—Double red-flowered English Hawthorn.
Exochorda grandiflora.
Forsythia variegata.—Variegated Golden Bell.
Genista tinctoria sibirica.—Dyer's Green-weed.
Laburnum Adami.
Ligustrum vulgare fol. aureis variegatis.—Golden-leaved Privet.
Lonicera Alberti.—Albert Regel's Honeysuckle.
Lycium chinense.
Philadelphus grandiflorus.—Large flowered Syringa.
Philadelphus hirsutus.
Philadelphus hybridus Lemoinei Boule d'Argent.
Philadelphus nivalis spectabilis plenus.
Ptelea trifoliata aurea.—Golden Wafer Ash.
Pyrus betulæfolia.—Birch-leaved Pear.
Pyrus Maulei.—Maule's Japan Quince.
Quercus from Japan.—Japan Oak.
Rhus Cotinus atropurpurea.
Spiræa arguta.
Spiræa bracteata.
Spiræa chamædrifolia.—Germander-leaved Spiræa.
Spiræa japonica Bumalda Anthony Waterer.
Spiræa sorbifolia.—Sorbus-leaved Spiræa.
Syringa villosa.
Syringa vulgaris Charles X.
Tamarix amurensis.—Amur tamarisk.
Viburnum prunifolium.—Black Haw.

CONIFERS.

Cupressus leptoclada.
Cupressus obtusa gracilis aurea.
Cupressus obtusa lycopodioides.
Cupressus obtusa viridis.
Cupressus pisifera plumosa argentea.
Juniperus communis aurea.
Juniperus communis fastigiata.—Irish Juniper.
Juniperus excelsa vera.
Juniperus Sabina.—Common Savin.
Juniperus Sabina argentea.
Juniperus virginiana Schotti.
Juniperus virginiana elegantissima.
Juniperus virginiana pyramidalis.

Juniperus virginiana tripartita.
Picea alcockiana.—Alcock's Spruce.
Picea excelsa pygmæa.
Picea excelsa pyramidalis.—Pyramidal Norway Spruce.
Picea excelsa Remontii.
Picea obovata schrenkiana.
Picea pungens glauca.—Rocky Mountain Blue Spruce.
Taxus canadensis.—American Yew.
Thuya occidentalis aurea.—Golden Arbor-vitæ.
Thuya occidentalis Columbia.
Thuya occidentalis elwangeriana—Elwanger's Arbor-vitæ.
Thuya occidentalis globosa.—Globose Arbor-vitæ.
Thuya occidentalis Hoveii.—Hovey's Arbor-vitæ.
Thuya occidentalis lutea.—Yellow Arbor-vitæ.

WINTER PROTECTION FOR ROSES.

To protect roses from killing back during the winter, barrels with their heads knocked out were sawn in two and placed on the ground over the rose bushes thus surrounding them, and into part of them sand was put, covering the plant; straw and horse manure was filled in around others, and a duplicate lot was filled with straw alone.

When the roses were uncovered in the spring they were all found in a first class condition, no difference as to the value of the various modes of protection could be noticed. However, filling the half barrel nicely with straw seemed the easiest and cleanest. To surround the plants with straw and cover them with spruce boughs to keep the straw in place seems the most practical protection.

THE FLOWER GARDEN.

From year to year many varieties of annual flowers have been grown, and they have not only added greatly to the attractiveness of the farm, but have been a great source of pleasure to visitors as well as to those living in the immediate vicinity. Many of the flowers were grown in beds 4 by 10 feet, which run parallel to each other, thus affording visitors an opportunity to study their character and usefulness. Each year records have been taken, and some particulars bearing upon some of the most desirable sorts are here given.

The dates at which annual flowers commence to bloom, and their vigour of growth vary considerably in different seasons. The date of blossoming as given is the average, and will serve as a useful guide to those desiring such information. Those flowers in class No. 1 were from seed sown in the open ground May 15, and those in class No. 2 were started in the hot-bed. Most varieties can be very much advanced by starting them in the hot-bed; verbenas and asters, however, will flower well from seed sown in the open ground. Pansies, carnations and snap-dragons can be started in the open ground and the latter two kept over winter nicely by moving the plants to a box and placing them in a cool cellar where the soil is occasionally watered, and not allowed to dry out; do not, however, keep them too wet as the roots will rot. Poppies do not easily transplant and the seed of these should be sown in the open ground only.

The second and third week in May is early enough to sow the majority of flower seeds. The plants will advance as quickly if sown then as they would with an earlier start. Sweet pease are an exception, and poppies will be materially advanced by sowing earlier. Those for transplanting should be sown not later than April 15, and can be transplanted about the first of June.

There is often a failure with annual flowers which is attributed to poor seed, but which is generally due to a lack of conditions suitable for germinating, and growth of the young plants. The soil should be loose and friable with considerable humus in it to hold moisture. This condition can best be obtained by working in a liberal quantity of stable manure in the fall and again thoroughly working the soil up in the spring. The seed should be covered not too deeply, and, as moisture as well as heat is necessary for germination, the soil should be kept moist. This may be done by placing a thin layer

of moss over the bed which prevents the heavy drying winds from taking the moisture out of the soil. As soon as the plants show themselves, the covering should be removed, and if necessary the bed kept moist until the plants are nicely started. The hand weeder should then be used, and the soil kept loose around the plants, thus conserving moisture. When the beds are watered they should be thoroughly saturated and as soon as the surface soil is dry enough it should be stirred. Frequent waterings which simply wet the surface soil are of little value, and are sometimes an injury.

A nice collection of such varieties as sweet pease, asters, phlox, verbenas, petunias, dianthus, nasturtiums, stocks and pansies, will produce splendid effects if well placed. Mixed planting and massing of the flowers is generally more attractive than planting in figure beds on the lawn, and where practicable this plan may be followed with advantage.

CLASS NO. 1.

Sweet Pease—There are many varieties of sweet pease; those grown here have consisted mainly of the Eckford mixture, which includes some thirty varieties. They commence to bloom about July 20, and continue until frost. They are allowed to run on a wire netting, and reach a height of about 4 feet. The seed is sown as early in the spring as possible, about 2 inches deep and about 2 inches apart in the row. The land is fertilized with stable manure the previous fall and worked in. In the spring, this is worked up about 3 inches deep and the soil below this remains undisturbed. If the soil is light, 4 inches is not too deep to plant the seed, as the sweet pea delights in cool moist roots. This flower should find a place in all gardens, and is a favourite wherever grown.

Nasturtiums.—This showy flower succeeds well in the Maritime Provinces, and year by year they are being more generally grown. The 'Tom Thumb' or dwarf growing sorts are especially desirable, and the great number of varieties now offered make an interesting collection. The dark coloured variety, Empress of India, grown alternately in rows, 6 inches apart with the variety Cloth of Gold, a golden sort, produces a very pleasing effect. The plants should be left about 3 inches apart in the rows, and will grow from 8 to 10 inches high. They continue in bloom from July 10 until frost.

The tall growing sorts reach a height of from 4 to 5 feet and are profuse bloomers from July 18 until frost. Their foliage effect is splendid, and probably no class of climbing plants will give better results for the attention given. They should be provided with a wire netting to run over.

Phlox Drummondii.—This plant is found in various colours of exquisite markings and should be included in a collection, no matter how small. They are free bloomers from July 20 until frost. They are spreading in habit, and grow from 8 to 15 inches high. They can be used to good advantage in beds, the dwarf sorts being of special value for this purpose, and in border beds they are indispensable. They are easily cultivated.

Stocks.—(Stocks, Gilly Flower).—These pretty flowers are desired for their delightful perfume. They commence to bloom the last of July and continue until frost. They are exceptionally fine for massing. The Dwarf German ten-week stocks, and the large flowered Pyramidal Double are exceptionally fine. They should be more generally grown; height, from 9 to 15 inches.

Petunias.—There are many varieties of this excellent flower offered in both the single and double types. They bloom from July 20 until severe frost, and vary in height from 12 to 20 inches. These flowers are general favourites. The single varieties have been the most profuse bloomers and are the best for massing.

Portulaca grandiflora fl-pl.—This is a low-growing spreading plant, and is desirable for edging and massing in beds. The flowers which continue in bloom from the first of August until frost, are of brilliant colours and remain open only during sunlight. Height about 4 inches.

Lobelia erinus.—This plant is dwarf and of spreading habit, with a light blue, small, pretty flower, which continues in bloom from August 4 until frost. It is one of the best edging plants grown. Height from 4 to 6 inches.

Dianthus chinensis (China or Indian Pinks), *D. Heddewigii* (Japan Pinks), *D. Caryophyllus* (Clove Pinks and Carnations), and *D. barbatus* (Sweet William), are a class of plants which should find a place in all flower gardens. The first two named sorts, both in double and single flowers, are profuse bloomers and their extremely variable and handsome colours are interesting. These pretty flowers continue to bloom from August 6 until frost; height, 12 inches. The Clove Pinks, like the Sweet Williams, should be started one year and set the next spring to where they are wanted for bloom. They want protection in the winter by covering with 2 inches of straw. The Clove Pinks have a delightful odour, similar to the Carnation. The Carnation, if started in the hot-bed, can be had to bloom about the middle of August. The Sweet William is an old favourite, although it can by no means take the place of the much larger and prettier Chinese Pinks.

Convolvulus Minor (Dwarf Morning Glory).—These are free bloomers, being at their best in the early morning, and when grown in masses the different shades of blue with white produce a very pleasing sight. They were in bloom from July 16 until August 28. They are trailing in habit and from 4 to 6 inches high. *C. Major* (Climbing Morning Glory) is also useful and can be used to good advantage for screens by allowing them wire netting to climb on.

Chrysanthemum carinatum has large white or yellow flowers with yellow eyes, which were in bloom from the middle of July until severe frost; height, 21 inches.

C. coronarium is a taller growing species with much smaller eyes, and commenced to bloom about the same time as the above. *C. tri-color*, with many coloured bloom, also adds to this collection of easy grown chrysanthemums. *C. inodorum plenissimum* has double pure white flowers and is liked the best of all the varieties grown here, especially for boquets. They commenced to bloom July 25, and continued until severe frost.

Iberis coronaria (Candytuft).—The White Rocket variety produces a mass of white bloom from July 8 until the last of August. The plants are erect in growth and about 15 inches high, and very striking when grown in a mass. Sweet Scented Candytuft blooms a little later than the above, but is equally fine and preferred by many. *Iberis umbellata* is dark red and light blue in colour, and bloomed from July 5 until August 18. Height, 12 inches. Candytuft is easily cultivated and produces good effect in a mass.

Tagetes (Marigold).—These pretty yellow flowers are striking when grown in a mass or in clumps in a mixed border. The dwarf sorts are 12 inches high and the others from 12 to 20 inches. They bloomed from July 28 until frost.

Papaver (Poppy).—These flowers are of easiest culture. The Double Carnation-flowered, Double Paeony-flowered, and the improved strains of single-flowered, make a collection of great interest. They continue in bloom from July 10 until August 22. The variety Shirley is one of the best, and if once grown seeds itself and will always continue in the flower collection. It grows about 14 inches high. The other sorts range from 18 to 22 inches.

Linum coccineum (Scarlet Flax) is very showy, especially in masses. It bloomed from July 15 until August 26, and is of easiest culture.

Eschscholtzia Californica (California Poppy).—This free blooming plant includes varieties of yellow, white, orange and rose colours. They were in bloom from July 10

until September 1. They are spreading in habit and from 10 to 12 inches high, and are showy plants.

Gaillardia picta and *G. picta Lorenziana* (Blanket Flower) are two varieties of Gaillardia worthy of more general cultivation. They are free blooming plants which continue in flower from August 8 until frost. The last named sort is double. They are erect in growth and about 15 inches high.

Godetia.—A branching plant of compact growth with beautiful satin like flowers, which continue in bloom from July 22 until September 10. Height, from 10 to 15 inches. The different varieties are very interesting.

Gypsophila elegans has a small white flower in spray-like clusters, which continues in bloom from about July 6 until September 1. Height, 18 inches. This flower is liked for boquets.

Datura cornucopia (Trumpet Flower) commenced to bloom the last of July and continued until the middle of September. The flowers are large and of a beautiful white. Height, 30 inches; of erect growth and extremely interesting.

Cacalia ('Tassel flowers,') bloomed from July 16 until September 10. The flowers are orange or scarlet and are splendid for cutting. Height, 15 inches.

Calliopsis or Coreopsis (Bright-eye) is erect in growth and about 24 inches high. The flowers are dark in the centre, with a yellow and fringed edge, and when grown in clumps or in a mixed border they produce splendid effects. The Tom Thumb variety (*C. Nana compacta*) is of bushy and erect growth, about 15 inches high. These plants flower freely from the last of July until frost.

Salpiglossis variabilis nana grows about 2 feet high. *S. variabibis grandiflora* grows 3 feet tall. They are free bloomers from August 2 until frost. The bloom is large and very fine but easily destroyed by wet weather and winds.

Reseda odorata grandiflora (Mignonette).—This large flowering variety is especially desirable, it is a general favourite and of the easiest culture.

Callirrhæ pedata grows about 20 inches high and blooms from the first of August until frost. The bloom is a large rose-coloured flower which continues in profusion throughout its season.

Centaurea cyanus (Bachelor's Button).—These pretty flowers are found in white, blue and dark blue colours. They are continuous bloomers from the middle of July until September 8. Height, 22 inches. The variety 'Marguerite' is very fine.

Brachycome iberidifolia (Swan River Daisy).—A small blue or white flower which blooms from July 25 until frost. The plant is erect in growth and about 10 inches high. They are splendid for massing in small beds and are quite useful for edging.

Browallia.—The flowers are white or blue, or blue with yellow centers, which continue in bloom from the middle of August to September 18. The plants are erect and grow 12 inches high.

Asperula azurea setosa.—This is a free bloomer with pretty azure blue flowers, about 8 inches high, which commence to bloom about the first of August and continue to the last of September.

Acroclinium album, white, *A. roseum* light red, are everlasting flowers, which bloom from July 14 until the last of August. They are of erect growth and about 12 inches high.

Helichrysum monstrosum fl. pl. (Double Everlasting Flower).—This is a very fine everlasting flower. They are erect in growth, about 21 inches high and commence to bloom August 1, continuing until the middle of September.

Rhodanthe Manglesii.—This desirable everlasting grows about 9 inches high and continues in bloom from July 18 until August 27.

Mirabilis ('Marvel of Peru,' 'Four O'clock').—This commenced to bloom July 28 and continued until frost. Height, 18 inches.

Sweet Alyssum compacta (Tom Thumb Sweet Alyssum) is about 6 inches high and especially valuable for edging. It blooms about a week later than the tall Sweet Alyssum, which continues in a mass of bloom from August 4 until frost. It is spreading in habit and about 10 inches high. These flowers are fine for massing in beds or borders.

Nigella ('Love-in-a-Mist,') has a blue or white flower with feathery foliage, and continues to bloom from August 2 until September 1. The dwarf sorts are 10 inches high and the tall about 15 inches.

Ricinus (Castor Oil Bean).—These plants are desirable for their foliage, and the variety *R. Gibsoni* is one to be recommended. They grow large with a height of 3 feet or more, and furnish a splendid center for a large bed.

Delphinium (Larkspur).—The annual larkspur is found in various colours except yellow, and both the dwarf and high sorts were grown. The former were about 12 inches high and the latter 20 inches. They commenced to bloom August 1 and continued to September 20. The flowers are borne on a spike.

Clarkia elegans Alba and *rosea* in single and double rose and white flowers are quite pretty. They bloom from July 10 to the middle of August. Height, 24 inches.

Collinsia are especially desirable for massing and growing in mixed border. They are about 13 inches high, of spreading growth, with pretty white, blue and crimson flowers, which continue to bloom from July 14 to September 1.

Adonis æstivalis has splendid foliage and rather erect growth, 16 inches high. The flowers are dark red with blue eyes, and continue in bloom from the middle of August until frost.

Abronia umbellata is a beautiful flower, something after the style of the verbena, bearing flowers of a rose-lilac colour in trusses. It is useful for edging, has a rather trailing habit, and is about 5 inches high. They bloom from the last of July until frost.

Calendula (Pot Marigold).—There are many varieties of this easily cultivated and free blooming orange and yellow flower. They commenced to bloom July 16 and continued until frost. They are about 20 inches high and erect in growth. *C. pongei* is a pretty white sort which blooms a little later than the above.

Calandrina grandiflora and *C. umbellata* are free bloomers about 12 inches high which continue with red and light red flowers from August 28 to frost. They are a blaze of colour when in bloom, and are showy, late flowering plants.

Ageratum Mexicanum is a profuse bloomer from July 1 until frost. Height, 24 inches. The Tom Thumb varieties are from 9 to 12 inches high and make splendid edgings for beds. The plant is very interesting and should be more generally grown.

Amarantus caudatus (Love Lies Bleeding), *A. tricolor* (Joseph's Coat), and *A. atropurpurea* are useful for their foliage. They are very attractive when grown in

masses in a border or to fill the centre of a large bed. Height, 32 inches. *A tricolor splendens* is an improvement on *A tricolor*, and the foliage is very fine, especially in late summer and early fall.

Agrostemma cœli rosa (Rose of Heaven). About 30 inches high and continues in bloom for about 3 weeks after July 20. They should be grown in masses, when quite a striking effect is produced.

Helianthus (Sunflowers) are especially useful to screen unsightly backgrounds. The California double grows about 4½ feet tall and has a fine golden flower which is very showy. Blooms from August 12 until frost.

Schizanthus (Butterfly Flowers) are of easy culture and grow about 18 inches high, producing bloom from July 5 to September 1.

Scabiosa ('Mourning Bride,' 'Sweet Scabiosa') is a free bloomer continuing in flower from July 15 until September 1. Height, 17 inches.

Salvia (Flowering Sage).—This beautiful scarlet late flowering plant is about 23 inches high, with a dwarf variety about 14 inches. They commenced to bloom August 12, and continued until severe frost.

Lupins are of easy culture, and the mixed varieties with their long flower spikes of different colours, are quite interesting. They grow from 15 to 22 inches high, and are in bloom from the middle of July to August 28.

Zinnias.—There are a large number of varieties of this flower, and the large flowering dwarf double sort were the best grown here. Many of the tall growing ones were found to be coarse and not desirable. They continued in bloom from July 18 to frost.

CLASS NO. 2.

Asters.—There are many strains of this beautiful flower, and probably *Truffaut's Paeony-flowered Perfection Aster* takes first place, although the *Comet Aster*, which closely approaches the *Chrysanthemum-flowered* type, is preferred by many. Varieties from each of the above named types will be found interesting. They range in height from 9 to 21 inches. Seed started in the hot-bed April 15, from which plants were set to the open ground June 6, commenced to bloom July 22 and continued until severe frost. Seed sown in the open ground May 15 blossomed August 14, and continued until severe frost.

Balsams were started in the hot-bed April 15 and planted in the open ground June 6. They bloomed from July 18 until frost. Height, from 12 to 18 inches. Much admired by all.

Antirrhinum (Snap dragons).—These are again becoming a universal favourite, and both the tall, half tall and dwarf sorts were grown in many colours. They produced abundant bloom from August 8 to frost. Height, 8 to 20 inches. The seed was sown in the hot-bed April 7 and the plants set in the open ground July 5.

Verbena hybrida compacta is an exceptionally fine strain of verbenas, and gives profuse bloom from the middle of July until severe frost. The seed was sown in the hot-bed April 14 and the plants set in the open ground June 6. The plants are of spreading habit and about 6 inches high. The seed can be sown in the open ground, but much later bloom will be had. This is one of the finest annual flowers. Valuable for bedding.

Carnations.—The seed was sown in the hot-bed April 7 and the plants were set in the open ground June 5. The first bloom was August 21, blooming continued until frost. These should be given as early a start as possible.

Pansies.—The seed was started in the hot-bed April 7, and the plants set in the open ground June 12. They commenced to bloom July 28, and continued until severe frost. The practice of sowing the seed in the open ground in the autumn, and mulching the plants with 2 inches of straw for winter protection is followed with success. By this system some bloom is sometimes had the first year and continuous bloom from early spring until fall is had the next year. They give best results when grown in a shady situation. No plant gives more continuous and better bloom.

VEGETABLE GARDEN.

EXPERIMENTS WITH GARDEN PEASE.

Eighty-three kinds of garden pease were sown May 12, in rows 4 feet apart. There were two plots of each variety. One plot was pulled and the quantity of marketable green pease with pods weighed. The other plot was allowed to ripen and the quantity of threshed seed obtained. Each plot was one row 66 feet long. The seed was planted from 1½ to 2 inches deep and 2 inches apart in the rows.

The land was previously in potatoes, for which crop chemical fertilizer, only, at the rate of 450 pounds per acre, was used. The land was ploughed in the fall and worked up with the disc harrow in the spring. It was again harrowed with the spring-tooth harrow and the seed planted. No fertilizer was used.

About July 28, the pea aphis (*Nectarophora destructor*) was noticed, and did considerable damage to the late maturing crop. The varieties Station, Alaska and Exonian are excellent half high sorts, and Nott's Excelsior and American Wonder good dwarf ones.

EXPERIMENTS with Garden Pease.

Name.	Length of Vine.	Length of Pod.	Date when Pulled and Pounds of Marketable Pease with Pods, per Plot.				Yield of Ripened Seed per Plot.
	Inches.	Inches.		Lbs.		Lbs.	Lbs.
Bergin Fleeting	36	2½ to 2¾	July 25	12½	Aug. 10	11	4
Station	36	2¼ 2¾	"	15½	"	7½	4
Alaska	36	2¼ 2¾	"	15	"	6	5½
New Maud S.	48	2¼ 2¾	"	6	"	19½	6¼
Nott's Excelsior	18	2¾ 2¾	"	12½	"	18	5¾
Sunol	30	2¼ 2¾	"	14½	"	11½	6¾
Exonian	36	2¼ 2¾	"	8½	"	24	7¾
American Wonder	17	2¾ 2¾	"	8	"	19½	4½
Philadelphia	36	2¼ 2¾	"	10½	"	9¾	5
Evergreen Pod	36	2¼ 2¾	"	9¼	"	9	5½
Extra Early Pioneer	33	2 2¾	"	12¾	"	13	6
Imp. Ex. Early Daniel O'Rourke	36	2 2¾	"	14¼	"	13	7¼
Thorburn's Early Market	36	2 2¾	"	15	"	9½	7
Cleveland's, First and Best	36	2¼ 2¼	"	14½	"	8¾	7½
Rural New Yorker	36	2¼ 2¾	"	13¼	"	17½	7¼
Tom Thumb	34	2¼ 2¾	July 28	25½	"	7	7¾
Gregory's Surprise	36	2¼ 2¾	"	17	"	2¾	3¼
Extra Early Star	38	2¼ 2¾	"	18¾	"	6¾	4¾
Mill's First of All	42	2 2¾	"	17½	"	3½	6
S. B. & M. Co.'s Extra Early	36	2½ 2¾	"	28½	"	11	7¾
Early Dexter	30	2¼ 2¾	"	12¼	"	8¼	5
Hancock	42	2¾ 3	"	21½	"	15	10
Dwarf Wrinkled Sugar	18	2¾ 2¾	Aug. 31	18¾	"	7	7
Ameer	46	3 3½	"	10¼	"	13½	6
Early Kent	42	2½ 3	"	22¼	"	6	6

EXPERIMENTS with Garden Pease—*Concluded.*

Name.	Length of Vine.	Length of Pod.	Date when Pulled and Pounds of Marketable Pease with Pods, per Plot.		Yield of Ripened Seed per Plot.
	Inches.	Inches.	Lbs.	Lbs.	Lbs.
Early May Improved	48	2½ to3	Aug. 31, 21	Aug. 10, 6½	8
Blue Beauty	30	2⅞ 3	" 24	" 8¼	12
Premium Gem	24	2⅞ 3	" 24½	" 10	9
Early Frame Improved	41	2⅞ 3	" 14½	" 6	6
Chelsea	18	2⅞ 3	" 24	" 6	8½
Alpha	48	2⅞ 3	" 18½	" 8½	7½
Simmer's First of All	41	2⅞ 3	" 27½	" 2½	5¾
Ringleader	36	2¾ 3	" 18	" 7	5
Kentish Invicta	48	2 2½	" 4, 8½	" 12, 13½	10½
Blue Peter	12	2½ 2⅞	" 12	" 12	6¾
Saxton's Alpha	36	2⅞ 3	" 4½	" 24	5¼
Carter's Up-to-Date	42	3½ 4	" 12½	" 20½	8¾
Petit Pois or Small French	36	2⅞ 3	" 15½	" 18¾	4¼
McLean's Little Gem	34	2⅞ 3	" 12½	" 14	8
Stanley	41	3⅜ 4	" 4	" 7½	8¼
New Giant Podded Marrowfat	30	3 4	" 4½	" 12¾	9¾
Champion of England	48	2½ 3¼	" 8, 8¾	" 16, 12	6¾
Boston Wrinkled	36	2½ 3	" 4	" 24½	7
Melting Sugar or Edible Podded	48	2⅞ 3¼	" 4½	" 20	5
Profusion	36	2½ 3	" 8½	" 12	7½
Admiral	42	2½ 3	" 8½	" 12	6
Horsford's Market	32	2⅞ 3	" 6½	" 8¼	6⅜
Sutton's Satisfaction	46	2½ 3	" 16½	" 16	6
Duke of Albany	48	3¼ 4¼	" 24½	" 35½	7¼
Startler	30	2½ 2¾	" 12, 8½	" 12	7
Pride of the Market	18	2⅞ 3¼	" 10	" 22½	7½
Sutton's Dwarf Defiance	18	2⅞ 3⅜	" 8½	" 20	6¾
Abundance	34	2¾ 2¾	" 8	" 24⅜	4¼
Everbearing	34	2½ 3	" 4½	" 13¼	7
Hair's Dwarf Mammoth	32	3½ 4	" 8½	" 15½	7
Daisy	24	2⅞ 3½	" 6½	" 22, 12	6
Burpee's Profusion	34	2½ 3	" 8	" 23⅜	4½
Eugenie	48	2½ 3	" 12	" 14	4½
Prince of Wales	36	2⅞ 3¼	" 8	" 18¼	8½
Black-eyed Marrowfat	48	2⅞ 3	" 16¼	" 16	6⅜
Duke of York	48	2⅞ 3½	" 8	" 34	9
Heroine	30	3½ 4	" 17½	" 16½	9
McLean's Prolific	30	3¼ 4	" 8½	" 25½	8
Dwarf Champion of England	30	2¼ 2⅜	" 8¼	" 18½	6⅜
900 to 1	48	2½ 3	" 31	" 12	6½
Queen	46	3 4	" 12	" 4	4
Grant's Favourite	48	2¼ 2⅜	" 8¼	" 12	3
Juno	30	2½ 3¼	" 11¾	" 8¼	10
Anticipation	36	2⅞ 3½	" 2	" 30	8
Forty-fold	48	2⅞ 3	" 2½	" 33½	6⅜
King of the Dwarfs	24	2½ 3	" 15½	" 4½	7¾
Telegraph	48	2⅞ 3½	" 2½	" 24	8
Pride	36	2¼ 2⅜	" 4	" 24	7½
Scheriezer's Giant	42	3 4	" 2	" 28½	7½
Sharp's Queen	48	2⅜ 3½	" 18, 4	" 28, 14½	5
Shropshire Hero	34	2½ 3¼	" 23½	" 6½	7½
New Victory	36	3 3¼	" 4	" 14½	5
Crooked or Scimitar	48	3 3¾	" 11½	" 12⅜	6½
Veitch's Perfection	48	2⅜ 3¼	" 1	" 15½	2
Sander's Marrow	48	3 3¼	" 6¾	" 25½	5½
Early Britain	48	2¼ 2⅜	" 2	" 7½	6⅜
French Canner	48	2½ 3¼	" 3	" 13⅜	10

TOMATOES.

Thirty-six varieties of tomatoes were started in shallow boxes March 16. These boxes were set in the hot-bed with a temperature not higher than 72° F., but falling somewhat at night. The plants were thinned on April 4, and were transplanted to another hot-bed on April 14, to rows 4 inches apart and 3 inches apart in the row. On May 18 six plants of each variety were transplanted to boxes that contained six inches deep of soil. The plants were set 6 inches apart each way, and the boxes, which were made to hold twelve plants, were set in a cold frame on scantling about 6 inches from the ground.

The plants were set in the open ground June 17, that day being about the first bright warm day of that month. The soil in the boxes was thoroughly saturated with water in the morning and allowed to drain off until about 10 o'clock, when planting commenced. The plants were cut out of the boxes with about 6 inches square of soil around each plant, and placed in a hole previously made. The plants suffered little from transplanting, and no plants were lost.

The land was devoted to vegetables the previous year, and was not fertilized for the tomatoes. It was ploughed in the fall and again in the spring, and thoroughly worked up, The plants were set 4 feet apart each way. The cold season prevented early maturity. The frost of September 24 destroyed much of the crop.

Name of Variety.	Date of First Ripening.	Pounds of Ripe Fruit in 6 hills.	Pounds of Green Fruit in 6 hills.	Total Number of Pounds in 6 hills.
Atlantic Prize	Aug. 26	32	24½	56½
Early Conqueror	" 26	37	30½	67½
Early Ruby	" 26	22	42	64
Earliest of All	" 29	25½	36	61½
Ponderosa	" 29	20	29	49
Livingston's Favourite	" 29	5½	23½	29
Imperial	Sept. 1	15½	19	34½
Mikado	" 1	9½	36	45½
Yellow Plum	" 1	20½	15	35½
Pear-shaped Yellow	" 1	20	25	45
New Dwarf Champion	" 4	5	24	29
Optimus	" 4	11	32	43
Livingston's Beauty	" 4	8	34	42
Matchless	" 4	13½	22	35½
Table Queen	" 4	6	52½	58½
Greekside Glory	" 4	15	30	45
Acme	" 4	11	31	42
Potato Leaf	" 4	8	35½	43½
Mayflower	" 4	11	41	52
Ignotum	" 4	35½	6	41½
Fordhook's First	" 4	12	29	41
Crimson Cushion	" 4	12½	26½	39
Pearce's Paramount	" 6	3	24	27
Volunteer	" 6	11	28½	39½
Golden Queen	" 6	9	49½	58½
Aristocrat	" 6	12½	23	35½
Canada Victor	" 6	21	26	47
Honour Bright	" 6	7	21	28
Royal Red	" 6	11	31	52
Perfection	" 6	7	29	36
Mitchell's No. 1	" 6	33½	6	39½
Stone	" 6	9	29	38
Buckeye State	" 6	5	22	27
New Yellow Peach	" 6	8	26	34
Red Peach	" 6	5	21	26

EARLY CABBAGE.

The seed of two varieties of early cabbage was sown in shallow boxes, which were placed in a hot-bed March 27. The plants were transplanted to another hot-bed April 14. Were set in rows 4 inches apart each way. These were transplanted to the open ground May 12. The hot-bed was kept well ventilated and cool after May 1. The plants were set on ground prepared similar to that on which the early potatoes were grown. The rows were 28 inches apart and the plants were put 2 feet apart in the rows. The size of the plot from which the yield tabulated below was taken was one row 66 feet long containing 33 plants.

Name of Variety.	Cut July 18.		Cut July 28.		Cut Aug. 10.		Cut Aug. 14.		Cut Aug. 22.		Total.	
	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.
Early Jersey Wakefield	4	6¼	9	28½	8	28	3	10¾	6	22	30	95½
Extra Early Express	5	7½	11	37	6	21½	5	17½	4	14½	31	98

CAULIFLOWERS.

Seed was sown of three varieties of cauliflowers at the same time the cabbages were sown. They were treated in the same manner, and were set in the open ground at the same time. The size of the plots from which the crop was weighed was one row 33 feet long containing 17 plants.

Name of Variety.	Cut July 18.		Cut July 22.		Cut July 28.		Cut Aug. 10.		Total.	
	Heads	Lbs.	Heads	Lbs.	Heads	Lbs.	Heads	Lbs.	Heads	Lbs.
Extra Early Dwarf Erfurt	3	4¾	5	7	5	7	3	5¾	16	24½
Early Snowball	3	4¼	6	7¾	5	6¼	1	1½	15	19¾
Large Late Algiers (First fit for use Aug. 18 and continued until frost,										

EXPERIMENTS WITH GARDEN CORN.

Twenty-three varieties of corn advertised as garden sorts, and five varieties of pop corn were planted. The land had potatoes for the previous crop and was ploughed after the crop was removed in the fall. It was manured in the spring at the rate of 30—30-bushel-cart loads of stable manure per acre, which was ploughed under. The land was then worked up and the corn planted in hills on the level. Each hill contained five plants and from the centre plant to each one at the four corners was 5 inches. The hills were 3 feet from centre to centre each way. Two plots were sown of each variety.

The marketable ears on plot No. 1 were pulled Septmber 18, and those on plot No. 2 were pulled on September 27. A heavy frost on September 24 prevented the crop from maturing, and none of the ears ripened. The varieties of pop corn, White Rice, White

Pearl, Early Amber and Pop Striped, made strong growth, but only a few of the ears from each plot reached the late milk stage of growth. There is no apparent difference between the first three named sorts. Each plot was one row 33 feet long.

Name of Variety.	Date when Sown.	Number of marketable ears on Plot, Sept. 18.	Number of marketable ears on Plot, Sept. 27.	Condition for use.
Early White Cory	May 26..	56	70	Good.
Cory	" 26..	54	50	"
Burpee's First of All	" 26..	54	46	"
Crosby's Early	" 26..	40	48	"
Early Marblehead	" 26..	52	60	"
Metropolitan	" 26..	28	40	"
First of All	" 26..	38	34	"
Early Minnesota	" 26..	26	44	"
Early Giant	" 26..	26	38	Fair.
Perry's Hybrid	" 26..	26	36	"
Kendall's Early Giant	" 26..	22	40	"
Mammoth			12	Poor.
Nonesuch			4	"
Shaker's Early			12	"
White Tuscarora				Ears not fit for use.
Country Gentleman				"
Moore's Early				"
Triumph				"
Honey Sweet				"
Stowell's Evergreen				"
Egyptian				"
Black Mexican				"
Zig-Zag Evergreen				"

REMOVING SUCKERS FROM CORN PLANTS TO HASTEN MATURITY.

In order to determine the value, if any, of removing the suckers or small leafy growths which start up from the base of a corn plant, to promote maturity, the suckers were removed from one set of plots July 9 and allowed to remain on duplicate ones of the same variety. The corn was in hills, being planted at the same time and in the same manner as the other corn plots. The land also received similar treatment. The plots were each one row 33 feet long. The results obtained were as follows :—

Name of Variety.	Date of planting.	Date of pulling.	Number of ears per plot where suckers were taken off.	Number of ears per plot where suckers were not taken off.
Cory	May 26	Sept. 27	52	52
Burpee's First of all	" 26	" 27	46	50
Mitchell's First of all	" 26	" 27	62	52

SOAKING CORN IN WARM WATER BEFORE PLANTING TO HASTEN GROWTH.

The object of this experiment was to learn whether corn could be advanced by soaking the seed in warm water for 24 hours before planting. Two varieties of corn were used, on which warm water was poured and allowed to remain for 24 hours. The water was kept warm during the day but cooled at night. Duplicate sets were planted at the same time with corn not soaked. The plots were each one row 33 feet long.

They were grown in a similar manner, on land that received the same treatment as given the other corn plots.

Name of Variety.	Date of planting.	Date of pulling.	Number of ears on plots planted with soaked seed.	Number of ears on plots planted with seed not soaked.
Cory	May 26	Sept. 27	52	54
Mitchell's Extra Early	" 26	" 27	52	62

EXPERIMENTS WITH GARDEN BEANS.

Thirty-eight varieties of garden beans were sown on May 31. Two plots were sown of each variety. One plot was pulled to obtain the weight of green marketable beans, and the other plot was allowed to mature. They were planted on the level in rows 3 feet apart, and the beans were dropped 2 inches apart. Each plot was one row 66 feet long.

The land was previously in potatoes, and was ploughed after that crop was removed. Stable manure was applied at the rate of 15-30-bushel-cart loads per acre in the spring and ploughed under. The land was then harrowed and the seed sown.

The variety Extra Early Red Valentine is one of the finest early green podded sorts. The varieties Dwarf German Black Wax, Mammoth Red German Wax, Keeney's Rustless Wax, and Roger's Lima Wax, are four exceptionally fine yellow podded sorts.

Name of Variety.	Dates when pulled for use and pounds of edible podded beans per plot.		Length of Pod.	Colour of Pod.	Proportion Rusted.	Pounds of Seed Harvested from Plot.	How Matured.
	Aug. 9.	Aug. 14.	Inches.				
Mammoth Red German Wax	12½	18	5 to 6	Yellow	Very slight.	8½	Fair.
Wardwell's Kidney Wax	7	8½	4 " 5	"	Badly	2½	Good.
Flageolet Scarlet Wax	7	21½	5 " 6	"	Very slight.	3½	Fair.
Dwarf German Black Wax	16	12½	4 " 5	"	"	4½	Good.
Early Mohawk	18½	16	4½ " 5½	Green	None	7½	"
Long Yellow Six Weeks	18	14½	5 " 6	"	"	8	"
Improved Rust-proof Golden Wax	9½	20½	3½ " 4	Yellow	"	6½	"
Detroit Wax	6½	20	4 " 5	"	"	9	Fair.
Early Giant Wax or Butter	14	39½	5 " 6	"	Very slight.	10½	Good.
Crystal White Wax	12½	28	5 " 6	"	"	3½	Fair.
Dun Colour	18½	10½	4½ " 5½	"	None	6	Good.
Early China	9	14	4 " 4½	Green	Very slight.	3½	Fair.
	Aug. 14.	Aug. 29.					
Taber's I X L	18	32	5 " 6	"	"	6½	Good.
The Canadian Wonder	8	24	5½ " 6	"	"	5	Fair.
Early Red Valentine	20	24	4½ " 4	"	None	6½	Good.
Early Large White Marrowfat	6	24	4½ " 5	"	Very slight.	6½	"
Dwarf Bush Stringless	10½	24½	5½ " 6½	Yellow	Badly	4½	Poor.
Royal Dwarf Kidney	20½	14½	4½ " 5½	Green	Very slight.	6	Good.
Dwarf Bush Golden Wax	6½	24	3½ " 4½	Yellow	"	5	"
	Aug. 18.	Aug. 29.					
Keeney's Rustless Wax	12½	28	3½ " 4½	"	"	8½	"
Black-Eyed Wax	.....	22½	3½ " 4½	"	Badly	4½	"
Mammoth Wax	.....	28	4 " 5	"	"	3	"
Black Wax or Butter	.....	11½	3½ " 4	"	"	2½	Fair.
Yosemite Wax	.....	24½	4 " 5½	"	Slightly	3½	"
Speckled Wax	.....	24½	5 " 6	"	"	6½	Good.
Golden Beauty	.....	10½	3 " 4½	"	Badly	2½	Poor.
Dwarf or Bush Golden Wax	.....	5½	3½ " 4½	"	"	2	Good.
Early Refugee or 1,000 to 1	.....	48½	3 " 4	Green	None	4½	Poor.
Roger's Lima Wax	.....	23½	3½ " 4	Yellow	Very slight.	6	"
Cylinder Ivory Podded Wax	.....	20½	3½ " 4½	"	Badly	5½	Good.
Giant Dwarf Wax Red-seeded	.....	18½	5 " 6	"	"	3½	Fair.

EXPERIMENTS WITH BEANS IN HILLS AND ROWS.

The practice of growing beans exclusively in hills is followed by many growers of early market beans, the claim being made that they will mature earlier in hills than in rows. To obtain information on this point, three varieties of beans were planted different ways. The plots were each one row 66 feet long. The hills were 1½, 2 and 2½ feet apart from the centre of one hill to the centre of another, and 3 feet apart from the centre of one row to the centre of another. Two plants were in the centre of the hill, and 5 inches from the centre, at each corner two more plants were allowed to grow, making ten plants to a hill. The plants in the rows were allowed to grow 2 inches apart. The land was manured and cultivated similar to that on which the corn plots were grown. The following table gives the results obtained.

YIELD of Marketable String Beans in Hills and Rows.

Name of Variety.	Date when Pulled.	Hills 2½ feet apart, Yield of plot.	Hills 2 feet apart, Yield of plot.	Hills 1½ feet apart, Yield of plot.	In row, yield of plot.
		Lbs.	Lbs.	Lbs.	Lbs.
Detroit Wax	Aug. 9	7 } 35	8 } 40	9 } 37	10½ } 40½
do	" 18	28 }	32 }	28 }	30 }
Rust-proof Golden Wax	" 9	14 } 46	10 } 44	19½ } 61½	14¼ } 48¼
do do	" 18	32 }	34 }	42 }	34 }
Early Yellow or Six Weeks	" 9	18 } 46	30 } 70½	38½ } 82½	28 } 64
do do	" 18	28 }	40½ }	44 }	36 }

EARLY MARKET POTATOES.

On May 12 six varieties of early potatoes were planted in rows 28 inches apart and the seed was dropped 18 inches apart. The ground was manured the previous fall with twenty 30-bushel cart-loads of stable manure per acre, and ploughed. The land was again ploughed in the spring and thoroughly worked up. Fertilizer (Imperial) was sown broadcast at the rate of 300 pounds per acre and harrowed in. The land was then run up into rows 28 inches apart.

Thirty-three feet of a row of each variety was dug July 26, and the quantity of large, medium and small tubers from it weighed. The large and medium ones were both considered marketable at that time. On August 9 a row of 66 feet from each variety was again dug, and the yield of marketable and unmarketable tubers harvested will be found in the following table.

It will be noticed that Vick's Extra Early is by no means an early market sort. It is white in colour and oval in shape. The variety Irish Cobbler is white, and round, with rather deep eyes. The other varieties considerably resemble the Early Rose.

Name of Variety.	Dug July 26, Yield from row 33 feet long.			Dug Aug. 9, Yield from row 66 feet long.	
	Large Tubers.	Medium Tubers.	Small Tubers.	Marketable Tubers.	Unmarketable Tubers.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Irish Cobbler	15½	7¾	5¼	84	6
Early Sunrise	10¾	8¾	10¾	80	5
Early Gem	18¼	10¾	12½	74	8
Early Ohio	9¼	13¼	10¾	68	4
Early Six Weeks	18¾	3	12¼	68	12
Vick's Extra Early	.....	.....	18¾	56	12

TOBACCO.

Seed of thirteen varieties of tobacco was sown in the hot-bed, April 20. The plants were thinned to 1½ inches apart. They were set in the open ground June 12. The plants were set 3 feet apart each way. The frost of September 24 destroyed the crop. The White Burley variety was beginning to show signs of maturity.

APPLES.

The apple trees have made good growth during the past season, and the terminal buds give indications that the wood has ripened up well. Some of the varieties fruited this year, but, as previously reported, the crop was not large. Reference is here made to some of the varieties planted in 1890 which have made thrifty growth and fruited since that time. These varieties are all hardy and are especially useful for sections not naturally well adapted for fruit growing.

YELLOW TRANSPARENT.

The trees were planted in 1890, and have made vigorous upright growth; fruited in 1892 and each year since. The fruit is medium to large, roundish oblate, slightly conical; skin clear white at first, becoming pale yellow when fully matured, covered with some light and greenish dots somewhat obscure. The flesh is white, juicy, a little coarse, tender, sprightly sub-acid; quality very good. Season August. This is a hardy variety and an abundant annual bearer, which should receive good cultivation and manuring. The trees should not be allowed to grow all the fruit that sets when they first come into bearing, because they are liable to be checked in growth and become stunted by so doing. The fruit is very early and of finest quality for an early sort. It is a Russian apple brought from St. Petersburg by the United States Department of Agriculture in 1870.

DUCHESS OF OLDENBURG.

This variety, sometimes known in the maritime provinces, as 'New Brunswicker,' was planted in 1890, and has made fairly vigorous growth. It fruited in 1893 and has borne heavily and lightly on each alternate year since. The fruit is of medium size, roundish oblate, regularly formed, skin pale yellow, washed and distinctly striped and splashed with light and dark red. The flesh is white, crisp, juicy, acid; quality fair; season August and September. This fruit is handsome in appearance and always commands a ready sale; valuable for local market and desirable for dessert and cooking purposes. The trees are generally thrifty, hardy, and abundant bearers. The variety is of Russian origin, and of all the apples under cultivation from that country is probably the most useful sort.

BOROVINKA.

Trees of this variety were planted in 1890 and are vigorous, and rather upright in growth. They fruited in 1894, and have since continued to give heavy and light crops on each alternate year. The fruit is large, roundish, oblate; skin pale yellow, washed with dull red in the sun and striped with dark red when fully coloured. The flesh is white, juicy, tender, but rather coarse in texture, sub-acid; quality fair. Season September. This variety possesses no special point of merit, and cannot be said to equal the Duchess of Oldenburg, which it somewhat resembles. It is a hardy tree, of Russian origin.

KESWICK CODLIN.

The trees were planted in 1890, are vigorous upright growers, with a regular round head. They fruited in 1895 and lightly each year since. The fruit is medium to large, somewhat conical and ribbed; skin greenish yellow, becoming light yellow when

matured. The flesh is white, crisp, juicy, pleasantly acid; quality fair. Season August to October. This fruit is a noted English cooking apple and is valuable for that purpose. The fruit can be used for cooking as early as the month of August, thus the season can be extended for some months. This variety is reported as an abundant annual bearer; but, with us one tree only has fruited well, the others only fair.

TITOVKA.

The trees were planted in 1890 and are very vigorous, with upright habit, but branches much spreading. They fruited in 1894 and have borne heavily on alternate years since. The fruit is large, oblong, slightly conical, irregular; skin greenish-yellow, often nearly coloured with deep red, striped with dark red. The flesh is white, crisp, juicy, sub-acid; quality fair. Season September. This variety is of Russian origin. It has no particular merit. It is a thrifty grower and productive.

CANADA BALDWIN.

The trees were planted in 1890 and are upright thrifty growers. They fruited in 1894 and have borne heavy and light crops on alternate years ever since. The fruit is medium in size, roundish, oblate; skin smooth, yellow, striped and splashed with dark red and crimson, purplish-crimson where fully exposed to the sun—covered with numerous white dots. The flesh is very white, sometimes tinged with pink, juicy, mild, sub-acid and of pleasant flavour; quality very good. Season December to March. This variety is exceedingly handsome when well coloured, and is a good sort for home use or commercial purposes. The trees do best on heavy soil, and are liable to sun-scald on light soils. This variety was propagated in 1855 by N. C. Fisk, Abbotsford, P.Q. It originated in the orchard of Alexis Déry, St. Hilaire, P.Q., from seed of *Pomme de fer*.

WINTER ST. LAWRENCE.

The trees were planted in the spring of 1890 and are of vigorous upright growth with round top. They fruited in 1897 and again this year. The fruit is medium in size, round, slightly conical; skin greenish yellow, well covered with light and dark red splashes and broken stripes with white dots. The flesh very white, juicy and soft, brisk, melting, sub-acid; quality good. Season November to February. This is a fine dessert apple, but does not rank as high in quality as the Fameuse, and is not so liable to the spot fungus. It, however, possesses the Fameuse type of flesh. The fruit should be handled carefully when it is harvested. This variety was introduced in 1833 by Wm. Sunn, of Montreal, from Manchester, England, under the name of Mank's Codling and was finally given its present name by the Montreal Horticultural Society about 1873.

HAAS.

This variety, sometimes known as the Fall Queen, was planted in 1890 and has made very vigorous upright growth, forming a symmetrical head. It fruited in 1892, continuing to do so each year since. The fruit is medium to large, oblate, angular, slightly ribbed; skin smooth, pale greenish-yellow, shaded nearly over the whole surface with light and dark red, some rather obscure splashes and stripes, and a few light dots; flesh quite white, juicy, fine-grained, sub-acid, and flavour not liked by many; quality fair. Season September to January. This is a beautiful apple, but, is not generally regarded as good in quality, while not a good dessert apple it is considered a good cooking sort. The trees are thrifty growers, and being abundant annual bearers, are considered a very profitable local market sort. This fruit was originated by Gabriel Cerré near St. Louis, Mo.

WEALTHY.

The trees were planted in 1890, and are vigorous growers with roundish spreading heads. They fruited in 1893, and have borne each year since. The fruit is medium to large, roundish, oblate, slightly conical; skin whitish-yellow, mostly overspread with dark red, obscurely striped, many light dots. The flesh is white, fine-grained, juicy, firm, tender, sub-acid; quality fair. Season October to January. This variety is a vigorous grower, hardy and productive. The fruit is handsome when well coloured and of fair quality. It is valuable for home use or market purposes. It was originated by Peter M. Gideon, near St. Paul, Minn., from seed gathered in Maine about 1860.

LONGFIELD.

The trees were planted in 1890, and are of very spreading growth with drooping branches and vigorous. They fruited in 1893, and have continued to produce heavy crops each year since. The fruit is medium to small, roundish conical; skin bright yellow with pink or brownish red cheek. The flesh is white, juicy, crisp, tender, rather soft, sprightly sub-acid; flavour good; quality good. Season October to January. This apple is good for home use, but it is too small and soft for other than local market purposes. The trees are very thrifty and prolific annual bearers. It is of special value for districts where apples do not grow well. The trees should receive good cultivation and manure. They are liable to set more fruit than the branches can carry, and unless the fruit is thinned they are liable to be broken. This variety was first introduced from Russia in 1870 by the United States Department of Agriculture, and subsequently by Prof. Budd, from different sources in Russia, in 1883.

APORT.

The trees were planted in 1890, are very vigorous growers of upright spreading habit. They fruited in 1894 and lightly each year since. The fruit is large, oblate, conical, regular; skin yellow, faintly streaked with red on the shaded side, but streaked and marked with bright red in the sun, with russet dots and rays of russet extending from the cavity. The flesh is white, juicy, crisp, a little coarse, sub-acid; quality fair. Season October to January. The tree is very thrifty and hardy, but has not been very prolific here. The fruit is large and resembles Alexander very much. The tree, however, is a much better grower than the Alexander, but has not been so prolific. Of Russian origin.

SCOTTS' WINTER.

The trees were planted in 1890 and are very vigorous, rather upright, with spreading branches. They fruited in 1893 and have continued to do so each year since. The fruit is below medium in size, round; skin striped and splashed with dark red. The fruit is whitish-yellow, firm, crisp, tender, acid; quality, fair. Season February to May. This fruit requires good cultivation to be profitable. If allowed to grow in sod, the apples are too small to be of commercial value. They should be manured well. It is a splendid variety for cooking, and fair for eating. Introduced by Dr. T. H. Hoskins, Newport, Vermont.

JONATHAN

The trees were planted in 1890 and are fairly vigorous, of upright spreading habit with drooping branches. They fruited in 1895 and lightly each year since. The fruit is of medium size, roundish, conical; skin smooth, clear light yellow, nearly covered with bright red, shaded into rich dark red in the sun, some light yellow dots. The flesh is white, rarely a little stained with red near the surface, very tender, juicy, with

mild sprightly, sub-acid, vinous flavour; quality good. Season November to February. This is a handsome fruit and is valuable for either market or home use, but is not large. The trees have not made vigorous growth nor fruited heavily here. It originated at Kingston, N.Y.

ONTARIO.

The trees were planted in 1890 and are slow-growing upright trees with spreading branches. They fruited in 1894 and fairly heavy each year since. The fruit is medium to large, oblate, frequently angular and slightly conical; skin whitish-yellow, well covered with bright rich red and some rather obscure stripes and splashes, a few light dots. The flesh is whitish-yellow, juicy, tender, brisk, sub-acid, fine-grained, slightly aromatic; quality good. Season, January to April. This fruit has a splendid appearance and is a good keeper, is valuable as a dessert apple as well as for cooking. The trees are productive, but have not made good growth here. The fruit can be safely recommended as a desirable winter sort for home use or market. It was originated by Charles Arnold, Paris, Ont. by using Wagener Pollen upon the flower of the Northern Spy.

MACINTOSH RED.

The trees were planted in the spring of 1890, and are fairly vigorous with a spreading head. They fruited lightly this season for the first time. The fruit is above medium, roundish, oblate, regular; skin whitish-yellow, nearly covered with dark rich red or crimson, almost purplish in the sun, and sprinkled with a few light lots. The flesh is white, fine grained, very tender, juicy, sub-acid, flavour, mild and pleasant; quality good. Season November to February. This is a very showy fruit and is excellent for market or home use. It is a splendid dessert apple. The tree as grown here is not an abundant bearer.

STRAWBERRIES.

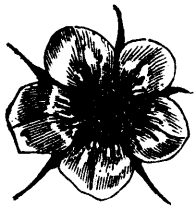


Fig. 2.

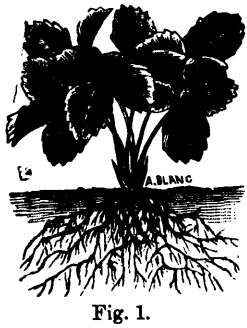


Fig. 1.

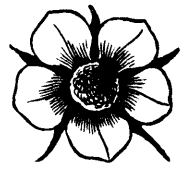


Fig. 3.

A number of varieties of strawberries have been under test at this farm, and a descriptive list is here given of those sorts which possess qualities worthy of notice. The plants are set in rows 3 feet apart with a trowel 1 foot apart in the rows. Care should be taken to plant them properly, so that the crown of the plant will be level with the ground when it is settled. Fig. 1 shows the correct way of setting the plant, the roots should be spread out evenly. The horse cultivator is used as close to the plants as possible during their early growth, and gradually the space disturbed by the cultivator is narrowed as the runners start out and plants are formed at each side. Hand-hoeing is also necessary.

The best results are obtained where one full crop only is taken off the plants and the plantation then ploughed under. Each year a new set of plots are planted. Never allow the weeds to get a start in the strawberry patch the first year, because they will reduce the attempt to grow strawberries to a failure.

The spring has been found to be the best time to plant strawberries, and the experience here discourages fall planting entirely. If the plants have been received from a

distance, mix up some clay soil and water to the consistency of thick paint and dip the roots into it before planting. Never allow the plants to remain where the roots will become dry and their tops wilted. Mulch the plants with about 2 inches of straw, when the ground can be carted over nicely after frozen. The plants seldom winter well without some protection.

Strawberries are divided into two classes, those which have bi-sexual or perfect flowers and those called pistillate or imperfect. Blossoms of the former contain stamens or the male organs, and pistils, or female organs, hence are called perfect or bi-sexual, and are marked B. (see figure 2). The flowers of the latter contain only female organs or pistils and are marked P. (see figure 3). The mistake of planting all pistillate varieties should not be made, as it is quite necessary to have some of the perfect flowering sorts to fertilize their blossoms if a profitable crop is to be obtained. At least one row in every third or fourth should be a perfect flowering variety.

Those sorts which have yielded the best here are:—Warfield, Crescent, H. W. Beecher, Lovett, Beder Wood and Parker Earle. For special culture Brandywine, Wm. Belt and Pearl are worthy of trial.

EXPERIMENTS WITH STRAWBERRIES.

Name.	Sex.	1898.		1899.		1898.		1899.	
		Date of First Picking.	Date of Last Picking.	Date of First Picking.	Date of Last Picking.	Total yield from Plot of 99 sq. feet.		Total yield from Plot of 99 sq. feet.	
						Lbs.	Oz.	Lbs.	Ozs.
Brandywine	B	July 11	July 25	July 19	Aug. 1	8	6	11	9½
Bisel	P	" 11	" 23	" 15	" 1	12	12½	32	7½
Beverly	B	" 11	" 23	" 15	" 1	9	2½	19	5½
Beder Wood	B	" 11	" 25	" 10	" 1	15	½	31	8½
Barton's	P	" 9	" 25	" 11	" 1	9	15½	24	2½
Bubach	P	" 9	" 25	" 15	" 1	12	13	18	9
Captain Jack	B	" 9	" 25	" 17	" 1	16	2½	17	5
Clark's Early	B	" 11	" 23	" 19	July 26	7	10½	11	5½
Chairs	B	" 11	" 25	" 15	Aug. 1	14	7½	15	12
Crescent	P	" 11	" 23	" 11	" 1	22	14½	39	9
Enhance	B	" 11	" 25	" 11	" 1	11	4½	13	9½
Equinox	B	" 16	" 25	" 15	" 1	9	6½	17	4
H. W. Beecher	B	" 11	" 25	" 11	" 1	31	15	37	3
Haverland	P	" 11	" 23	" 15	" 1	9	9	22	8½
Jas. Vick	B	" 11	" 25	" 17	" 1	21	11½	21	9
John Little	B	" 11	" 23	" 12	July 25	17	2½	22	3
Leader	B	" 11	" 23	" 14	" 27	4	6½	7	4
Otsego	P	" 13	" 25	" 15	Aug. 1	10	13	14	6½
Pearl	B	" 9	" 20	" 15	July 26	13	1½	19	6
Paris King	B	" 11	" 23	" 11	" 28	7	11	4	7½
Parker Earle	B	" 9	" 23	" 10	" 27	13	15½	21	5
Robinson	B	" 9	" 23	" 11	" 26	9	2	8	11
Shirts	B	" 11	" 23	" 18	Aug. 1	14	9	15	2
Sharpless	B	" 11	" 25	" 15	" 1	15	5	17	7
Swindle	B	" 11	" 25	" 19	" 1	10	7	28	8
Seneca Queen	B	" 11	" 20	" 11	July 27	4	2	17	14
Thompson's Late	P	" 11	" 18	" 10	" 24	2	2	9	15
Tennessee Prolific	B	" 11	" 25	" 11	" 27	9	8½	19	2½
Wm. Belt	B	" 11	" 25	" 15	Aug. 1	13		14	4½
Warfield No. 2	P	" 11	" 20	" 11	" 1	7	6½	40	
Wilson	B	" 9	" 23	" 17	" 1	12	12	21	4
Williams	B	" 11	" 23	" 17	" 1	13	12	19	15½
Woolverton	B	" 11	" 20	" 10	July 27	2	15½	21	14
Lovett	B			" 10	Aug. 1			35	13
Mary	P			" 15	" 1			22	4
Sandy	B			" 15	" 1			19	6
Eureka	P			" 19	" 1			21	13
Grenville	P	July 11	July 25	" 15	" 1	9	6½	17	4

DESCRIPTION OF VARIETIES.

Brandywine (perfect), dark crimson, large, very firm; quality good. This is a late variety and has not been productive here. It is reported fairly so by many growers. Its shipping qualities colour and quality make it an ideal berry in other respects. Should be more generally cultivated.

Beverly (perfect). Dark scarlet; medium to large; firm; quality fair to good. This variety is a thrifty grower. The fruit is large at the first of the season, but soon gets much smaller. The tips of the berries do not ripen well. It is a good shipping variety and a splendid colour when well ripened; but the unripe end on the fruit greatly lessens its value.

Fig. 4.—Beder Wood.

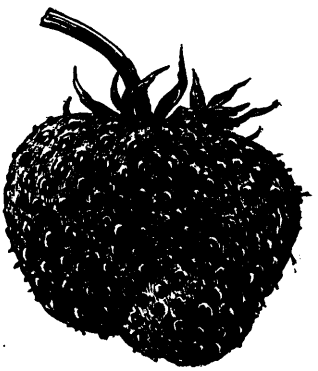


Fig. 5—Bubach.

Beder Wood, see figure 4 (perfect), light scarlet colour; rather soft; of medium size; quality fair. Will not stand distant shipment, but all right for home markets. The plants are very thrifty and productive; and the variety seems better adapted to a variety of soils than many of the sorts tested. It seems to be be productive when the season is not favourable for many of the other sorts. Especially useful as a pollenizer for imperfect sorts.

Bissel (pistillate). Dark red; large to medium; moderately firm; quality fair. This is a strong vigorous grower and quite productive. It stands shipment well. A prominent sort.

Bubach (pistillate) see figure 5. Scarlet; large; inclined to be soft; quality fair. It likes good soil and high cultivation. If neglected it yields light crops. It sets few plants and is of special value for hill culture. The fruit is very large and handsome.

Crescent (pistillate). Bright scarlet; small to medium; moderately firm; quality fair. This variety is quite largely grown for market purposes. It is very productive and ships well. It has a long season, the fruit however, gets very small towards the end of the season, and in many localities other sorts producing larger fruit are taking its place.

Haverland (pistillate) see figure 6. Bright scarlet; medium firm; above medium in size; quality good. This is a strong growing variety, but has not been very prolific here until this season. It is a splendid fruit for local markets, but does not stand long shipment well. It is of special value for hill culture.

H. W. Beecher (perfect). Crimson; large to medium; fair quality; medium firm. This is a prolific variety here and very thrifty. The fruit will not stand long shipment, but is all right for local market; a valuable sort.

Gandy (perfect). Bright crimson; large; firm; fair quality. This variety is largely planted as a late sort. The plants are only fairly productive. A good shipper.

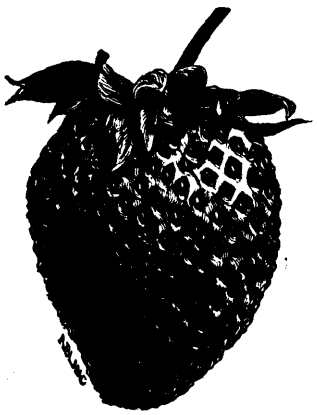


Fig. 6.—Haverland.

Fig. 7.—Parker Earle.

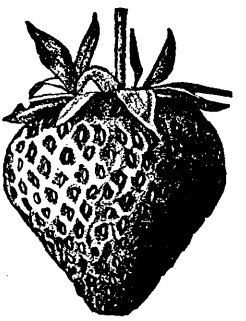


Fig. 8.—Wilson.

Grenville (pistillate). Dark red; medium firm; medium to large, and rather below fair in quality. This variety has splendid colour, and is valuable for local market. It has not been very productive here, but is reported a good yielder by many growers.

Lovett (perfect). Bright red colour; above medium size; quality fair. This is a healthy, strong growing variety and very productive. It is valuable for local shipment or home use. It is an excellent variety for fertilizing pistillate sorts. Should be more largely grown.

Parker Earle (perfect), fig. 7. Dark scarlet; rather soft, quality fair; large size. It is valuable for near local market, and when given rich soil, with good culture, the fruit is very large and the plants productive. A vigorous growing variety, but not suited to poor ground

Pearl (perfect). Dark, rich colour; rather soft; of fair quality; large. This sort has very large and handsome fruit, but does not stand shipment well. It has not been very prolific here. Valuable for special market culture.

Fig. 9.—Woolverton.

Fig. 10.—Williams.

Sharpless (perfect). Dark scarlet; large; moderately firm. This sort is quite extensively grown by many shippers, and is a splendid variety to fertilize pistillate sorts with. It is considered prolific, but has not done well here.

Wilson (perfect), fig. 8. Deep crimson; medium size; firm; fair quality. This variety is an old standard sort, still extensively grown for shipment. It is firm and stands long shipment, but being quite acid is not generally liked. A vigorous grower and prolific.

Wm. Belt (perfect). Bright crimson, large to medium; quality fair; moderately firm. This variety has been fairly productive and some of its fruit is very large and quite attractive. Of special use for fancy culture or special market.

Woolverton (perfect), fig. 9. Crimson; medium to large; moderately firm; quality fair. This variety has not fruited very well here. It is generally considered to be a prolific sort, and stands shipment well. A vigorous grower, but makes few runners.

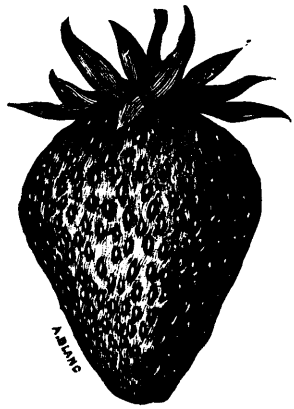


Fig. 11.—Warfield.

Williams (perfect), fig. 10. Dark red; medium size; moderately firm; quality fair. It is a vigorous variety, fairly productive, and stands shipment well. The fruit does not ripen up well at the tips, which somewhat lessens its value.

Warfield (pistillate), fig. 11. Dark rich colour of medium size; moderately firm and fair quality. This is a very productive sort. It sets very many plants and to get the best results some of the runners should be cut when forming. The fruit stands shipment well and takes well on the market. A desirable sort.

AGRICULTURAL MEETINGS.

I attended the annual meeting of the Nova Scotia Fruit Growers' Association at Wolfville, N.S., on February 20, 21, and 22. I also addressed agricultural meetings at the following places:—

January 10, Campbellton, N.B.
" 11, Millerton, Northumberland County, N.B.
" 12, Napan, Northumberland County, N.B.
" 13, Bass River, Kent County, N.B.
" 14, Harcourt, Kent County, N.B.
" 16, West Branch, Kent County, N.B.
" 19, Melrose, Westmorland County, N.B.
" 20, Bayfield, " "
" 23, Coverdale, Albert County, N.B.
" 24, Salem, Albert County, N.B.
" 25, Riverside, Albert County, N.B.
" 26, Salisbury, Westmorland County, N.B.
April 4, Durham, Pictou County, N.S.

I have the honour to be, Sir,

Your obedient servant,

W. S. BLAIR,

Horticulturist.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

BRANDON, MAN., November 30, 1899.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my twelfth annual report, with details of the experiments undertaken and work accomplished on the Brandon Experimental Farm during the past year.

The past season opened very unfavourably ; seeding did not commence until April 15, it was stopped by snow on the 19th of that month; and was not resumed until the 24th.

May was unusally wet and cloudy, with a low temperature, and seeding was frequently interrupted by rain. In low lying spots some injury was sustained from the flooding and subsequent caking of the soil.

Rain was abundant during early June, followed by bright warm weather later in the month ; growth was therefore rapid, cultivated grasses making an unusually good showing.

The temperature and rainfall during July and August was about normal. Although the temperature dropped to 38 early in August, no injurious frost was experienced until September 22, by which time one of the finest crops of grain ever raised in the province was safely harvested.

The yield of all kinds of grain on the Experimental Farm was above the average and the quality was excellent, being free of frosts, bright in colour and heavy. The crop of hay was also excellent and it was all stacked in good condition.

The fall months being unusually dry, the root crop was a small one and the product is not keeping as well as usual.

WHEAT.

The wheat crop of the past year has been remarkably uniform in character throughout the province, no very small returns being reported from any district and phenomenally large yields were also rare. The quality of the grain was much above the average, very little being damaged during harvest or in the stacks. In certain districts, slight injury was caused from bleaching in the stook ; this is partially accounted for by the inadequate supply of threshing outfits and the very risky practice of threshing from the stook.

A few districts report injury from the Hessian fly, something almost unknown in former years. On recommendation of Dr. Fletcher, farmers whose crops have suffered from this cause were advised to practice deep fall ploughing so as to bury the insect and so prevent its appearance above ground next spring.

No injury was apparent on this farm from this insect.

There was a very small amount of injury from rust on the Experimental Farm during the season, only six varieties were thus injured, the straw of nearly all other varieties was bright and stiff.

The loss from the bunt or hard smut in wheat was less than in any year since the establishment of the farm,—only in one variety of which only a small plot was grown—was it noticeable.

Loose smut was, however, more prevalent than usual, but the loss from this cause was not large and unlike hard smut this kind does not seriously injure the grain for milling purposes.

The wheat sample on this farm was much above the average, the berry was plump and bright. Owing to the soil being thoroughly saturated in the late spring, there was very little trouble from the drifting of soil by wind ; the increased area being sown with Brome Grass and filling the soil with fibrous roots also helps to lessen this evil.

EXPERIMENTS WITH WHEAT.

Roumanian and *Goose wheat* gave the largest returns. These are for all practical purposes identical, but not being valuable for milling, cannot be recommended for general cultivation. Six cross-bred varieties came next in productiveness and five of these mature very early,—Dawn ripening in 107 days

Early Riga, a wheat grown here for the first time this year, proved the quickest to mature of any variety tested on this farm, taking only 101 days, or 20 days earlier than Red and White Fife. This should prove a promising kind for districts troubled with early frosts ; it has a good appearance and is beardless.

Blue Stem is being highly recommended in some parts of this province, and a very pure sample of this variety was procured from an extensive grower of this wheat in Dakota and sown in close proximity to Red Fife. It will be noticed that it is a little later than Red Fife and not so productive.

The small returns from Polonian is largely due to poor germination. Fifty-six varieties of spring wheat were included in this test.

The land was summer-fallowed the previous year, the size of the plots was one-twentieth acre each, the soil a rich black sandy loam. All the varieties were sown from April 29, to May 1.

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SPRING WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
			In.		In.		Lbs.	Bush. Lbs.	Lbs	
Roumanian	Aug. 30	121	46	Weak	2½	Bearded	3,940	54 20	65	Little.
Goose	" 29	122	48	"	3	"	3,680	50 20	64½	"
Crown	" 20	112	39	Stiff	3	"	4,060	45 40	61	"
Laurel	" 30	121	45	Weak	3½	Beardless.	3,960	44 ..	59	Very little.
Dawn	" 15	107	35	Stiff	3½	"	3,420	43 ..	61	None.
Huron	" 20	112	42	"	3½	Bearded	3,660	42 20	61	Considerable.
Countess	" 20	113	38	"	3	Beardless	4,000	41 40	61½	Little.
Byron	" 18	109	38	"	3½	Bearded	3,520	41 20	61½	None.
Pringle's Champlain	" 26	118	36	Weak	3	"	4,340	41 ..	60½	Little.
Advance	" 20	113	42	Stiff	3	"	4,170	40 30	60	Badly.
Wellman's Fife	" 28	120	41	"	3	Beardless.	4,390	40 10	60	Very little.
White Russian	" 28	121	40	"	3	"	4,120	39 40	60	"
Monarch	" 28	121	44	"	3½	"	4,620	39 40	60	"
Rio Grande	" 25	118	44	"	4	Bearded	4,020	39 40	61	Little.
White Fife	" 28	121	41	"	3	Beardless.	4,160	39 ..	61	"
Crawford	" 19	110	40	Fair	3	"	2,860	39 ..	61	"
Preston	" 20	112	38	Stiff	3	Bearded	3,580	38 40	60	"
Fraser	" 14	105	34	"	2½	"	3,080	38 40	61	None.
Red Fife	" 28	121	41	"	3	Beardless.	4,210	38 30	61	"
White Connell	" 28	121	48	"	3	"	3,590	38 30	60½	"
Blue Stem	Sept. 1	123	40	"	3	"	3,720	38 ..	60	"
Dion's	Aug. 25	118	43	"	3½	Bearded	4,820	38 ..	61½	Little.
Norval	" 18	109	42	"	3	"	4,140	37 40	60	None.
Hungarian	" 26	118	40	Weak	3	"	2,950	37 30	61½	Little.
Dufferin	" 20	113	42	Stiff	4	"	3,650	37 30	61	None.
Harold	" 14	105	38	"	3	"	2,960	37 20	60½	"
Ebert	" 17	108	35	"	3½	Beardless.	2,360	37 20	61	"
Early Riga	" 10	101	41	"	4	"	2,560	37 20	60½	"
Blair	" 19	111	39	V. weak	3½	"	2,860	37 20	61	Badly.
Admiral	" 20	113	45	Stiff	3	"	3,770	37 10	60½	None.
Captor	" 22	113	40	"	2½	"	3,680	37 ..	58½	"
Mason	" 19	111	40	Weak	3	"	3,280	37 ..	61½	Little.
Stanley	" 20	113	45	Stiff	3½	"	3,420	36 20	59½	None.
Progress	" 20	112	36	Stiff	3	Beardless.	3,520	36 20	60	Little.
Alpha	" 20	111	45	"	3¼	"	3,640	36 ..	59	"
Weldon	" 20	111	36	V'y stiff	3	"	4,040	36 ..	60	None.
Clyde	" 28	119	42	Stiff	3½	"	3,840	36 ..	60	"
Plumper	" 18	109	39	"	2½	Bearded	2,780	35 20	61½	Little.
Campbell's White Chaff	" 20	112	40	"	2½	Beardless.	4,480	35 20	59	Badly.
Emporium	" 28	119	43	"	4	"	3,990	35 10	60½	Little.
Red Fern	" 27	118	43	"	4	Bearded	4,700	35 ..	60	"
Blenheim	" 20	113	40	"	3	"	3,500	35 ..	59	Considerable.
Rideau (White Chaff)	" 20	112	42	"	3½	Beardless.	3,020	34 40	59	Little.
Club	" 18	109	34	F'y stiff.	2	"	3,720	34 40	58½	None.
Beauty	" 26	119	38	Stiff	3	"	4,020	34 40	58	Very little.
Black Sea	" 17	109	40	Fair	3	Bearded	4,120	34 40	58	None.
Percy	" 18	109	46	Stiff	3½	Beardless.	3,140	34 20	59	Little.
Golden Drop,	" 20	112	40	"	3½	"	4,780	33 40	58½	"
Ladoga	" 18	110	38	Weak	3½	Bearded	3,120	33 ..	58	None.
Herisson Bearded	" 26	118	42	V. weak	1½	"	3,430	32 50	61	Little.
Vernon	" 24	115	40	Stiff	3	"	3,430	32 50	57	"
Colorado	" 20	113	44	Fair	4	"	3,540	32 40	60½	"
Red Swedish	" 29	120	42	Weak	3½	"	3,580	30 20	57	None.
Beaudry	" 16	108	30	V. weak	3	"	4,420	29 40	60	Badly.
Polonian	" 29	120	45	Weak	5	Beardless.	720	18 ..	56	None.

AVERAGE Results of a Five Years Test of 30 Varieties of Wheat.

Name of Variety.	Years included.	Average Yield Per Acre.	
		Bush.	Lbs.
Goose Wheat	1895-96-97-98-99	40	34
White Fife	"	39	4
Crown	"	37	22
Red Fife	"	37	10
Monarch	"	36	56
Preston	"	36	37
Pringle's Champlain	"	35	58
White Connell	"	35	40
Rio Grande	"	35	22
Hungarian Mountain	"	35	8
White Russian	"	34	2
Wellman's Fife	"	33	58
Advance	"	33	46
Admiral	"	32	48
Stanley	"	32	12
Red Fern	"	32	8
Percy	"	32	4
Alpha	"	31	34
Blenheim	"	31	30
Emporium	"	31	18
Dions	"	30	48
Golden Drop	"	30	42
Herisson Bearded	"	30	40
Rideau	"	30	..
Colorado	"	29	58
Captor	"	27	54
Ladoga	"	27	44
Campbell's White Chaff	"	27	30
Black Sea	"	27	14
Beaudry	"	25	51

FIELD Plots of Wheat all sown on backsetting, soil clay loam.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Yield per Acre.		Weight per Bushel.
					Inches.	Bush.	Lbs.	Lbs.
Stanley	2 acres.	April 25	Aug. 17	114	42	32	22	61
Dufferin	1 "	" 28	" 21	115	39	30	18	60
Percy	2 "	" 25	" 14	111	40	29	45	60
Monarch	1 "	May 1	" 28	119	40	29	31	60
Advance	2 "	April 28	" 20	114	38	28	44	60
Red Fife	2 "	May 2	" 23	113	39	25	29	62
Ladoga	1 "	" 1	" 28	119	36	24	6	59½

Usually spring ploughing gives a better yield of wheat than land ploughed in the fall, but the past season was exceptional and for once fall ploughed land gave the best return.

As a more reliable guide the average returns for four years is also given.

Both tables show the advantage of summer-fallowing land.

This year's test was made on plots of $\frac{1}{10}$ acre each, the soil was a sandy loam. All were sown on May 1.

LAND ploughed for Wheat at different seasons of the year.

Name of Variety.	How Treated.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw. per plot.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Red Fife	Summer-fallowed.	Aug. 28..	119	41	Stiff ..	3	Beardless.	210	41	10	61
" ..	Fall-ploughed ...	" 22..	113	38	" ..	3	" ..	285	38	10	62½
" ..	Spring-ploughed..	" 25..	116	43	" ..	4	" ..	290	36	40	61½

AVERAGE RESULTS of Wheat from spring and fall-ploughed land, as compared with summer fallow, four years' test.

How Prepared.	Years included.	Average Yield per Acre.		Average Days Maturing.
		Bush.	Lbs.	
Summer-fallow	1895, 1897, 1898, 1899	41	9	124
Spring-ploughed	1895, 1897, 1898, 1899	31	22	116
Fall-ploughed	1895, 1897, 1898, 1899	28	40	118

RESULTS OF THE PLOUGHING UNDER OF GREEN CROPS.

To gain information on this subject a ten-acre field was set aside for this test in 1898.

The field was divided into twenty half acre plots and as the soil was not very uniform, check plots of summer-fallow and oats were interspersed in 1898 at regular intervals, thus giving better opportunities for comparison.

The green crops were generally ploughed under when in blossom; the only exceptions being the Rape and Brome Grass, these were turned under during August.

The soil of this field was a rich moist sandy loam which had borne a crop of oats in 1897. This year the whole area has been sown with Wellman's Fife wheat.

No. of Plot.	1899 Crop. Variety.	Previous Crop (1898).	How Previous Crop was Treated.	Wheat Sown.	Wheat Ripened.	No. of Days Maturing.	Yield per Acre.		Weight per Bushel.
							Bus.	Lbs.	Lbs.
1	Wellman's Fife ..	Mammoth Red Clover.	Ploughed under green.	May 16.	Aug. 28.	104	29	24	60
2	" " ..	Summer-fallow..	No crop in 1898.	" 16.	" 28.	104	35	40	60
3	" " ..	Common Red Clover..	Ploughed under green.	" 16.	" 27.	103	29	54	60
4	" " ..	Oats	Crop harvested	" 16.	" 26.	102	26	56	60
5	" " ..	Alsike Clover	Ploughed under green.	" 16.	" 27.	103	32	20	60
6	" " ..	Summer-fallow	No crop in 1898.	" 16.	" 28.	104	35	14	60
7	" " ..	Alfalfa	Ploughed under green.	" 16.	" 27.	103	28	14	60
8	" " ..	Oats	Crop harvested	" 16.	" 26.	102	27	12	60
9	" " ..	Sweet Clover	Ploughed under green.	" 16.	" 27.	103	25	18	60
10	" " ..	Summer-fallow	No crop in 1898	" 16.	" 28.	104	33	24	60
11	" " ..	Tares	Ploughed under green.	" 16.	" 27.	103	34	32	60
12	" " ..	Oats	Crop harvested	" 16.	" 26.	102	23	48	60
13	" " ..	Rye	Ploughed under green.	" 16.	" 27.	103	33	22	60
14	" " ..	Summer-fallow	No crop in 1898.	" 16.	" 28.	104	32	34	60
15	" " ..	Rape	Ploughed under green.	" 16.	" 30.	106	34	20	60
16	" " ..	Oats	Crop harvested	" 16.	" 27.	103	24	32	60
17	" " ..	Pease	Ploughed under green.	" 16.	" 30.	106	35	58	60
18	" " ..	Summer-fallow	No crop in 1898.	" 16.	" 31.	107	35	40	60
19	" " ..	Buckwheat	Ploughed under green.	" 16.	" 29.	105	30	22	60
20	" " ..	Brome Grass	" " ..	" 16.	" 29.	105	24	50	60

AVERAGES.

	Yield per acre. Bush.	Lbs.
Results from summer fallow	34	30
" leguminous plants ploughed under	31	00
" other plants ploughed under	30	43
" oats harvested	25	37

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Owing to a heavy rain storm in June only five successive sowings were made this year.

The results obtained with wheat were similar to those of last year. In each case the earliest sown wheat gave the largest crop; the first sown, Red Fife, yielded 38⅓ bushels with a gradual reduction to 25⅓ bushels for the last sown. The weight per bushel also lessened in the same manner.

In every instance the Red Fife gave a larger return than the Stanley, but the latter variety ripened earlier, averaging about 5 days for each sowing.

Only the last sown plot of Red Fife showed injury from frost.

The size of the plots was one-twentieth acre each, and the soil a rich black loam which had been summer-fallowed.

WHEAT—Sown at different dates.

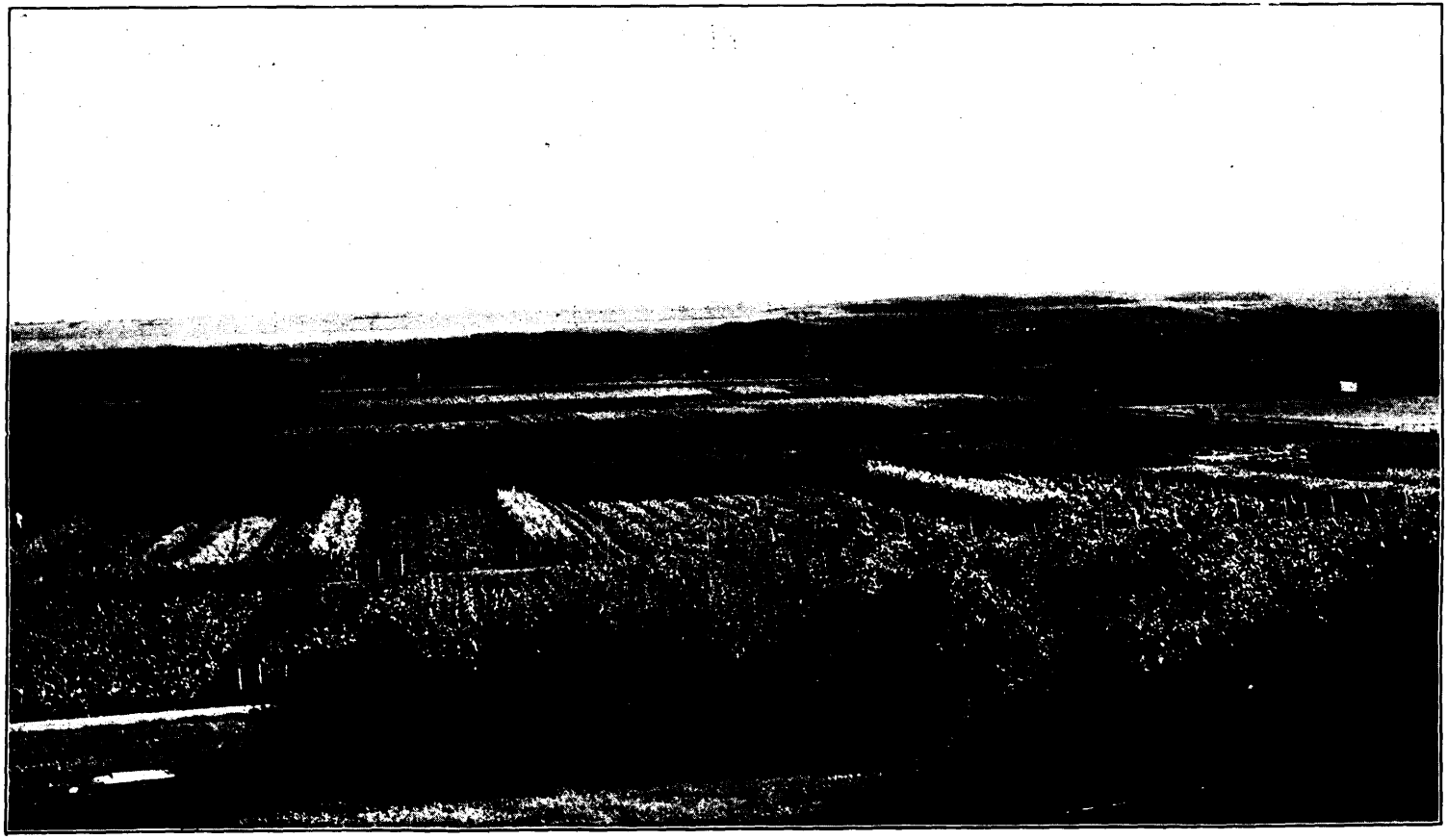
Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
Red Fife	May 1	Aug. 24	115	36	Stiff..	3	3,400	38	20	61	Considerably.
"	" 8	" 29	113	34	" ..	3½	3,520	34	40	60½	Slightly.
"	" 15	Sept. 2	110	29	" ..	3½	2,980	32	..	59½	"
"	" 22	" 5	106	36	" ..	3½	2,740	29	20	59½	"
"	" 29	" 11	105	44	" ..	3½	2,680	25	20	52	"
Stanley	" 1	Aug. 20	111	38	" ..	3	3,290	33	..	59	"
"	" 8	" 24	108	42	" ..	4	3,270	30	30	58½	"
"	" 15	" 27	104	33	" ..	3	3,380	28	..	58½	"
"	" 22	Sept. 1	102	37	" ..	3½	2,520	23	..	58½	"
"	" 29	" 6	100	36	" ..	3½	2,360	20	40	58½	"

OATS SOWN AT DIFFERENT DATES.

Usually the second sown plot of oats gives the largest crop, but this year the third sowing takes the lead with each variety. The weight per bushel was also heavier from the third sowing.

The last sowing of Banner and the two last sowings of Abundance were injured by rust; all were treated with formalin, and there was no smut.

The land for this test was summer-fallowed, the soil a sandy loam, and the size of the plots were $\frac{1}{20}$ acre each.



View on Experimental Farm, Brandon, Man.—Showing experimental plots of Roots and Grain.

OATS—SOWN AT DIFFERENT DATES.

Name of Variety.	Date of Sowing.	Date of Ripening	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per Acre.	Weight pe Bushel.	Rusted.
				Inches		Inches	Lbs.	Bush. Lbs.	Lbs.	
Banner	May 1.	Aug. 17.	108	42	Stiff..	9	3,780	94 24	38½	Slightly.
"	" 8.	" 24.	108	43	"	10	4,280	91 26	39½	"
"	" 15.	" 29.	106	45	"	10	3,800	99 24	40	"
"	" 22.	Sept. 3.	104	46	"	8	3,560	95 10	39	"
"	" 29.	" 7.	101	42	"	8	3,530	87 12	38	Badly.
Abundance	" 1.	Aug. 18.	109	40	"	9	3,460	92 12	39	Slightly.
"	" 8.	" 24.	108	40	"	7	3,280	91 26	38½	"
"	" 15.	" 29.	106	48	"	9	3,960	95 10	40	"
"	" 22.	Sept. 2.	103	46	"	8	3,250	92 22	38½	Considerably.
"	" 29.	" 5.	99	50	"	9	2,740	87 2	37	Badly.

BARLEY SOWN AT DIFFERENT DATES.

The results from the sowing of barley in this test are not as uniform as with other sorts of grain.

The size of these plots was also $\frac{1}{20}$ acre each, and the soil a rich loam which had been summer-fallowed.

BARLEY—SOWN AT DIFFERENT DATES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush. Lbs.	Lbs	
Odessa	May 1	Aug. 7	98	33	Fair..	2½	6-rowed.	3,570	56 42	50	Slightly.
"	" 8	" 11	95	29	"	2¼	"	2,920	62 4	49	"
"	" 15	" 18	95	35	"	3	"	2,900	56 12	49	"
"	" 22	" 24	94	32	"	3	"	3,030	57 34	49	"
"	" 29	" 28	91	33	"	3	"	3,220	55 40	49	"
Canadian Thorpe	" 1	" 16	107	30	Stiff..	3	2-rowed.	3,500	56 12	50½	None.
"	" 8	" 18	102	33	"	3	"	2,560	55 ..	50	"
"	" 15	" 24	101	32	"	3	"	3,070	56 42	49½	"
"	" 22	" 29	99	31	"	3	"	3,490	54 18	48½	"
"	" 29	Sept. 5	99	34	"	3	"	3,470	50 30	48	"

PEASE SOWN AT DIFFERENT DATES.

The size of the plots for this test was $\frac{1}{20}$ acre, and the soil a stiff black loam, which had been summer-fallowed.

PEASE—SOWN AT DIFFERENT DATES.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	In.		Bush.	Lbs.	Lbs.
Mummy	May 1	Aug. 24	115	Fair	27	2½	Medium	35	30	62
"	" 8	Sept. 1	116	"	28	2½	"	40	10	61½
"	" 15	" 5	113	"	28	2	"	43		63½
"	" 22	" 7	108	"	27	2	"	43	40	63½
"	" 29	" 7	101	"	20	2½	"	42	50	63
Golden Vine	" 1	Aug. 16	107	Rank	32	2	Small	41	30	63
"	" 8	" 24	108	"	45	2½	"	42	30	63
"	" 15	Sept. 1	109	Weak	35	2½	"	44		63
"	" 22	" 4	105	"	32	2½	"	41	40	63
"	" 29	" 8	102	"	34	2	"	42	20	63

ROTATION PLOTS.

This series of plots reported on last year has been continued. The first four plots have retained their respective positions on the schedule. The changed positions of the others is consequent on the past season being a summer-fallowed year with two of them. Plot 1 still shows the advantage of a hoed crop intervening between two crops of wheat.

All but the summer-fallowed land was ploughed in the spring.

The size of the plots in this test was $\frac{1}{10}$ acre, the soil an average sandy loam.

8a—19½

Number.	1895.				1896.				1897.				1898.				1899.				Total Value.
	Crop.	Bush.		Value.	Crop.	Bush.		Value.	Crop.	Bush.		Value.	Crop.	Bush.		Value.	Crop.	Bush.		Value.	
		Bush.	Lbs.	$ cts.		Bush.	Lbs.	$ cts.		Bush.	Lbs.	$ cts.		Bush.	Lbs.	$ cts.		Bush.	Lbs.	$ cts.	$ cts.
1	Wheat....	45		22 50	Turnips. .	453	..	22 65	Wheat....	23	30	11 75	Corn.....	22 t'ns		44	Wheat....	31	40	15 83	116 73
2	"	22	30	11 25	Oats.....	83	28	20 95	"	13	10	6 58	Oats.....	60	20	15 14	" ...	27	..	13 50	67 42
3	"	16	30	8 25	Wheat....	33	40	16 83	"	22	40	11 33	Wheat....	27	50	13 91	"	19	10	9 58	59 90
4	Barley....	38	26	9 63	"	28	30	14 25	Oats.....	35	..	8 75	Barley....	40	20	10 10	"	24	50	12 42	55 15
5	Wheat...	45	50	22 91	Fallow	...	...	.....	Wheat....	27	50	13 91	Fallow....	.....		.....	" ...	35	..	17 50	54 32
6	Fallow ...	.....		....	Wheat....	36	40	18 33	Oats.....	37	22	9 41	" .. .	....	...	.....	"	33	30	16 75	44 49
7	" ...	.....		.....	"	34	10	17 8	Barley....	22	4	5 52	Oats.....	64	24	16 17	Fallow....	..	.....	.....	38 77
8	" ...	.....		... .	"	28	50	14 41	Oats.....	36	6	9 04	"	56	20	14 19	" . ..	..	. ..	.....	37 64

OATS.

The yield of oats has been very satisfactory throughout this province during the past season. Although not as important as wheat, still the sales of this grain for oatmeal and feeding purposes are increasing each year, and will probably continue to do so if a sufficient quantity of No. 1 grade is grown. A fairly pure and clean sample of heavy Manitoba oats is looked upon with much favour by oatmeal millers throughout the Dominion, and finds ready sale at remunerative prices; but much of the oats offered are smutty, badly mixed with wheat, and below the standard in weight. This is largely the result of farmers growing this grain on land partly exhausted by repeated crops of wheat, instead of sowing them in the order of a regular rotation. On this farm it is found that no more than two crops of wheat should precede the oat crop, the first crop of wheat, of course, being sown on fallow. A thorough disc-harrowing of the wheat stubble in the fall will usually start any shed grain from the previous crop and greatly lessen the amount of volunteer wheat among the oats.

Very satisfactory results have been obtained on this farm from growing oats intended for seed on new land. This plan gives clean and plump seed and may be preferable to the plan of obtaining a change of seed from a distance with its attendant risk of introducing foul weeds and an unproductive variety.

These tests were made with seventy-three varieties on plots of one-twentieth acre each, the soil was sandy loam summer fallowed, two bushels of seed was used per acre, sown with a shoe drill, and all the plots were sown on May 10.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
New Electric	Aug. 24	106	40	Stiff	9	Branching	3,720	120		38	Slightly.
Miller	" 22	104	42	Fair	8	"	4,640	113	18	38½	None.
Banner	" 24	106	48	Very stiff.	7½	"	4,060	110	10	39	Slightly.
Buckbee's Illinois	" 27	109	48	Very weak	9	"	4,680	109	24	37½	Badly.
American Beauty	" 24	106	46	Stiff	10	"	3,500	108	28	38	Slightly.
Early Maine	" 23	105	39	Very weak	9	"	3,940	107	22	37	Badly.
Hazlett's Seizure	" 22	104	46	Fair	8	"	4,880	106	16	40	Very badly.
Poland	" 15	97	42	"	9	"	3,720	105	20	40	None.
King	" 24	106	42	Stiff	7	"	4,010	105	20	37	Slightly.
Wide Awake	" 20	102	47	"	9	"	4,380	103	28	37	"
Golden Beauty	" 23	105	44	Weak	7	"	4,720	102	12	38	Considerably.
Improved Ligowo (Imp.)	" 24	106	43	Stiff	7	"	3,280	100	20	40½	Slightly.
Early Archangel	" 22	104	44	Fair	8	"	4,240	98	28	40	Very badly.
Bavarian	" 22	104	44	Weak	8	"	5,050	98	18	37½	"
Abundance	" 24	106	46	Stiff	8	"	3,060	98	8	38	Slightly.
Early Blossom	" 28	110	48	"	8	Half-sided	5,680	94	24	38	Considerably.
Salines	" 29	111	48	Fair	8	Branching	4,580	94	24	35	Slightly.
Early Gothland	" 21	103	49	Stiff	9	Half-sided	4,420	93	18	41	Considerably.
American Triumph	" 22	104	43	Fair	9	Branching	3,430	93	8	37	"
Lincoln	" 22	105	45	Stiff	8	"	3,940	92	32	40	"
Bonanza	" 14	96	36	"	7	"	3,660	92	22	41	Slightly.
White Schonen	" 20	102	42	"	10	"	3,460	92	12	38	Considerably.
Russell	" 23	105	44	"	9	Hf.-b'hing	4,080	92	2	40	Slightly.
Holstein Prolific	" 22	104	45	"	9	Branching	2,870	92	2	38	Considerably.
Winter Grey	" 15	97	36	"	7	"	3,500	91	6	42	None.
Golden Tartarian	" 28	110	40	"	9	Sided	2,320	90	20	36	Considerably.
Abyssinia	" 24	106	50	"	9	Half-sided	4,440	90	10	41	Slightly.
Oderbruch	" 24	106	46	"	8	"	4,040	90	10	40	"
Golden Giant	" 31	113	49	"	10	Sided	4,280	89	4	35	"
Master	" 19	101	46	Very stiff.	8	Half-sided	4,280	88	28	39	"
Columbus	" 18	100	31	Fair	6	Branching	2,980	88	28	37	"
Early Golden Prolific	" 22	104	41	Stiff	8	"	2,740	86	36	38	Badly.
Danish Island	" 22	104	48	"	9	"	3,450	86	26	38	Slightly.
Siberian, O.A.C.	" 20	102	40	"	9	"	3,560	86	26	37½	"

OATS—TEST OF VARIETIES—*Concluded.*

Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Welcome	Aug. 14	96	42	Stiff	9	Branching	2,860	86	26	41	None.
Improved American	" 18	100	36	"	8	"	2,860	86	16	37	"
White Giant	" 18	100	36	"	9	"	3,460	86	16	38	"
Medal	" 24	106	50	Very stiff.	10	Half-sided	3,680	86	6	38½	Slightly.
Coulommiers	" 31	113	48	Weak	10	Branching	5,120	84	24	37	"
Improved Ligowo	" 18	100	36	Fair	6	"	2,720	84	24	41	None.
Imported Irish	" 17	99	47	Very stiff.	9	"	3,540	84	14	41	"
Wallis	" 22	104	48	Fair	9	"	3,630	84	14	35½	Considerably.
New Zealand	Sept. 2	115	46	"	12	Half-sided	2,760	83	28	35	Badly.
Mennonite	Aug. 19	101	41	Stiff	8	Branching	4,160	83	18	35½	None.
Black Beauty	" 22	104	42	Very weak	11	"	2,780	82	32	36	Badly.
Newmarket	" 18	100	37	Very stiff.	7	"	2,380	82	32	40	None.
Black Tartarian	" 28	110	48	Fair	9	Sided	3,980	82	32	35	Considerably.
Holland	" 31	113	43	Stiff	10	"	3,250	80	30	34	Slightly.
Prolific Black Tartarian	" 28	110	48	Fair	8	"	3,860	80	20	35	Considerably.
California Prolific Black	" 28	110	48	"	8	"	4,080	80	..	36	"
Brandon	" 24	106	46	Stiff	9	Half-sided	4,100	79	24	40	Slightly.
Oxford	" 24	106	46	"	8	"	3,720	79	4	42	"
White Russian	" 26	108	48	Fair	9	Branching	4,810	79	4	39	"
Thousand Dollar	" 16	98	38	Stiff	8	"	3,140	78	8	39	None.
Pense	" 27	109	47	"	9	Half-sided	3,940	78	8	38½	Slightly.
Rennie's Prize White	" 16	98	40	"	9	Branching	3,100	76	16	43	None.
California Prolific Black	" 28	110	48	Very weak	8	Sided	4,310	76	6	34	Very badly.
Prize Cluster	" 14	96	43	Stiff	9	Branching	3,320	76	6	43	None.
Joanette	" 22	104	42	Weak	7	"	3,840	75	10	37	Slightly.
Cream Egyptian	" 14	96	42	Stiff	10	Half-sided	3,380	74	4	43	None.
White Wonder	" 13	95	45	"	9	Branching	3,420	72	32	43	Slightly.
Mortgage Lifter	" 10	92	37	"	8	"	2,730	72	22	40½	"
Cromwell	" 22	104	36	"	8	"	2,540	72	12	37½	"
Olive	" 26	108	48	Fair	7	Half-sided	3,860	72	2	38	"
Kendal	" 28	110	48	"	9	Sided	3,560	71	26	37	"
Scottish Chief	" 10	92	40	Very stiff.	9	Branching	2,460	71	26	42½	"
Flying Scotchman	" 16	98	44	"	8	"	3,280	71	6	39½	None.
Black Mesdag	" 10	92	38	Stiff	9	"	2,580	69	14	36	"
Milford	" 26	108	48	Fair	8	Sided	4,080	68	8	37½	Slightly.
Early Dawson	" 16	98	46	Stiff	10	Branching	2,370	65	20	43	None.
Rosedale (injured)	" 22	104	34	Fair	6	Half-sided	4,200	58	18	39	Slightly.
Doncaster Prize	" 18	100	33	Stiff	8	Branching	3,540	57	22	39	"
Victoria Prize	" 10	92	39	"	9	"	1,880	56	26	41	"

AVERAGE RESULTS of a five years' test of twenty-eight varieties of Oats.

Name of Variety.	Years Included.	Average Yield per Acre.	
		Bush.	Lbs.
Banner	1894-95-96-98-99	97	6
Abundance	1894-95-96-98-99	85	14
Holstein Prolific	1894-95-96-98-99	85	12
Golden Beauty	1894-95-96-98-99	82	22
Golden Prolific	1894-95-96-98-99	79	26
Archangel	1894-95-96-98-99	78	28
Golden Giant	1894-95-96-98-99	78	10
Abyssinia	1894-95-96-98-99	78	8
Columbus	1894-95-96-98-99	77	14
White Russian	1894-95-96-98-99	76	8
Oderbruch	1894-95-96-98-99	75	16
California Prolific	1894-95-96-98-99	75	10
Improved Ligowo	1894-95-96-98-99	75	4

AVERAGE RESULTS of a five years' test of twenty-eight varieties of Oats—*Concluded.*

Name of Variety.	Years Included.	Average Yield per Acre.	
		Bush.	Lbs.
Early Gothland	1894-95-96-98-99	72	26
Early Blossom	1894-95-96-98-99	72	22
Prolific Black Tartarian	1894-95-96-98-99	72	12
American Triumph	1894-95-96-98-99	71	26
Poland	1894-95-96-98-99	70	6
Flying Scotchman	1894-95-96-98-99	69	12
Imported Irish	1894-95-96-98-99	68	22
Black Coulommiers	1894-95-96-98-99	68	20
Bonanza	1894-95-96-98-99	67	20
Scottish Chief	1894-95-96-98-99	67	18
Joanette	1894-95-96-98-99	66	8
Welcome	1894-95-96-98-99	65	18
Rennie's Prize White	1894-95-96-98-99	65	8
Cream Egyptian	1894-95-96-98-99	62	20
White Wonder	1894-95-96-98.99	54	18

Different Methods of Preparing Land for Oats.

In last year's report results were given of different ways of treating land for wheat, this year the same thing has been done with oats.

Pea stubble gave the best crop of wheat last year and has proved a good preparation for oats this year.

Clover has not given as good results with oats as with wheat.

All the plots in this test were sown on May 18, the size of the plots was $\frac{1}{10}$ acre each, and the soil a sandy loam.

Variety.	Previous Crop.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per plot.	Yield Per Acre.		Weight Per Bushel.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs
Banner Oats.	Summer-fallow	May 18	Aug 31	105	43	Stiff	10	Branching	380	104	4	
"	Pease	" "	" 31	105	42	"	10	"	330	96	6	
"	Barley	" "	" 28	102	40	"	9	"	310	94	24	42
"	Clover	" "	" 28	102	41	"	9	"	290	80	20	39
"	Buckwheat	" "	" 28	102	43	"	9	"	280	76	16	39

Field Plots of Oats.

These were all sown on backsetting, except the 8 acres of Banner, which was sown on summer fallow. The soil was clay loam.

Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Yield per Acre.	
			Inches.	Bush.	Lbs.
Banner	May 16	Aug. 28	48	100	30
Early Golden Prolific	" 20	Sept. 5	39	84	22
New Electric	" 20	" 5	47	83	6
Siberian	" 20	" 5	56	80	24
American Beauty	" 20	Aug. 24	39	71	27
Bavarian	" 20	Sept. 5	40	68	10
Russell	" 20	" 5	51	67	11
Joanette	June 1	" 11	36	62	16
Golden Giant	May 20	" 5	50	54	24

EXPERIMENTS WITH BARLEY.

The past season has been favourable for a large yield of barley, and the absence of storms enabled nearly all but the Chevalier varieties to stand up well. The heavy dews and light showers during harvest very seriously discoloured the grain and injured it for malting purposes, as, however, nearly all barley grown in this province is used for feed, no serious loss will occur on this account.

The results of ten years experience shows that the Chevalier varieties of two-rowed barley have not succeeded well here, the ear seldom fills perfectly and every year these varieties are more or less lodged; sometimes so badly that it is impossible to cut the crop clean; they are also late in maturing.

The two-rowed sorts of the duck-bill type, such as Canadian Thorpe, are much stiffer in the straw, and generally speaking the heads fill well.

The six-rowed varieties are the best adapted for general cultivation in this province, they ripen early and can be sown after all other grain and will ripen early enough to escape injury from fall frosts. The straw is usually stiff and bright and the ears usually fill well. Of these sorts the Mensury and Odessa are excellent varieties; some of the new hybrid kinds are also promising.

The size of the plots used for this test of varieties was $\frac{1}{40}$ and $\frac{1}{20}$ acre, the soil was a rich black loam which had been summer-fallowed, and the plots were all sown on May 24 in the proportion of 2 bushels of seed to the acre. Fifty-two varieties were included in this test, twenty-two of the two-rowed sorts and thirty of the six-rowed.

BARLEY—TWO-ROWED—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre	Yield per Acre.	Weight per Bushel.	Rusted.
			Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.	
Logan	Aug. 20	88	38	Stiff	3	4,620	68 6	50	Slightly.
Harvey	" 24	92	38	"	3½	4,800	64 28	50	"
Dunham	" 20	88	38	Very stiff	4	3,480	63 36	51	"
Fulton	" 24	92	40	Stiff	3	3,360	62 4	51½	"
Bolton	" 20	88	42	Weak	3½	3,520	62 4	49	Badly.
Newton	" 27	95	30	Stiff	3	4,220	61 2	52	"
French Chevalier	" 27	95	30	Very weak	4	3,000	60 40	50	"
Victor	" 20	88	34	Weak	3	4,280	59 28	52½	Considerably.
Nepean	" 20	88	34	Fair	3	3,840	58 16	52½	"
Pioneer	" 24	92	34	Stiff	2½	3,760	56 42	51½	Slightly.
Clifford	" 21	89	40	Fair	4	4,560	56 32	51	Considerably.
Prize Prolific	" 31	99	20	Weak	3½	3,400	56 22	50½	None.
Kinver Chevalier	" 31	99	30	Very weak	4	3,340	56 12	50	"
Jarvis	" 21	89	42	" stiff	5	3,920	55 40	49	Considerably.
Leslie	" 24	92	40	Fair	3½	3,260	55 ..	50	Slightly.
Sidney	" 17	85	37	"	3	2,960	53 6	50½	None.
Beaver	" 27	95	30	Very weak	4	3,960	52 24	51	Badly.
Danish Chevalier	" 31	99	31	Weak	3½	3,860	50 30	48	Slightly.
Canadian Thorpe	" 26	94	32	Very stiff	3	3,320	49 38	50	"
Pacer	" 24	92	42	Weak	3	3,920	47 24	48	"
Monck	" 24	92	34	Very stiff	3½	5,000	46 2	52½	"
Thanet	" 24	92	30	" weak	4	2,540	44 18	49	Very badly.

Barley—Six-rowed—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per Acre		Weight per Bushel.	Rusted.
			Ins.		Ins.	Lbs.	Bush.	Lbs.	Lbs.	
Claude	Aug. 26	94	32	Fair	2½	3,080	67	4	47½	Slightly.
Summit	" 21	89	32	Weak	2	3,360	66	12	49½	"
Trooper	" 22	90	36	Stiff	3	2,880	65	40	50	Badly.
Mansfield	" 18	86	33	Weak	2½	3,320	64	38	48	None.
Argyle	" 18	86	40	Very stiff.	2½	2,680	63	36	48	"
Royal	" 15	83	35	Stiff	3	2,460	61	42	48	"
Nugent	" 24	92	34	"	2½	3,080	61	22	49	Slightly.
Vanguard	" 18	86	32	"	2½	1,800	58	36	47	None.
Surprise	" 20	88	31	"	2½	3,120	58	26	50	Slightly.
Mensury	" 18	86	37	Very stiff.	3½	2,020	58	16	48	None.
Empire	" 21	89	34	Weak	3	2,840	57	44	50	Considerably.
Stella	" 20	88	30	Stiff	2½	2,300	56	42	50	Slightly.
Oderbruch	" 17	85	36	Weak	2½	2,260	55	40	50½	None.
Common	" 12	80	37	Stiff	2½	2,340	55	40	48	"
Kirby	" 24	92	36	Weak	3	1,860	55	20	49½	Slightly.
Rennie's Improved	" 14	82	39	Stiff	2½	2,600	53	46	48	"
Baxter's	" 14	82	38½	Fair	2½	2,200	53	26	48	"
Phœnix	" 18	86	33	Stiff	2	1,980	53	26	48	None.
Yale	" 26	94	31	"	2	2,920	53	16	49	Slightly.
Petschora	" 17	85	36	Weak	3½	2,880	53	6	48	None.
Odessa	" 19	87	36	"	3	2,420	52	14	48	"
Garfield	" 26	94	36	Stiff	2½	2,640	51	32	50	Slightly.
Brome	" 26	94	32	Weak	2½	1,680	48	16	51	"
Albert	" 18	86	34	Fair	3	3,360	48	16	51	"
Champion	" 17	85	38	Stiff	3	3,440	47	24	45	None.
Blue Barley	" 19	87	33	Very stiff.	3	6,620	46	32	44	"
Excelsior	" 11	79	36	Fair	2	3,100	46	32	45	Slightly.
Hulless Black	" 20	88	30	Weak	2	4,680	44	8	62½	"
Success	" 15	83	42	Fair	3	2,540	41	32	44	None.
Hulless White	" 20	88	30	Very weak	2½	3,160	34	8	59½	"

Results of Tests with Barley, 1895 to 1899.

Name of Variety.	Average Yield.		Name of Variety.	Average Yield.	
	Bush.	Lbs.		Bush.	Lbs.
Trooper, 6-rowed	57	10	Newton, 2-rowed	48	8
Common "	56	4	Vanguard, 6-rowed	47	44
Mensury "	55	18	Odessa "	47	42
Nugent "	53	30	Oderbruch "	47	10
French Chevalier, 2-rowed	53	6	Petschora "	46	34
Summit, 6-rowed	52	26	Excelsior "	46	38
Surprise "	51	46	Champion "	46	28
Stella "	50	46	Beaver, 2-rowed	44	42
Royal "	50	2	Thanet "	44	26
Rennie'sImproved "	49	18	Prize Prolific "	43	13
Sidney, 2-rowed	49	2	Canadian Thorpe "	41	44
Baxter, 6-rowed	48	42	Kinver Chevalier "	41	6
Phœnix "	48	22	Success, 6-rowed	39	14

DIFFERENT METHODS OF PREPARING LAND FOR BARLEY.

It has been shown that pease make a good preparatory crop for both oats and wheat, and from the annexed table it will be seen that two other legumes, horse beans and soja beans, serve a good purpose as a preparation for barley.

The size of the plots in this test was $\frac{1}{20}$ acre, and the soil a rich sandy loam.

Variety.	Previous Crop.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per plot.	Yield per acre.		Weight per Bushel.
					Ins.		Ins.	Lbs.	Bush.	Lbs.	Lbs
Six-rowed Mensury Barley	Soja beans....	May 30.	Aug. 25.	87	33	Stiff....	3½	330	63	6	50
" " ..	Horse beans..	" 30.	" 25.	87	34	"	3	278	59	8	50
" " ..	Summer fallow	" 24.	" 18.	86	31	"	3½	325	58	16	48
" " ..	Millet..... ..	" 30.	" 25.	87	33	"	3	281	49	28	50
" " ..	Barley.....	" 30.	" 25.	87	36	"	3	250	49	8	50½

EXPERIMENTS WITH PEASE.

Fifty-one varieties of pease were tested this year. The yield was about an average one, but from some unexplained cause the vines continued to grow late in the season and the sample in many instances was somewhat injured by the presence of unripe grain.

It is a matter for regret that pease are not more extensively grown in this province. The yield on this farm has nearly always been large, the pea bug is unknown here, the sample is equal to that grown in the best pea sections of Ontario, and the price obtained is high.

Pease should be grown on clean stiff rich land, summer-fallow prefered ; and from 2½ to 3 bushels of seed per acre should be used, seeding should be done about a week after spring opens up, as late seeding encourages a rank growth of straw which is apt to mildew.

When grown on a large scale, one peck of oats per acre should be sown with the pease, the combined crop can then be cut with a binder and stooked and threshed the same as any other grain.

The size of the plots for this test was $\frac{1}{20}$ acre and the soil a rich clay loam, summer-fallowed.

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
					In.	In.		Bush. Lbs.	Lbs.
Elder	May 8	Sept. 4	119	Rank	34	2	Small...	58 30	64
Chelsea	" 8	" 4	119	"	45	2½	Large ..	56 ..	64
Wisconsin Blue	" 8	" 8	123	"	60	2½	Small...	52 ..	65
White Wonder	" 11	" 4	116	Fair	45	3	Large ..	51 30	63
Archer	" 11	Aug. 30	111	"	30	2	Medium	51 30	62
Victoria	" 11	Sept. 9	121	Medium	34	2	"	51 ..	63½
Herald	" 11	" 9	121	Weak	44	2½	Small...	51 ..	63½
Prussian Blue	" 11	Aug. 30	111	Rank	37	3	Medium	49 40	63½
Macoun	" 8	Sept. 8	123	Fair	36	3	"	49 40	63
Carleton	" 11	Aug. 30	111	"	34	2	Small...	49 20	63½
Mummy	" 11	" 30	111	"	44	2	"	48 50	63
Golden Vine	" 11	" 29	110	"	36	2	"	48 50	63½
Pearl	" 8	Sept. 11	126	Rank	46	3	Large ..	48 50	62½
Trilby	" 1	" 7	129	"	51	3	Medium	47 ..	62
Mackay	" 2	Aug. 30	120	"	42	3	"	47 ..	61
Picton	" 11	" 30	111	Fair	35	2	Small. .	46 50	63
Paragon	" 11	" 20	101	Weak	17	2½	Medium	46 40	63½
Multiplier	" 11	Sept. 4	116	Rank	49	2	Small...	46 20	62½
Bedford	" 1	" 4	126	Very rank	60	3	Medium	46 ..	64
Fergus	" 8	Aug. 30	114	Rank	31	2½	Small...	45 40	63½
Black-eyed Marrowfat	" 8	" 30	114	"	38	3	Large ..	45 30	62½
Elliott	" 11	Sept. 8	120	"	43	3	"	45 30	62
Crown	" 11	Aug. 28	109	Fair	37	3	Small...	45 20	63
New Potter	" 1	Sept. 4	126	Rank	43	3	Medium	45 20	62
Nelson	" 11	Aug. 22	103	"	33	2½	"	45 ..	63
Kent	" 11	Sept. 9	121	Fair	40	3	"	44 40	62
Bruce	" 11	" 8	120	Weak	34	2	Large ..	44 20	62½
Early Britain	" 11	Aug. 29	110	Rank	35	2½	Medium	44 20	61
King	" 1	Sept. 4	126	Fair	44	2½	"	44 10	63
Pride	" 11	Aug. 22	103	Rank	24	2½	"	43 30	63
German White	" 11	" 30	111	"	35	3	"	43 10	62
Chancellor	" 11	" 21	102	Weak	36	2½	Small ..	43 ..	64
Prince Albert	" 8	" 30	114	Rank	42	3	" ..	42 50	64
Canadian Beauty	" 1	Sept. 8	130	"	42	2	Large ..	42 50	61½
Daniel O'Rourke	" 11	Aug. 28	109	"	39	2½	Small...	42 40	63
Arthur	" 8	" 22	106	Fair	29	2½	Medium	42 40	63
Perth	" 2	" 22	112	"	38	3	"	42 40	61
Alma	" 8	Sept. 8	123	"	37	3	Large ..	42 20	62½
Duke	" 8	" 9	124	Rank	42	3	" ..	42 ..	62¼
Dover, mixed	" 11	" 5	117	Weak	42	3	" ..		
Gray Winter	" 8	" 1	116	"	30	2	Small...	41 40	64
Creeper	" 8	Aug. 22	106	Rank	45	2½	" ..	39 40	64
Large White Marrowfat	" 1	Sept. 7	129	"	27	3	Large ..	38 30	62
Gregory	" 8	Aug. 30	114	Fair	34	2½	" ..	38 20	62
Vincent	" 11	" 28	109	"	39	3	" ..	38 ..	61
Cooper	" 2	Sept. 9	130	Medium	54	2	" ..	37 40	62½
French Canner	" 11	Aug. 22	103	Fair	28	3	Medium	37 40	62½
Elephant Blue	" 11	" 31	112	"	30	2½	Large ..	37 40	63
Agnes	" 2	" 20	110	Rank	42	2½	" ..	37 20	62
Bright	" 1	Sept. 7	129	"	48	3	Medium	36 30	62
Centennial	" 8	Aug. 23	107	"	34	3	Large ..	36 20	62½
Lanark	" 11	" 30	111	Weak	38	3	" ..	35 50	61
Fenton	" 8	" 30	114	Fair	33	2½	Medium	35 40	61½
English Gray	" 8	Sept. 3	118	Weak	39	3	"	35 10	62
Harrison's Glory	" 8	Aug. 20	104	"	27	3	Large ..	34 ..	62½
Prince	" 2	" 31	121	Rank	48	3	Medium	32 20	62
Oddfellow	" 2	Sept. 9	130	"	50	2	"	32 20	63

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AVERAGE RESULTS of a Five Years' Test of Pease.

Name of Variety.	Years included.	Average Yield per Acre.	
		Bush.	Lbs.
Mummy	1894-6-7-8-9	44	8
Pride	1894-6-7-8-9	43	30
Potter	1894-6-7-8-9	42	10
Black-eyed Marrowfat	1894-6-7-8-9	39	44
Prince Albert	1894-6-7-8-9	38	40
Crown	1894-6-7-8-9	38	22
Canadian Beauty	1894-6-7-8-9	37	26
Centennial	1894-6-7-8-9	37	14
Multiplier	1894-6-7-8-9	34	40

MIXED AND UNMIXED GRAIN CROP.

This test was undertaken for the purpose of ascertaining whether or not larger returns could be obtained from mixed grain than from one kind grown alone.

It will be seen from the accompanying tables that the difference between the two kinds of sowing was very slight indeed, amounting to only 55 pounds per acre.

Where different kinds of seed was used they were mixed before sowing, $2\frac{1}{2}$ bushels of pease, 2 bushels of oats and $1\frac{1}{2}$ of wheat was sown per acre, and the same proportions were used in the mixed grain plots.

The size of the plots for this test was $\frac{1}{20}$ acre, the soil a sandy loam summer-fallowed; all the plots were sown on May 13.

Plot.	Kind of Grain Sown.	Variety.	Ripe.	Straw per Plot.	Yield of Grain per Acre.	Average per Acre.
				Lbs.	Lbs.	Lbs.
1	Pease	Daniel O'Rourke	Aug. 26		2,020	
2	Oats	Bavarian	" 26	295	2,820	2,225
3	Barley	Kinver Chevalier	" 26	295	2,340	
4	Wheat	Stanley	" 26	235	1,720	
5	½ Barley, ½ Oats	Kinver Chevalier, Bavarian	" 26	250	2,240	
6	⅜ Barley, ⅜ Pease, ¼ Oats	Kinver Chevalier, Daniel O'Rourke, Bavarian	" 26	220	2,360	2,280
7	¼ Barley, ¼ Pease, ¼ Oats, ¼ Wheat	Kinver Chevalier, Daniel O'Rourke, Bavarian, Stanley	" 26	260	2,040	

EXPERIMENTS WITH BUCKWHEAT.

Four varieties of buckwheat were sown during the past season.

The Japanese gave the best yield, but even that variety did not give a paying crop, and owing to the injury to future crops from the growing of the shelled grain, this crop cannot be recommended for general cultivation.

The size of the plots used for this test was $\frac{1}{20}$ acre, the soil was a clay loam which had been summer-fallowed.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
			In.	In.	Lbs.	Bush. Lbs.	Lbs.
Japanese	June 20..	Sept. 10..	82	40	140	19 8	52
Silver Hull	" 20..	" 5..	77	34	130	17 24	53½
Tartarian or Siberian	" 20..	" 10..	82	28	85	16 12	51
Rye Buckwheat	" 20..	" 12..	84	33	95	12 24	52

Formalin as a Smut Preventive.

As excellent results were obtained last year from the use of formalin as a preventive of smut in oats, more extensive trials were undertaken this season.

The experiments in 1890 included not only oats, but also wheat and barley; altogether 42 plots were devoted to this purpose; three varieties of each kind of grain were used, and the efficiency of both sprinkling and soaking was tested. Although the seed used was in every instance very smutty, eight of the nine varieties produced grain practically free of smut, even when untreated, making the experiment with these varieties of little value, and showing clearly that the season was not favourable for the spread of this fungus.

With one variety, however, Doncaster Prize Oats, the results were very conclusive and are given below.

Test of steeping in a liquid composed of 4½ oz. Formalin to 10 galls. water.

Name of Variety.	How Treated.	Good Heads in 9 sq. ft.	Smutty Heads in 9 sq. ft.
Doncaster Prize Oats	Not treated	443	98
" "	Steeped 5 minutes	335	12
" "	" 15 "	342	2
" "	" 1 hour	421	0
	Sprinkling Test.		
" "	Not treated	443	98
" "	Sprinkled with 4½ oz. formalin to 10 galls. water	356	21
" "	" " 9 oz. " " "	394	0

The effectiveness of the preparation in this instance was increased in proportion to the time occupied in steeping. This is different from the result obtained in 1898, when five minutes steeping gave results equal to a longer steeping. Sprinkling with a solution of double strength promises to be effectual.

Massel Powder as a Preventive of Smut in Grain.

A package of this preparation, was sent by the Director to the Experimental Farm with a request that its usefulness for this purpose be tested.

This powder was used in the following manner, one pound of lime was slaked with enough water to make a gallon of fluid, to this was added two ounces of Massel Powder, and when well stirred the liquid was sprinkled on the grain before sowing.

All the seed sown was very smutty. Six plots were used for this test, three of which were sown with treated grain and three with untreated; from the following table it does not appear that the Massel Powder was of very much benefit as a smut preventive.

These tests were made on plots of $\frac{1}{20}$ acre, soil was a sandy loam summer-fallowed.

MASSEL POWDER AS A PREVENTIVE OF SMUT.

Kind of Grain.	Variety.	When Sown.	Treatment.	Good Heads.	Smutty Heads.
Wheat	Red Fife	May 27	Not treated	320	2
"	"	" 27	Treated	311	2
Oats	Doncaster Prize	" 27	Not treated	323	103
"	"	" 27	Treated	370	111
Barley	Canadian Thorpe	" 27	Not treated	372	18
"	"	" 27	Treated	391	7

EXPERIMENTS WITH INDIAN CORN.

The spring and early summer months were cold, wet and backward and hence unfavourable to the corn plant, for this reason growth was very slow at first, but the weather in July and August was more favourable, and nearly an average crop was harvested.

Some of the varieties now tested for several years are decidedly promising for this country, among them Pearce's Prolific a rank leafy variety which gives a large yield of fodder fairly well matured.

Longfellow is another suitable sort, the grain of which reached the late milk stage. Sanford and North Dakota Flint have also proved very satisfactory. All these are excellent for either dry fodder or ensilage purposes and can be safely recommended for this province.

The strong growing ensilage varieties give larger returns in weight of crop but they have to be cut in an immature condition; this makes sour ensilage or unpalatable dry fodder with very poor feeding qualities.

Although better returns of corn generally are obtained from summer-fallowed land it has always been used as a cleaning crop here; it answers well for this purpose and the succeeding crop of wheat is nearly always equal to that on summer-fallow, the only exception being during a very dry season, when the corn leaves less moisture in the ground than the fallow. Rich warm land is selected with a southern exposure if possible. The stubble is ploughed as soon as frost is out in the spring, and harrowed at once so as to start the weed seeds to germinate, the surface soil is then worked with a cultivator and harrows every few days until May 20, when the corn is sown with a wheat drill in rows 35 inches (5 spouts) apart.

The crop is kept clean by harrowing until the corn is well out of the ground, when a weeder is used, followed when the corn is 3 inches high by the one horse cultivator.

The crop is harvested during the last days of August; if not above 6 feet in height it can be cut with a binder, but if taller than this it should be cut by hand or with a corn binder.

An active man can cut with a sickle from $\frac{3}{4}$ to 1 acre per day.

The following table gives the yield obtained from the thirty-five varieties grown on the Experimental Farm this year.

The soil was a rich black loam; all were sown on May 26, and the yield per acre has been calculated from the weight of the crop cut from two rows, each 66 feet long.

The previous crop was potatoes.

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		In.							Tons.	Lbs.	Tons.	Lbs.
Champion White Pearl	Fair	94	Few leaves.	Aug. 20	.....	.....	.....	Tassel....	26	1,900	15	1,900
Longfellow.....	Rank	88	Very leafy.	" 7	Aug. 15	Aug. 24	Aug. 30	Late milk.	24	620	16	120
Mammoth Cuban	"	83	Fairly leafy	" 18	.....	.....	.....	Tassel ...	20	920	15	580
Early Mastodon.	Fair	91	" "	" 20	.....	.....	.....	"	20	40	16	120
Eureka.....	"	89	Few leaves.	" 24	.....	.....	.....	"	19	1,820	16	120
Ex. Early Szekely	Poor	70	" "	" 12	Aug. 20	Aug. 25	Aug. 30	Late milk.	19	1,820	15	140
Cloud's Early Yellow.	Fair	85	" "	" 9	" 12	" 20	" 26	" .	19	1,600	15	800
King of the Earliest	"	90	Fairly leafy	" 9	" 12	" 20	" 28	" .	19	500	12	1,740
Compton's Early.	Rank	87	Very leafy.	" 8	" 15	" 25	" 29	" .	19	500	14	1,480
Country Gentleman	"	63	" "	" 20	.....	.....	.....	Tassel....	18	1,400	9	260
Red Cob Ensilage	Fair	91	Few leaves.	" 26	.....	.....	.....	"	18	1,400	17	1,200
Mammoth eight-rowed Flint...	"	80	Fairly leafy	" 9	Aug. 20	Aug. 25	.....	Early milk	18	300	11	1,540
Evergreen Sugar.	"	71	Very leafy.	" 20	" 29	.....	.....	Silk.....	18	300	14	160
Angel of Midnight.....	Rank	87	Leafy	" 8	" 20	Aug. 26	.....	Early milk	17	1,860	14	1,920
Pearce's Prolific.	"	85	Very leafy.	" 12	" 19	" 27	.....	" .	17	1,860	17	1,200
Iowa Silver Mine	Fair	76	Few leaves.	" 26	.....	.....	.....	Tassel....	17	1,640	14	1,700
Canada White Flint.....	"	80	" "	" 5	Aug. 12	Aug. 20	Aug. 26	Late milk.	17	1,200	16	340
Selected Leaming	"	91	" "	" 12	" 20	" 24	" 30	" .	17	1,200	13	400
Rural Thoroughbred W'te Flint	Rank	84	Leafy	" 25	.....	.....	.....	Tassel ...	17	100	16	1,000
North Dakota White.....	"	83	"	" 8	Aug. 18	Aug. 24	Aug. 30	Late milk.	16	1,000	13	1,060
Giant Prolific Ensilage.....	Fair	81	Few leaves.	" 24	.....	.....	.....	Tassel ...	16	780	14	1,040
Sanford	Rank	91	Very leafy.	" 8	Aug. 15	Aug. 25	Aug. 30	Late milk.	16	560	15	1,680
Ruby Mexican ..	"	73	" "	" 12	" 20	" 26	" 30	" .	15	1,680	11	660
Kendall's Early Giant.....	Fair	67	Leafy ...	" 6	" 12	" 23	" 30	" .	15	1,240	13	620
Iowa Gold Mine.	"	87	Few leaves.	" 24	" 28	.....	.....	In silk....	15	1,240	13	1,940
Mitchell's Extra Early.....	"	59	Leafy	" 1	" 8	Aug. 12	Aug. 25	Late milk.	15	580	13	1,940
White Cap Yellow Dent...	"	85	Few leaves.	" 12	" 21	" 25	.....	Early milk	14	1,920	14	1,480
Cory.....	Rank	73	Very leafy.	" 10	" 16	" 25	Aug. 30	Late milk.	14	1,480	12	1,080
Early Butler....	Fair	86	Few leaves.	" 12	" 20	" 25	" 30	" .	14	1,040	13	840
Burpee's First of All.....	"	66	Very leafy.	" 1	" 7	" 15	" 25	" .	14	820	10	900
Yellow Six-weeks Extra.....	"	53	" "	" 4	" 10	" 20	.....	Early milk	12	1,740	10	460
Pride of the North	Rank	83	Fairly leafy	" 9	" 16	" 22	.....	" .	12	1,300	11	880
Early Yellow, long-eared	"	93	Very leafy.	" 14	" 20	" 25	.....	" .	12	640	12	200
Extra Early Huron Dent	"	87	Few leaves.	" 10	" 18	" 26	Aug. 29	Late milk.	11	220	10	20

INDIAN CORN sown at different distances apart.

Name of Variety.	Distance between Rows.	Height.	Condition when Cut.	Weight per Acre, Green, in Rows.
	Inches.	Inches.		Tons. Bush.
Longfellow	21	81	Early milk..	13 1,282
"	28	78	" ..	13 1,498
"	35	79	" ..	18 435
"	42	79	" ..	15 88
Champion White Pearl	21	87	In tassel....	20 201
"	28	92	" ..	17 109
"	35	90	" ..	18 96
"	42	93	" ..	18 1,454
Selected Leaming	21	93	In silk	17 1,227
"	28	87	"	18 382
"	35	80	"	16 172
"	42	79	"	17 163

	Tons.	Lbs.
Average yield of green corn from rows 21 inches apart..	17	236
" " 28 " ..	16	663
" " 35 " ..	17	901
" " 42 " ..	16	1,901

FIELD ROOTS.

The spring and early summer was favourable for the growth of field roots, and no injury was experienced from insect enemies, the work of the turnip-beetle not being apparent during the whole season. The late summer and fall was, however, too dry for turnips and mangels, and the unusually close planting of the rows probably intensified the injury from light rain fall; the carrots being planted exceptionally wide apart gave a full average return. With one exception, all the varieties gave good, sound roots. The Webb's New Renown turnip was so badly rotted as to be unfit for use, and returns of this variety are not given.

From some unknown cause all varieties of the second sowings of mangel seed germinated so unevenly that it was found impossible to give accurate returns of the yield.

EXPERIMENTS WITH TURNIPS.

The soil was a rich sandy loam. The first plots were sown on May 21, and the second on June 3, in drills 24 inches apart. All were pulled on October 5. The previous crop on the fall-plowed land was mangels. The estimate of yield has been made from the product of two rows each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Variety.	Character of Growth.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot. Tons.	Lbs.	Yield per Acre. 1st plot. Bush.	Lbs.	Yield per Acre. 2nd Plot Tons.	Lbs.	Yield per Acre. 2nd Plot Bush.	Lbs.
Mammoth Clyde	Rank	May 20.	June 3.	Oct. 5.	Oct. 5.	23	1,850	797	30	20	590	676	30
Hartley's Bronze	Fair	" 20.	" 3.	" 5.	" 5.	22	880	748	..	18	1,290	621	30
Champion Purple Top	Rank	" 20.	" 3.	" 5.	" 5.	21	1,230	720	30	16	1,990	566	30
Carter's Elephant	Fair	" 20.	" 3.	" 5.	" 5.	21	570	709	30	12	750	412	30
Monarch	Rank	" 20.	" 3.	" 5.	" 5.	18	1,950	632	30	10	1,450	357	30
Imperial Swede	"	" 20.	" 3.	" 5.	" 5.	18	960	616	..	11	770	379	30
Shamrock Purple Top	"	" 20.	" 3.	" 5.	" 5.	17	1,970	599	30	14	50	467	30
Prize Purple Top	"	" 20.	" 3.	" 5	" 5.	17	1,310	588	30	17	650	577	30
Bangholm Selected	Fair	" 20.	" 3.	" 5.	" 5.	17	1,310	588	30	13	730	445	30
Hall's Westbury	Rank	" 20.	" 3.	" 5.	" 5.	17	1,310	588	30	16	1,000	550	..
Skirvings	"	" 20.	" 3.	" 5.	" 5.	17	980	583	..	15	690	511	30
East Lothian	"	" 20.	" 3.	" 5.	" 5.	17	320	572	..	11	1,100	385	..
Halewood's Bronze Top	Weak	" 20.	" 3.	" 5.	" 5.	16	1,500	550	..	12	1,740	429	..
Hardy Goliath	"	" 20.	" 3.	" 5.	" 5.	15	1,680	528	..	15	1,020	517	..
Selected Champion	Rank	" 20.	" 3.	" 5.	" 5.	15	1,020	517	..	14	1,370	489	30
Selected Purple Top	"	" 20.	" 3.	" 5.	" 5.	15	1,020	517	..	14	50	467	30
Perfection Swede	"	" 20.	" 3.	" 5.	" 5.	15	360	506	..	20	1,250	687	30
Prize Winner	Fair	" 20.	" 3.	" 5.	" 5.	14	1,700	495	..	13	1,720	462	..
Giant King	Weak	" 20.	" 3.	" 5.	" 5.	13	1,720	462	..	11	1,100	385	..
West Norfolk Red Top	Rank	" 20.	" 3.	" 5.	" 5.	13	730	445	30	12	1,740	429	..
New Arctic	"	" 20.	" 3.	" 5.	" 5.	13	400	440	..	9	1,800	330	..
Drummond Purple Top	Fair	" 20.	" 3.	" 5.	" 5.	11	1,100	385	..	12	750	412	30
Sutton's Champion	"	" 20.	" 3.	" 5.	" 5.	10	790	346	30	9	1,800	330	..
Jumbo	"	" 20.	" 3.	" 5.	" 5.	10	790	346	30	11	770	379	30
Marquis of Lorne	Weak	" 20.	" 3.	" 5.	" 5.	9	480	308	..	12	420	407	..
Webb's New Renown	.....	" 20	" 3	.....	.....		Rotted.				Rotted.		

EXPERIMENTS WITH MANGELS.

The soil on which these roots were sown was a rich clay loam, and the estimate of yield has been made from the product of two rows, each 66 feet long.

The first sowing was made on May 30, the second on June 3, in drills 24 inches apart; all were pulled on October 4.

MANGELS.—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot. Tons.	Lbs.	Yield per Acre, 1st Plot. Bush.	Lbs.
Norbiton Giant	Rank	May 30	June 30	Oct. 4.	Did not germinate.	35	620	1,177	..
Yellow Intermediate	Fair	" 30	" 30	" 4.		35	620	1,177	..
Mammoth Long Red	"	" 30	" 30	" 4.		34	1,630	1,160	30
Lion Yellow Intermediate	"	" 30	" 30	" 4.		34	640	1,144	..
Giant Yellow Intermediate	"	" 30	" 30	" 4.		33	1,650	1,127	30
Ward's Large Oval-shaped	"	" 30	" 30	" 4.		33	1,320	1,122	..
Red Fleshed Globe	"	" 30	" 30	" 4.		33	660	1,111	..
Mammoth Yellow Intermediate	"	" 30	" 30	" 4.		33	600	1,110	..
Prize Mammoth Long Red	Rank	" 30	" 30	" 4.		33	600	1,110	..
Selected Mammoth Long Red	"	" 30	" 30	" 4.		32	1,010	1,083	30
Giant Yellow Half Long	"	" 30	" 30	" 4.		31	1,690	1,061	30
Yellow Fleshed Tankard	Weak	" 30	" 30	" 4.		31	700	1,045	.
Red Fleshed Tankard	"	" 30	" 30	" 4.		28	100	935	..
Giant Yellow Globe	Fair	" 30	" 30	" 4.		27	450	907	30
Warden Orange Globe	Weak	" 30	" 30	" 4.		25	1,810	863	30
Golden Fleshed Tankard	Fair	" 30	" 30	" 4.		24	1,500	825	..
Gate Post	Rank	" 30	" 30	" 4.		18	630	610	30
Gate Post, Yellow	Fair	" 30	" 30	" 4.		14	1,700	495	..
Canadian Giant	Rank	" 30	" 30	" 4.		12	750	412	30
Champion Yellow Globe	Fair	" 30	" 30	" 4.		8	1,490	291	30

EXPERIMENTS WITH CARROTS.

Twenty varieties of carrots were tested in 1899. The soil was a rich clay loam, the previous crop was mangels, and the estimate of yield has been made from the product of two rows, each 66 feet long. The first plots were sown on May 20, the second on June 3, in drills 24 inches apart, and all were pulled on October 6.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pull'd	2nd Plot Pull'd	Yield per Acre 1st Plot.		Yield per Acre 1st Plot.		Yield per Acre 2nd Plot		Yield per Acre 2nd Plot	
							Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate	Rank.	May 20	June 3	Oct. 6	Oct. 6	19	610	643	30	13	1,390	456	30
Ontario Champion	"	" 20	" 3	" 6	" 6	19	280	638	..	14	710	478	30
Half Long White	"	" 20	" 3	" 6	" 6	18	300	605	..	10	1,780	363	
Giant White Vosges	"	" 20	" 3	" 6	" 6	17	1,640	594	..	15	30	500	30
New White Intermediate	"	" 20	" 3	" 6	" 6	17	1,640	594	..	10	790	346	30
Iverson's Champion	"	" 20	" 3	" 6	" 6	17	980	583	..	14	1,370	489	30
Long Yellow Stump Rooted	Fair	" 20	" 3	" 6	" 6	16	1,660	561	..	13	730	445	30
Green Top White Orthe	Rank.	" 20	" 3	" 6	" 6	16	1,330	555	30	12	1,080	418	
Improved Short White	"	" 20	" 3	" 6	" 6	15	360	506	..	12	1,740	429	
Yellow Intermediate	"	" 20	" 3	" 6	" 6	15	30	500	30	11	1,100	385	
Guerande or Ox Heart	Fair	" 20	" 3	" 6	" 6	14	1,700	495	..	12	90	401	30
Early Gem	"	" 20	" 3	" 6	" 6	13	1,060	451	..	11	770	379	30
Carter's Orange Giant	"	" 20	" 3	" 6	" 6	13	400	440		8	1,490	291	30
Half Long Chantenay	Weak	" 20	" 3	" 6	" 6	13	70	434	30	10	1,120	352	
White Vosges Large Short	Fair	" 20	" 3	" 6	" 6	12	1,740	429		9	480	308	
White Belgian	"	" 20	" 3	" 6	" 6	12	1,740	429	..	10	130	335	30
Long Orange or Surrey	Rank.	" 20	" 3	" 6	" 6	12	750	412	30	10	1,450	357	30
Scarlet Intermediate	Weak	" 20	" 3	" 6	" 6	11	770	379	30	9	1,140	319	
Scarlet Nantes	Weak	" 20	" 3	" 6	" 6	8	1,820	297	..	6	1,860	231	
Long Scarlet Altringham	Weak	" 20	" 3	" 6	" 6	6	1,860	231	..	5	1,220	187	

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested. The soil was a black sandy loam. The first plots were sown on May 20, the second on June 3, and all were pulled on October 6. The yield per acre has been calculated from the produce of one row 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per acre. 1st Plot.		Yield per acre. 1st Plot.		Yield per acre. 2nd Plot.		Yield per acre. 2nd Plot.	
					Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Wanzleben	May 20.	June 3..	Oct. 6..	Oct. 6..	34	1,630	1,160	30	did	not	germinate	
Danish Improved	" 20.	" 3..	" 6.	" 6..	34	970	1,149	30	20	590	676	30
Danish Improved Red Top.	" 20.	" 3..	" 6..	" 6..	30	1,710	1,028	30	27	1,770	929	30
Vilmorins Improved	" 20.	" 3..	" 6..	" 6..	26	1,460	891		15	690	511	30
Improved Imperial	" 20.	" 3..	" 6..	" 6..	26	1,130	885	30	20	920	682	
Red Top Sugar	" 20.	" 3..	" 6..	" 6..	25	1,810	863	30	22	220	737	

EXPERIMENTS WITH POTATOES.

The land chosen for the potato plots during the past year was somewhat flat and became water soaked by the unusually heavy rains which fell in the early part of the season, on this account a number of the best varieties did not germinate and others gave a very poor return.

For this reason the results given cannot be regarded as a fair test of the relative productiveness of the different sorts under trial—one hundred and ten varieties have been under trial and the yield per acre has been estimated in each case from the product of one row 66 feet long.

Practically all were marketable.

All the varieties were planted on May 23, in rich clay loam soil, without manure, and were dug October 2. There was no injury from rot.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Dug.	When Matured.	Average Size.	Quality.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
Delaware	Oct. 2.	Not ripe.	Very large	Fair	403	20	Long, flat, white.
Irish Daisy	" 2.	"	Large	Poor	388	40	Round, light pink.
Troy Seedling	" 2.	"	"	"	388	40	Long, white.
Clay Rose	" 2.	"	"	"	381	20	Long, flat, red.
Penn Manor	" 2.	"	"	Good	377	40	Long, pink.
Maule's Thoroughbred	" 2.	"	"	"	377	40	" "
Burnaby Seedling	" 2.	"	Medium	Poor	370	20	Long, round, red.
Dreer's Standard	" 2.	"	Large	Good	355	40	" white.
General Gordon	" 2.	"	"	"	344	40	Long, red.
Bill Nye	" 2.	"	Medium	"	333	40	Long, round, white.
Maggie Murphy	" 2.	"	Very large	"	333	40	Long, flat, light red.
Freeman	" 2.	Sept. 11.	Medium	Fair	333	40	Flat oval "
Vanier	" 2.	Not ripe.	"	Good	333	40	Long, pink.
Green Mountain	" 2.	"	Large	Poor	330	..	" white.
McKenzie	" 2.	"	Medium	Good	330	..	Long, round, white.
Carman, No. 1	" 2.	"	Large	Poor	330	..	" "
Flemish Beauty	" 2.	"	"	Fair	330	..	Long, red.
Lizzie's Pride	" 2.	Sept. 15.	"	Good	330	..	Flat, oval, light red.
Brownell's Winner	" 2.	Not ripe.	"	Fair	330	..	" red.
Rural Blush	" 2.	"	Medium	"	330	..	Oval, red.
Early Puritan	" 2.	Sept. 20.	"	"	330	..	Long, white.
American Giant	" 2.	Not ripe.	"	Good	326	20	" "
Satisfaction	" 2.	"	"	Poor	322	40	" "
Reeve's Rose	" 2.	"	"	Good	322	40	" "
State of Maine	" 2.	"	Large	"	320	50	Flat "
Clarke's No. 1	" 2.	Sept. 10.	Medium	Fair	319	..	Long, pink.
Holborn Abundance	" 2.	Not ripe.	"	Good	319	..	Round, white.
Late Puritan	" 2.	Sept. 9.	"	Poor	319	..	Long, red.
Dakota Red	" 2.	Not ripe.	Large	"	315	20	" "
Good News	" 2.	Sept. 13.	Medium	Fair	311	40	Long, round, pink.
Early Gem	" 2.	" 8.	"	"	311	40	Oval, red.
Carman, No. 3	" 2.	Not ripe.	Large	"	311	40	Long, flat, light yellow.
Northern Spy	" 2.	Sept. 12.	"	Poor	311	40	Long, deep red.
Hopeful	" 2.	Not ripe.	"	Good	311	40	Long, flat, white.
Quaker City	" 2.	"	Medium	Fair	311	40	Round "
Great Divide	" 2.	"	Large	Good	300	40	Long, flat "
Gem of Aroostook	" 2.	"	Medium	Poor	300	40	Oval, pink.
Pearce's Prize winner	" 2.	Sept. 15.	"	Good	297	..	Flat, oval, white.
Early Six Weeks	" 2.	" 12.	"	"	297	..	Round, pink.
Brown's Rot Proof	" 2.	Not ripe.	"	Fair	293	20	Round, oval, red.
Money Maker	" 2.	"	Small	"	293	20	Round, white.
I. X. L	" 2.	"	Medium	Poor	293	20	Long, flat, red.
Seedling No. 230	" 2.	Sept. 15.	Small	Good	293	20	Round, white.
Chicago Market	" 2.	Not ripe.	Medium	"	293	20	Long, light red.
Lightning Express	" 2.	"	Large	"	293	20	Long, flat, pink.
White Beauty	" 2.	Sept. 12.	Medium	"	289	40	Long, white.
Hale's Champion	" 2.	" 11.	Small	Poor	287	50	Flat, round, white.

POTATOES—TEST OF VARIETIES.—*Concluded.*

Name of Variety.	Dug.	When Matured.	Average Size.	Quality.	Total Yield per Acre. Bush.	Lbs	Form and Colour.
Sir Walter Raleigh	Oct. 2	Not ripe	Large	Good	282	20	Flat, white.
Lee's Favourite	" 2	Sept. 20	Medium	Fair	282	20	Oval, light red.
Early Rose	" 2	" 11	"	Good	282	20	" pink.
Peerless Junior	" 2	Not ripe	Large	Fair	278	40	Round, white.
Everett	" 2	Sept. 12	Medium	Good	275	..	Long, light red.
Queen of the Valley	" 2	" 14	Large	Poor	275	..	Long, flat, pink.
Seedling No. 7	" 2	Not ripe	"	Good	275	..	" red.
Pride of the Market	" 2	"	Medium	"	275	..	Kidney, long, white.
New Queen	" 2	Sept. 8	"	"	275	..	Long, round, pink.
King of the Roses	" 2	" 15	Large	"	275	..	Oval, light red.
Charles Downing	" 2	" 18	Medium	Fair	275	..	Flat, oval, white.
New Variety No. 1	" 2	" 12	Small	Poor	264	..	Flat, white.
Harbinger	" 2	Not ripe	Medium	Good	264	..	" pink.
Uncle Sam	" 2	"	Small	Poor	260	20	Long, white.
Victor Rose	" 2	Sept. 10	Medium	Good	260	20	Long, flat, red.
Bovee	" 2	" 19	"	Fair	256	40	Oval, light red.
Crown Jewel	" 2	" 9	"	Poor	256	40	Round, "
Thorburn	" 2	" 15	"	Good	253	..	Oval, pink.
Reading Giant	" 2	" 13	V'y small	Fair	245	40	Round, oval, pink.
Early White Prize	" 2	" 7	Medium	Poor	245	40	Oval, light yellow.
Beauty of Hebron	" 2	" 8	"	Good	242	..	Long, red.
London	" 2	" 8	"	"	242	..	Flat, oval, red.
Earliest of All	" 2	" 7	"	Dry	242	..	Oval, light red.
Ohio Junior	" 2	" 5	"	Fair	242	..	Round, light pink.
Russell's Seedling	" 2	Not ripe	Small	Good	238	20	Round, oval, white.
Rural No. 2	" 2	"	Large	Fair	234	40	" flat "
Record	" 2	"	Small	"	227	20	Long, white.
Burpee's Extra Early	" 2	Sept. 7	Medium	Poor	220	..	Oval, pink.
Wonder of the World	" 2	" 9	"	Fair	209	..	" red.
Prize Taker	" 2	Not ripe	"	Poor	205	20	Round, deep red.
Irish Cobbler	" 2	"	"	"	201	40	Flat, round, white.
Sharpe's Seedling	" 2	Sept. 7	Small	Fair	201	40	Oval, pink.
Early Market	" 2	" 8	Medium	Good	198	..	" red.
Early Sunrise	" 2	Not ripe	"	Poor	194	20	Round, oval, pink
Vick's Extra Early	" 2	Sept. 20	Large	Good	190	40	" light yellow.
Early Ohio	" 2	" 7	Medium	Fair	190	40	" light rose.
Rose No. 9	" 2	Not ripe	"	Good	187	..	Flat, oval, red.
Stourbridge Glory	" 2	"	Small	Poor	183	20	Long, white.
Cambridge Russet	" 2	Sept. 15	Medium	"	183	20	" yellow.
Daisy	" 2	" 7	Small	Fair	132	..	Round, oval, red.
Seedling No. 214	" 2	" 9	Medium	Poor	128	20	Oval, white.
Table King	" 2	Not ripe	"	Good	121	..	Round, white.
Extra Early Harvest	" 2	Sept. 12	"	"	117	20	Long, white.

GRASSES AND CLOVERS.

The past season has been a very favourable one for all grasses and clovers, the unusually heavy rainfall during the spring and early summer ensuring a large return.

An increased area of the farm was in grass during the past season, and the very fine crop attracted much attention from visitors.

The production of home grown brome grass seed is not nearly equal to the demand, and as the seed grown in the province is much preferred to the imported article, it was deemed advisable to raise as much seed as was practicable on the Experimental Farm.

The crop was very clean and the yield a large one, 4,500 pounds of cleaned seed was grown from 13 acres, or 346 pounds per acre. Three acres of this was the fourth crop, three acres the third crop and the balance (7 acres) the first cutting. Five men and four horses threshed with a 'Little Giant Separator,' and four-horse sweep power 750 pounds of clean seed per day. The cost of threshing and fanning was about 2 cents per pound.

EXPERIMENTS WITH GRASSES SOWN ON SUMMER-FALLOW IN THE SUMMER OF 1896.

Although the season has been an exceptionally favourable one for the growth of grass, the returns from these plots show on the whole quite a falling off from previous years.

Variety.	Seed per Acre.	Weight per Acre 1898.		Weight per Acre 1899.		Total Weight 2 Years.	
	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
American Lyme Grass	20	3	1,000	1	1,200	5	200
Awnless Brome Grass	20	2	500	2	1,500	5	
Timothy	15	2	500	1	500	3	1,000
Western Rye Grass	20	2	300	1	1,400	3	1,700
Timothy and Clover	10 + 10	2	300	1	900	3	1,200
Meadow Fescue	30	1	1,100	1	80	2	1,180

Brome Grass sown on spring ploughed stubble June 1, 1898, 15 pounds seed per acre, cut for the first time this year, gave on sandy loam, when ripe and ready to cut for seed 4 tons 60 pounds per acre and on clay loam, cut green for hay 3 tons 1,860 pounds per acre.

TEST OF THICK AND THIN SEEDING.

The average result of a test for three years shows that with timothy and western rye grass, 10 pounds of seed is sufficient, but with brome grass and bald rye grass 20 pounds gave the best results, and with American lyme grass 15 pounds, was found sufficient.

Variety.	Seed per Acre.	Weight per Acre 1897.		Weight per Acre 1898.		Weight per Acre 1899.	
	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
Timothy (Phleum pratense)	5	1		1	500	..	1,600
" "	10	1	670	1	200	..	1,500
" "	15	1	750		1,700	..	1,200
" "	20	1	700		1,800	..	900
Awnless Brome Grass (Bromus Inermis)	10	2	350	1	1,100	..	1,600
" " "	15	2		1	900	..	1,300
" " "	20	2	400	1	700	1	1,250
Western Rye Grass (Agropyrum tenerum)	10	3	400	1	1,400	1	250
" " "	15	3	200	1	1,300	1	300
" " "	20	3	300	1	1,200	1	400
American Lyme Grass (Elymus Americanus)	10	3		2	1,000	1	400
" " "	15	3	555	2	900	1	1,950
" " "	20	3	500	2	300	1	1,860
Bald Rye or Wheat Grass (Elymus Virginicus)	10	2	700	2	100	1	1,100
" " "	15	2	700	2	800	1	1,400
" " "	20	2	750	2	1,800	1	1,500

As an evidence of the gradual decreasing productiveness of hay land, the average yearly returns of all these plots was as follows:—

	Tons	Lbs.
Average for 1897, the first year's cutting	2	686
" 1898, the second year's cutting	1	481
" 1899, the third year's cutting	1	419

GRASS SEED DISTRIBUTION.

The demand for grass seed exceeded that of any former year, and the supply was not equal to the demand.

The number of applicants receiving one-pound samples free was 212 and 47 lots of two-pound and over were sold at 15 cents per pound.

THE USE OF NITRAGIN IN GROWING CLOVER.

During the summer of 1898 two plots of red clover were sown, one with seed which had been inoculated with nitragin (a culture of the micro organisms which form the nodules on the roots of clovers) and the other plot was sown with the same seed untreated.

A perfect stand was obtained from the treated seed by the fall of 1898 and a fairly good stand of the untreated, but there were some vacant spots in the latter.

The treated plot gave in 1899 a yield of 2 tons 1,950 pounds, and the untreated, 2 tons 600 pounds.

EXPERIMENTS WITH CLOVER.

TEST of Varieties sown in June, 1896, on Spring-ploughed Stubble.

Variety.	Seed per Acre.	Thickness of After-math.	Yield per Acre, 1897.	Yield per Acre, 1898.	Yield per Acre, 1899.
	Lbs.		Tons Lbs.	Tons Lbs.	Tons Lbs.
Alfalfa	60	Thick	2 100	2 1,800	1 820
Red Clover	20	"	900	2 1,300	Ploughed up
Alsike	10	Fair	1 100	1 1,200	"
Mammoth Red Clover	25	Thin	1 500	1 1,200	1 1,000
White Dutch	12	"		1,200	Ploughed up

EXPERIMENTS WITH MILLETS.

Seven varieties of millet were sown but three of them, viz., Pearl, Algerian and Italian, were killed by flooding.

The Japanese variety was sown in drills nine inches apart, the others seven inches; the size of the plots was $\frac{1}{20}$ acre, the soil a clay loam which had been summer-fallowed.

Variety.	When Sown.	When Cut.	Height.	Yield per Acre, Dry Hay.
			Ft. In.	Tons. Lbs.
Japanese Millet	June 6	Sept. 2	3 4	3 1,600
Siberian	" 6	Aug. 27	4 ..	3 326
Hungarian Grass	" 22	Sept. 1	4 ..	2 1,200
White Round French	" 6	Aug. 25	4 ..	1 1,200

Experiments With Broom Corn.

Two plots of this plant were grown, but owing to heavy rains seeding was delayed until June 22, and the heads were only partially developed when cut on September 1.

The size of the plots in this test was $\frac{1}{40}$ acre, the soil was a clay loam which had been summer-fallowed.

—	Distance between Rows.	When Sown.	When Cut.	Height.	Yield per Acre, Green.	
					Tons.	Lbs.
Broom corn	21 inches	June 22	Sept. 1	7 feet	9	1,354
"	28 "	" 22	" 1	"	8	1,258

Experiments with Early Soja Beans and Horse Beans.

A further trial was made of these two leguminous plants, but the returns are not as large as last year.

During the past two seasons both Soja and Horse Beans have been tried for ensilage, but with very poor success. In both years the plants rotted in the silo and partially spoilt any corn coming in contact with them.

The land was summer-fallowed. The seed was sown with a garden drill on June 20 and kept clean by the occasional use of a cultivator, the soil was a clay loam.

The size of the plots was $\frac{1}{40}$ acre, the Horse Beans fully matured their seed, but the plants of Soja beans had only a few immature pods.

Yield of Early Soja Beans sown at different distances.

Variety.	Sown.	Rows.	Height.	Cut.	Yield per Acre, Green.	
			Inches.		Tons.	Lbs.
Early Soja Beans	June 20	21 inches apart	28	Aug. 31	4	...
" "	" 20	28 "	28	" 31	3	...
" "	" 20	35 "	28	" 31	3	200

Yield of Horse Beans sown at different distances.

Variety.	Sown.	Rows.	Height.	Cut.	Yield per Acre, Green.	
			Inches.		Tons.	Lbs.
Horse Beans	June 20	21 inches apart	35	Aug. 31	8	600
"	" 20	28 "	37	" 31	7	800
"	" 20	35 "	37	" 31	6	1,000

CATTLE.

The cattle on the Brandon Farm have kept in good health during the past year, and the herd now consists of twenty-three head.

The following is a list of the names, breed, age and weight of the animals :—

Name of Animal.	Breed.	Age.	Weight.
			Lbs.
Lord Lossie, bull	Shorthorn	2 years	1,320
Brandon Fashion, cow	"	6 "	1,370
Violet, cow	"	3 "	1,190
Mary of Brandon, heifer calf	"	4 months	330
Duke, bull	Aryshire	2 years	1,290
Dandy, cow	"	10 "	1,200
Primrose, heifer	"	18 months	830
Sandy, bull calf	"	4 "	350
Prince of the Prairie 2nd, bull	Holstein	2 years	1,600
Lida of Brandon, cow	"	5 "	1,410
Lida's Princess of Brandon, cow	"	3 "	1,380
Queen of Brandon, heifer	"	21 months	915
Siepkje of Brandon, heifer	"	19 "	875
Brandon Friar, bull calf	"	4 "	370
Richard Lyons, bull	Guernsey	3 years	1,570
Lady Jane Grey, cow	Grade	11 "	1,260
Pansy, cow	"	5 "	1,280
Violet, cow	"	3 "	1,270
Jennie, cow	"	3 "	1,430
Jack, steer	"	18 months	800
Jill, heifer	"	18 "	810
Reddy, steer calf	"	5 "	470
Dick, steer calf	"	3 "	325

Experiments in Feeding Steers.

The impression is prevalent among farmers that although oat straw can be used with advantage for feeding cattle, wheat straw is worth very little for that purpose. This opinion is perhaps formed from experience gained in Ontario, where the wheat straw is generally much inferior to the bright, green cut, article obtainable here.

During the past winter a comparative test of the feeding value of the two kinds of straw was made on this farm; with the result that wheat straw gave slightly the best returns. Although this result may not be obtained with a series of experiments, it shows at least that the bright green wheat straw of this country, when used in connection with roots and grain, has considerable value as a fodder.

For the purpose of this test six shorthorn grade steers, three years old, were purchased in December, 1898, at 3 cents per pound, live weight, and sold for export to England, in April, at $4\frac{85}{100}$ cents.

The steers were divided into two evenly matched groups of three each and fed all they would eat of the following ration :—

First Lot of Steers.

Wheat straw	15 lbs.
Ensilage	20 "
Grain chopped	5 to 10 "
Flax seed for the last 55 days	1 "

Second Lot of Steers.

Oat straw	15 lbs.
Ensilage	20 "
Grain chopped	5 to 10 "
Flax seed for the last 55 days	1 "

At the commencement of the test only 5 pounds of mixed oats and barley chop was fed. This was increased every four weeks until the maximum of 10 pounds was reached.

The actual amount and estimated value of the feed consumed per head during the feeding period of 110 days, was as follows:—

First Lot of Steers.

1,650 lbs.	wheat straw	
2,200 "	ensilage, @ $2 per ton	$2 20
624 "	chopped barley, @ ½ cent per pound	3 12
207 "	" oats, @ ¾ cent per pound	1 55
55 "	ground flax seed, @ 1¼ cents per pound	68
		$7.55

Second Lot of Steers.

1,650 lbs.	oat straw	$
2,200 "	ensilage at $2 per ton	2 20
624 "	chopped barley at ½c. per lb	3 12
207 "	" oats at ¾c. "	1 55
55 "	ground flax seed at 1¼c. "	68
		$7 55

Summary of Results.

—	First cost of steers, per head.	Value of feed consumed, per head.	Average price sold for per head.	Profit per head.	Average daily gain per head.
	$ cts.	$ cts.	$ cts.	$ cts.	Lbs. Ozs.
First lot of steers fed on wheat straw...	34 54	7 55	62 20	20 11	1 3
Second lot of steers fed on oat straw....	34 63	7 55	61 82	19 64	1 1

SWINE.

The herd of swine on the farm continues in good health, and consists now of the following animals:—

Name.	Breed.	Age.
Royal Victor, boar	Berkshire	14 months.
Crocus, sow	"	18 "
Minnie Merle 3rd, sow	"	6 "
Juno, sow	"	2 "
Topsy, sow	"	2 "
Dunrobin, boar	Tamworth	2 years.
Amy's Choice 2nd, sow	"	7 months.
Nina of Brandon	"	13 "
sucking pigs	Berkshire Tamworth, crosses	2 "
Squire, boar	Chester White	2 years.

Cutting Crop of Awnless Brome Grass, Experimental Farm, Brandon, Man.

An effort was made to find out the value of brome grass pasture for fattening pigs, but owing to a delay in the receipt of fence wire, there was not sufficient time left to complete the test; it was, however, ascertained that pigs are very partial to this grass, and further tests will be made with it next year.

Coarse Grain and Bran as Pig Feed.

This test was made to ascertain whether a ration of coarse grain with a small proportion of bran could be used with advantage here.

The four pigs used were Berkshires and were purchased at six weeks old for $2 each.

Rations fed.

First period of eleven weeks—

Bran, 70 pounds at ½c. per pound	$0 35
Oats, 472 " at ¾c. "	3 54
Barley, 140 " at ½c. "	0 70
	$4 59

Second period of four weeks—

Bran, 91 pounds at ½c. per pound	$0 45½
Oats, 91 " at ¾c. "	0 68¼
Barley, 182 " at ½c. "	0 91
	$2 04¾

Third period of five weeks—

Oats, 100 pounds at ¾c. per pound	$0 75
Pease, 100 " at ¾c. "	0 75
Barley, 200 " at ½c. "	1 00
	$2 50

GRAIN IN PERIODS.

Period.	Time.	Lbs. Gain.	Cost.	Cost per 100 lbs.
			$ cts.	$ cts.
1st	11 weeks	166	4 59	2 76
2nd	4 "	84	2 04	2 42
3rd	5 "	126	2 50	1 98

SUMMARY.

Penned.	Cr.	Dr.
	$ cts.	$ cts.
First cost of 4 pigs at $2 each		8 00
Cost of feed		9 13
Sold, 518 lbs. at 4½c	23 31	
Profit on the 4 pigs		6 18
	23 31	23 31

POULTRY.

FOWLS.

The fowls have kept quite healthy, and thirty-four chickens were raised during the year. At present the flock consists of Black Minorcas, White Plymouth Rocks and Light Brahmas.

Comparison of a short with a long term for Fattening.

The pen of birds for this test consisted of eight cockerels, two Black Minorcas, two White Plymouth Rocks, and 4 barred Plymouth Rock crosses. These were fed altogether on a mixture of finely crushed grain, consisting of $\frac{1}{3}$ each of oats, wheat and barley; this was given in troughs, mixed with water, about the consistency of thin porridge.

In the estimate of cost the meal has been valued at $1.00 per hundred pounds.

The flesh gained during the first term of three weeks only cost about $3\frac{1}{3}$ cents per pound, live weight, while further gains in the next two weeks cost at the rate of 7 cents per pound. This agrees with the experiments carried on here in 1897.

First period of twenty-one days.

Sept. 16.	Oct. 7.	Gain.	Cost.	Cost per Pound, Live Weight.
Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Cts.	Cts.
28 12	34 13	6 1	20	$3\frac{1}{3}$

Second period of fourteen days.

Oct. 7.	Oct. 21.	Gain.	Cost.	Cost per Pound, Live Weight.
Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Cts.	Cts.
34 13	38 13	4 ..	28	7

FATTENING DUCKS.

A similar test to the one made with chickens was undertaken with ducks. The flock for this purpose consisted of five Pekin crosses under one year old. They were confined in a yard and water kept constantly before them; the grain given consisted of equal parts of wheat, oats and barley, finely chopped and well moistened with water. They were also supplied with abundance of refuse vegetables, such as cabbage and turnip leaves.

GAIN during first period of twenty-four days.

—	Live Weight, Sept. 15.	Live Weight, Oct. 9.	Live Weight Gain.	Cost of Gain.	Cost per Pound.
	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Cts.	Cts.
Five ducks.....	23 2	28 2	5 ..	44	$8\frac{4}{5}$

GAIN during second period of nine days.

—	Live Weight, Oct. 9.		Live Weight, Oct. 18.		Live Weight Gain.		Cost of Gain.	Cost per Pound.
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Cts.	Cts.
Five ducks..	28	2	29	1	..	15	16	17$\frac{1}{7}$

BEES.

Owing to unfavourable weather at the time when most of the honey is usually gathered here, very little more than sufficient to carry the bees over winter was gathered this year.

FRUITS.

WILD CRAB APPLES.

The wild Siberian crab *(Pyrus baccata auruntiaca)* again gave a large crop of fruit this year, and others of the more recently planted varieties of the same species, namely, *Pyrus baccata lutea*, Rgl., of which three trees fruited this season for the first time, these were superior both in size and flavour to the *auruntiaca*.

Although these wild forms of Siberian crabs are too small to be of commercial value they are perfectly hardy and will prove useful as a jelly fruit for home consumption, and also as an ornamental shrub, and may prove valuable as stocks for grafting the better classes of apple on.

STANDARD CRAB APPLE.

The Transcendant Crab tree, the only remaining specimen of a consignment of ten trees received in 1889, has this year borne a crop of thirty nice crabs. Its success is no doubt due to the fact of its being protected by a case built around the stem which is filled each winter with earth.

CROSS-BRED APPLES.

One hundred and thirty-one trees of thirty-eight varieties of cross-bred apples were received in the spring of 1898, from the Central Experimental Farm. Seventy-six trees of the thirty-eight varieties were living in the fall of 1898, and all survived the winter without protection and started to grow from the terminal bud in the spring. These have made a good healthy growth during the past season.

This orchard was increased this season by a further addition of 126 trees received from the Central Experimental Farm, at Ottawa, consisting of twenty-eight varieties or crosses, taking the wild crab of Siberia *(Pyrus baccata)* as the female parent, and cultivated varieties of commercial apples as the male. Scions of these have been grafted on the *P. baccata* stock. Of these we can report very favourably ninety-six trees of twenty-eight varieties go into the winter well established and with well ripened wood.

CROSS-BRED APPLES.

Number Received.	Record Number.	Cross.	Seedling or Graft.	Number Alive.	Number Dead.
4	161	Pyrus baccata × Red Anis	Grafted	3	1
4	19	" × Transcendant	"	3	1
4	30	" × Hyslop	"	3	1
4	102	" × "	"	3	1
5	125	" × Wealthy	"	4	1
4	164	" × Red Anis	"	4	0
2	137	" × Anis	"	1	1
5	46	" × Tetofsky	"	3	2
2	116	" × "	"	1	1
4	117	" × Wealthy	"	4	0
5	118	" × "	"	3	2
5	107	" × Hyslop	"	3	2
3	132	" × Wealthy	"	1	2
5	142	" × Duchess	"	4	1
5	127	" × Wealthy	"	4	1
5	162	" × Red Anis	"	4	1
3	165	" × "	"	3	0
5	163	" × "	"	5	0
5	64	" × Tetofsky	"	4	1
5	105	" × Hyslop	"	2	3
4	122	" × Wealthy	"	3	1
4	53	" × Tetofsky	"	4	0
3	16	" × Orange Crab	"	3	0
5	79	" × Tetofsky	"	2	3
10	.....	" × Krimskoe	Seedlings	8	2
8	.....	" × Ball's Winter Crab	"	8	0
4	.....	" × Beautiful Arkad	"	3	1
4	112	" × Wealthy	Grafted	3	1

PEARS.

Longworth:—Planted spring 1897 which winter killed to near the ground two years ago, was completely destroyed by frost last winter.

PLUMS.

Many of the varieties of plums sent to this farm in 1893 bore fruit for the second time this year, the fruit was of fair size and the trees were fairly well laden, but the plums were again injured by frost before they had time to ripen. It is evident that all those of this lot so far tested are too late for this district.

The trees that fruited were De Soto 2, American Seedling 3, Seedlings of Cheney 4, Seedlings of Weaver 11, Frankland's Seedlings No. 21, No. 67 and No. 38. One of the grafted plums "City" from Charles Luedloff, of Carver, Minnesota, fruited well but this was also frozen before becoming ripe.

NATIVE PLUMS.

More success has been had with the native plum, nearly all of which ripen in time to escape frost. Many thousands of seedlings of the native species have been grown from selected seed. Among these some will no doubt be found superior in quality, while others will prove useful as stocks on which to graft the superior sorts.

Many trees and scions of wild plums have been received from growers in different parts of the province, these have been planted or grafted on native stocks for further testing.

SAND CHERRIES.

The native sand cherry crop was not up to the average this season, very few trees bearing fruit.

The work of reproducing the seven selected and named varieties has been continued.

The Compass cherry, a cross between the sand cherry and an American plum, winter killed badly last year.

Ten trees of a hybrid named Rupert were received from the Central Farm at Ottawa, where they have fruited and proved useful. These were produced by crossing the sand cherry with a variety of the American plum; four of these were well established when winter set in.

GRAPES.

The two varieties of grape named Gibb and Bacchus, which have been tried here for four years, although protected, were cut down to the ground last winter.

Wild grape cuttings were received from Mountain City, Manitoba, and also from the northern part of Quebec, and grafted on staminate roots already established here. Many of these were also successfully grown from cuttings.

CURRANTS.

The currant crop this season was only fairly good. The red and white varieties gave an average return, while the black currants fell slightly below the average in yield. Many of the seedlings still show desirable qualities.

The Climax, favourably spoken of in previous reports as the best black currant, still heads the list. It is worthy of more general distribution throughout the province.

It was noticeable this year that the native black currant, the variety grown chiefly by the farmers of the province, was almost an entire failure. This was probably due to the unusually rainy weather while pollination of this kind was taking place; and shows the advantage of growing varieties flowering at different periods. The annexed table gives the yield of some of the seedling currants, also some of the standard varieties, and the dates of ripening.

CURRANTS.

Variety.	Kind.	Size.	Date of Ripening.	Yield per Bush.	Remarks.
				Lbs. Ozs.	
Black Champion	Standard	Small to medium	July 17	5 3	Vigorous.
Black Naples	"	Medium	" 8	3 10	Poor growth of wood.
Lee's Prolific	"	Small	" 4	5 14	" "
Climax	Seedling	Very large	" 11	11 8	Very vigorous.
Eclipse	"	"	" 4	8 ..	"
Winona	"	Small to medium	" 6	7 ..	Fairly vigorous.
Clipper	"	Large	" 8	5 8	"
Stirling	"	Medium	" 8	4 12	Vigorous.
Oxford	"	Small to medium	" 1	4 5	"
Star	"	"	" 2	3 13	Weak growth.
Perth	"	Small	" 5	3 2	Vigorous.
Lewis	"	"	" 5	2 2	"
Tree Currant	Standard	Very small	" 18	1 6	Very vigorous.

Of the red varieties the Red Cherry, Red Grape and Fertile d'Angers, all gave good returns this year.

The Stewart and Star, new varieties, gave a fair crop and are promising.

Of the white currants White Imperial fruited for the first time this season; it is apparently not equal to either the White grape or White Dutch.

GOOSEBERRIES.

Nine varieties of gooseberries are now under test, many of these in former years were more or less injured by frost. Last winter all the varieties were laid down and covered with earth, and on raising them in the spring, all were found to be in good condition and bore fruit this year.

The Whitesmith, Columbus and Industry produced a small quantity of very large fruit. Of the several varieties tested Smith's Improved and Houghton are recommended for general cultivation, the first mentioned variety should, however, receive some winter protection.

JUNE-BERRIES.

Three varieties of this fruit are now growing on the farm. One of these is the native (*Amelanchier alnifolia*), locally called the Saskatoon-berry, and two are improved dwarf varieties, which have been named A. Gardner and A. Alpina.

The native form seldom bears fruit; this is no doubt owing to its early flowering habit. This year it was in full bloom on May 10, and on the 22nd of that month the thermometer registered 10 degrees of frost. A. Gardner flowered on May 29 and A. alpina on June 1, when all danger of frost was past. The fruit of the two latter is also superior both in size and quality. They ripen during July, but very unevenly, and need the protection of nets, being much relished by birds.

RASPBERRIES.

The raspberry canes were covered with earth in the usual manner last fall and were lifted the first week in May, when the old wood was pruned out. They all came through the winter uninjured.

They flowered well, and although receiving a severe check from protracted dry weather just as fruit was forming, showers came in time and an abundant crop was gathered.

Among the old varieties specially deserving of mention are Turner and Philadelphia of the reds, and the Caroline and Golden Queen among the yellow sorts. These were heavily loaded with beautiful fruit of a rich flavour.

Many varieties fruited this season for the first time, and notes were taken as to their comparative merits.

Kenyons Seedling.—A good yielder, thrifty grower, suckers rather too freely, medium early, red in color with fair flavour.

Trusty.—Is poor in yield and growth, flavour fair, colour red, late.

Garfield.—Very large fruit, strong grower, apparently hardy, flavour good, colour red.

Hebner.—Only produced a small amount of very fair red fruit and needs further testing.

Niagara.—Gave a fair yield; a weak grower, fruit of fair flavour, rather late, colour red.

Parnell.—Flavour good, yield medium, very early, colour red.

Miller.—Generally poor, very late, red in colour.

Of all the raspberries tried here the London has proved one of the best. With light protection it has been found quite hardy and bears large clusters of large red luscious fruit.

This is the first year's test, and if it maintains its reputation it will be a decided acquisition.

Muskingum.—Is a strong grower, a good bearer, with large dark red fruit, ripening very late, and having a sprawling habit, it requires staking.

Palmer.—Is a black-cap, ripening about with the Hilborn, but cannot be as highly recommended as that berry.

Snyder.—A black berry which has fruited for two years here, is the last to become ripe. The fruit is very fine, but the yield is small, and it is probably too tender for general cultivation.

The season of picking commenced the last week in July with the Cuthbert and finished with the Snyder on September 1.

The yield from 150 feet (solid rows) of eleven varieties growing under like conditions, was weighed, and the weights are given below :—

RASPBERRIES.

Variety.	Yield From 1 row 150 ft. long.	Period of Ripening.	Colour.	Remarks.
	Quarts.			
Philadelphia	27	July 29 to Aug. 19	Red	Vigorous.
Caroline	26	Aug. 1 " 29	Yellow	Vigorous, needs protection.
Golden Queen	25	July 29 " 25	"	" "
Turner	22	" 28 " 18	Red	Very vigorous.
Kenyon Seedling	21	Aug. 4 " 28	"	Sprawling growth.
Mary	17½	" 7 " 30	"	Vigorous.
Cuthbert	17	July 27 " 18	"	Weak growth
Reider	16	" 29 " 19	"	Vigorous.
Marlboro	16	" 31 " 28	"	"
Garfield	15	Aug. 8 " 19	"	Fairly vigorous.
Hilborn	14	" 5 " 20	Black	Vigorous, needs protection.

FOREST TREE SHELTER BELT.

Planting was commenced in this belt in 1889 and completed the following year, and from the notes taken in the intervening ten years much valuable data has been secured.

In this belt were planted principally Box Elder, Elm, Ash, Birch, Cottonwood, Poplar, Spruce, Pine and Arbor Vitæ.

The growth has now become very dense, and any slight opening has become filled up with a thick growth of native trees. The seed of many of these evidently being brought in by birds. Each summer hundreds of birds make this their nesting place, enlivening the scene with their showy plumage.

It is perhaps owing to the presence of these feathered friends that we can report almost complete immunity from the many insect pests that too often prey upon trees in Manitoba.

It has been found that many of the Pines and Spruce have been injured from the crowding of faster growing deciduous kinds, and it has now become a struggle between the different varieties, and unless thinned out from time to time, the victory will rest with the most robust and fastest growers.

From our observations we would advise for general planting of wind-break belts such trees as Box Elder or Manitoba Maple, the Elm, Ash and Poplars, and even in this case it would be better if some varieties were much larger than others at the time of planting. The Manitoba maples and poplars should be two years old, and the elms and ash four years. They may be planted four feet apart each way. Such close planting would insure straighter and taller trees, and their foliage would the sooner cover the ground, thus stopping the evaporation of moisture and keeping down weeds.

Evergreens, such as Spruce, Pine and Arbor Vitæ, if planted in such belts, must be given room, so that they may have the sunlight and air they require for healthy growth. These are quickly injured by overcrowding if planted in conjunction with rapid growing, deciduous kinds.

NEW PLANTATION.

A plantation of one acre in extent was set out in the spring of 1898 with maples, ash, elm and sand cherry, alternating, the latter shrub was planted in each alternate row, the other row was made up of the three former varieties, in the proportion of three maples to one each of ash and elm. It is expected that the sand cherries, with their rapid growth and recumbent habit, will soon fill the intervening spaces and thus lessen the time during which it is necessary to cultivate to keep weeds under. These, in their second year, have not yet become recumbent, but are still growing quite comparatively upright. The plantation is making a thrifty growth.

ARBORETUM.

The area of the Arboretum was substantially increased this season both to the north and to the east to make room for the additional number of varieties received. Last spring many new trees were planted in these grounds from the test plot where they had spent at least two winters and had been found hardy or nearly so.

List of the additions to the Arboretum of new trees and shrubs.

Acer spicatum.—Mountain Maple.
Acer saccharinum No. 1.—Sugar Maple.
Abies lasiocarpa.—Fir.
Berberis asiatica—Asiatic Barberry.
Berberis vulgaris violacea.—Violet Barberry.
Berberis sinensis.—Chinese "
Berberis Sieboldii.—Siebold's "
Berberis americana.—American "
Berberis canadensis.—American "
Betula populifolia.—White Birch.
Betula pumila.—Low Birch.
Cratægus sanguinea.—Siberian Hawthorn.
Cratægus No. 9 Niemetz.—Hawthorn from Niemetz.
Cornus sanguinea, fol. variegatis.—Variegated-leaved Dogwood.
Prunus serotina.—Wild Black Cherry.
Cytisus purpureus.—Purple Broom.
Celastrus scandens.—Climbing Bitter-sweet.
Cotoncaster No. 10 (Niemetz).
Caragana Chamlagu.—Chinese Pea Tree.
Euonymus americanus.—Spindle Tree.
Fraxinus quadrangulata.—Blue Ash.
Juglans nigra.—Black Walnut.
Lycium chinense.—Chinese Matrimony Vine.
Lonicera siberica.—Siberian Honeysuckle.
Ligustrum sinense.—Chinese Privet.
Populus deltoides aurea.—Golden-leaved poplar.
Populus nigra.—Black poplar.
Populus nigra pyramidalis.—Lombardy poplar.
Ptelea trifoliata.—(Russian Form.)
Prunus mahaleb.—Mahaleb cherry.
Rhamnus No. (Niemetz).—Buckthorn.
Rhamnus tinctoria.
Rhus aromatica.—Fragrant Sumach.
Rhus glabra.—Smooth Sumach.
Ribes siberica.—Siberian currant.
Rosa-villosa pomifera.—Apple Rose.
Salix Alba.—White Willow.
Salix aurea pendula.—Yellow weeping willow.
Salix capraea.—Goat willow.
Salix alba britzensis.—White willow.
Salix Nicholsoni purpurascens.
Salix rubra forbyana.—Red willow.
Salix nigra.—Black willow.
Spiræa arguta.—Many flowered spiraea.
Spiræa Chamædrifolia.—Germander leaved spiraea.
Spiræa Japonica Bumalda.—Japanese spiraea.
Spiræa tomentosa.—Hardhack.
Syringa japonica.—Japan Lilac.
Thuya occidentalis Hoveyi.—Hovey's Arbor Vitae.

HEDGES.

The importance of hedges is becoming more and more apparent in this country of high winds and hot sun, for they no doubt temper the latter as well as materially break the force of the former.

Much interest is taken and many inquiries are made from time to time concerning the best varieties to plant, the manner of planting, clipping, &c.

As for variety the Manitoba Maple (*Acer negundo*) seems hard to beat for a hedge tree when a windbreak is required. It is naturally a hedge tree, taking very little checking to make it grow thick at the bottom; another thing in its favour is the ease with which it can be grown from seed, which can be readily obtained.

For tall windbreaks the Cottonwood (*Populus deltoidea*) and Russian poplar (*Populus berolinensis*) have been tried with success. Such hedge windbreaks are much

admired for seven or eight years, but by that time the lower branches are apt to die off and the shelter hedge then presents a very ragged appearance.

For a lower or medium hedge the Siberian Pea Tree (*Caragana arborescens*) seems to be all that can be desired, being very hardy, compact and beautiful.

It is also useful as bee pasturage, filling a gap in the flowering season, between the native poplars and willows and the indigenous and cultivated flowers.

For a very low or garden hedge the Asiatic Maple (*Acer ginnala*), the native rose (*Rosa blanda*) and the native Meadow Sweet (*Spiraea salicifolia*) are all desirable.

Native Maples have been planted in hedge rows on this farm at various distances apart, from two to four feet in double rows, and from 9 inches to 3 feet in single rows. It has been found that planting in single rows 18 inches apart is about the best distance, but cottonwood and poplars require to be 4 feet apart, while for medium sized to low hedges the plants should be set out from 9 to 16 inches apart.

NEW HEDGES.

The 44 sample hedges undergoing test are making a rapid and thrifty growth, and attract much attention from visitors, more especially from those who contemplate planting.

They were increased by the addition of 9 kinds last spring, making the number now 63 varieties.

Additions to sample hedges 1899 :—

Betula lenta—Sweet Birch.
Betula Lutea—Yellow Birch.
Abies balsamea—Balsam Spruce.
Viburnum lantana—Wayfaring Tree.
Ptelea trifoliata—Hop Tree.
Betula Nigra—Black Birch.
Betula Alba—White Birch.
Hippophae rhamnoides—Sea Buckthorn
Thuya occidentalis—Arbor Vitae.

DISTRIBUTION OF POPLARS AND WILLOWS.

Under instructions from the Director, many thousands of cottonwood, poplar and willow cuttings were prepared and planted during the past year for the purpose of distribution as soon as they have become established. This was deemed advisable owing to the want of success among farmers generally in striking the cuttings which have hitherto been distributed to them. In preparing and planting these cuttings it was thought well to test several different methods. Some cuttings were taken in the usual way, namely, 9 inches long, cut carefully above a bud at the top, and below a bud at the bottom, with all side shoots trimmed off. Others were cut, leaving the terminal bud intact and many of the small shoots left on. Others again were cut in the shape of what is technically called mallet or heel cuttings. This is a shoot 9 inches long with a heel of older wood about 3 inches long.

Notes were taken of the results of the different methods through the growing season and on taking the percentage of those struck it was found that 95 per cent of the mallet cuttings had become well rooted. 75 per cent of those with the side shoots left on grew and only 30 per cent of the straight cuttings rooted. These remarks refer to the poplars and cottonwoods. The willows in every case were cut straight 9 inches long and 100 per cent of them grew.

The procedure of planting was as follows:—A deep furrow was drawn with the plough, in the manner followed in opening a land; an assistant with a basket of cuttings (which had been well soaked) inserted the cuttings on one bank of the furrow and covered with moist soil as quickly as possible, a hoe being used for the purpose, followed by a thorough tramping.

The mallet system of cutting is especially advised in growing such hard wooded plants as the Loniceras, Syringas, &c.

A FUNGOUS DISEASE.

The cottonwood (*P. deltoidea*) although generally our fastest growing tree has, for the past two or three seasons, become seriously affected in its foliage by a fungous disease which eventually causes the death of the leaves. The progress of the disease may be briefly described as follows:—During the summer a growth resembling a rust makes its appearance on the leaves, more especially on the young and succulent growth, which in a short time discolours all the leaves, which fall prematurely from the tree, and in the following spring a large portion of the wood is found to be in a dead or dying condition.

The exceptionally rank growth caused by the heavy rainfall of the past two seasons, has, perhaps, made an ideal propagating ground for this disease.

Fungicides will be tried during the coming spring with the hope of arresting the progress of this disease.

SHRUBS AND TREES.

In previous reports, lists and descriptions have been given of some of the more promising of the shrubs and trees, which have been tested here. Brief descriptions are herewith given of some further desirable species.

Berberis Thunbergi—Thunberg's Barberry. Is one of the most ornamental of the more recently introduced species of barberry. This beautiful little shrub is especially admired when it assumes its autumnal tints of brilliant red. The flower is quite small and inconspicuous, but the drooping red berries which follow are very handsome.

Juniperus sabina—Common Savin. This graceful little evergreen is a species of juniper which grows to a height of about 2 feet; it is quite hardy and worthy of general cultivation. Its vivid evergreen foliage makes it useful as a cemetery shrub. There is a creeping form of this that is indigenous to the sand-hills of this province, but is not so handsome as the more erect form. Both are propagated by layering.

Syringa Vulgaris Charles 10th, Charles 10th Lilac.—This is one of the most beautiful of the lilacs tested here, and this year, four year old trees, two feet high were a mass of bloom. This early flowering habit makes it a very desirable shrub. It can, however, only be reproduced by cuttings, layering or grafting.

Ptelea trifoliata aurea, Golden Hop Tree.—A shrub more noticeable for its golden leaves than from its flowers, which are inconspicuous. It is in bloom about July 1.

Spiræa multiflora arguta, Many Flowered Spiræa.—This is a very pleasing addition to the Arboretum, both for its foliage and its profusion of delicate white flowers, which are produced quite early in the season.

Cotoneaster integerrima (vulgaris), Common Cotoneaster.—This shrub is a valuable acquisition. It is very promising for low hedge purposes as well as for individual planting. In flower May 30, followed by purple berries, from the seeds of which it can be grown.

Symphoricarpus occidentalis, Western Snowberry.—This is a pretty little common native shrub, very useful for low hedges. It has a delicate bell-shaped, pink flower, succeeded by small, snow-white berries, from which it derives its name. It has a maximum height of 3 feet, can be grown from seed, or transplanted from the prairies, where seedlings grow in abundance.

Betula pumila.—Low Birch.—A symmetrical little shrub which usually grows to a height of 3 to 6 feet, it is found growing in damp places, but does equally well on higher grounds under cultivation. It is difficult to propagate from seed, but seedlings are easily obtainable from native sources.

Sambucus racemosa pubescens.—Native Red fruited Elder.—This fast growing shrub with a maximum height of seven feet, is indigenous but uncommon. The flowers are sweet scented and grow in clusters, while the pretty red berries in the autumn are also ornamental and by some are considered useful for the making of wine, which many suppose to have medicinal properties. This can be grown both from cuttings and seed.

Salix Alba Britzensis.—This is one of the prettiest of the imported white willows. It is not only showy in full leaf but its bright red wood when devoid of leaves is much admired. It is useful for ornamental hedges and is readily propagated from cuttings.

Rhus Glabra, Smooth Sumach.—A very striking shrub found growing wild in the southern part of the province. Its chief beauty is after the first frost, when its leaves become coloured from a light red to a deep purple.

Syringa Japonica.—Japan Lilac.—This is a late blooming species, the flowers are not as sweet scented and are paler in colour than the common lilac (*S. Vulgaris*). It flowers the last week in June or early in July; this makes it a sure bloomer, as the danger of frost is then over. This late flowering habit makes it also useful for succession of bloom.

Acer Tataricum.—Tartarian Maple.—A small shrub like tree from Asiatic Russia, this has true maple leaves and being quite hardy is well worthy of general cultivation. It is propagated from seed which ripens in early fall.

Rhamnus alnifolia (frangula).—Alder leaved Buckthorn, is a hardy compact growing shrub with ornamental foliage. It has a flowering period of four or five weeks and as honey bee pasture is a great favourite. Grows readily from seed.

Viburnum opulus.—High bush Cranberry.—This shrub grows naturally in the ravines and low lands, all over the province. Its large clusters of white flowers make it very attractive.

The fruit is much used by settlers for making jelly, wine, &c.

This shrub grows well on the higher lands when kept cultivated.

NEW SHRUBS AND TREES.

Several large consignments of trees of over two hundred varieties were received in good condition from the Central Experimental Farm last spring; these are undergoing their first winter's test after which they will be reported on as to their promise as to hardiness in this province.

THE VEGETABLE GARDEN.

In accordance with the plan adopted for several years past, special attention was given during 1899 to one group of vegetables, and enough varieties of others sown, to supply representatives of the various kinds.

Onions were selected for the special test this season, thirty-three varieties being sown, and four varieties of sets planted.

Until the fall, the weather was all that could be desired, but although there was immunity from frost until quite late in the season, the weather was too cool to permit the ripening of the late vegetables, such as corn, tomatoes, &c.

Another important test undertaken, was to ascertain the effectiveness of *formalin* as a germicide for Bean Rust. The trial test of various cuttings of seed potatoes, was also continued. Full particulars of these are submitted with details of other portions of the work done in this department.

FORMALIN AS A GERMICIDE FOR BEAN ANTHRACNOSE. (Rust.)

A test was undertaken to try the efficacy of *formalin* as a germicide for *Bean Rust.* Some seasons this disease is very prevalent in this vicinity and by disfiguring the pods, causes a great amount of damage to this valuable crop. The past season was evidently unfavourable to the propagation of the rust and in consequence, many of the affected pods were only slightly marked.

The results of the test indicate that Formalin is likely to prove a useful deterrent to the disease. It was used in different proportions varying from 1 oz. to 1 gallon, to 1 oz. to 4 gallons of water and the most efficient proportion seems to be 1 ounce of formalin to one gallon of water, in which the beans were soaked for two hours. The germination was not appreciably affected by any of the solutions.

NOTES ON SEED ONIONS.

The onion crop this season was below the average, with some exceptions. Thirty-three varieties were sown, and all germinated well. The most noticeable of all varieties tested was the one named Gibraltar, tried here for the first time this season. The bulbs were large, even and quite conspicuous among the others, and the yield was far above any other variety tested. Red Globe Danvers, Yellow Globe Danvers, Early Cracker and Ohio Yellow Globe are all emimently suitable for this province. Australian Brown, a variety recently introduced, and much lauded by some seedsmen, was found to be of little value here as a cropper, the bulbs only attaining a small size. The Red Tripoli and Giant Rocca are also of little value for general crop, although if planted the second year they might possibly attain their full size. Of the white skinned varieties the only one that proved desirable was Southport White Globe, the others tested possessing a very loose skin, which lessens their keeping qualities. White Barletta again heads the list in pickling varieties, giving the largest percentage of suitable bulbs for this purpose, viz., 65⅔ per cent, Round Hard Dutch coming next with 58 per cent. Attention is called to the result of fall sown Yellow Danvers, the yield and quality being much larger than that of the same variety spring sown. Providing a location can be secured free from spring wash, it would appear that fall sowing is likely to give the best results with this variety on account of the much earlier start received in the spring.

All varieties were sown on April 22, in rows 14 inches apart, the fall sowing being done on October 28, 1898.

SEED ONIONS.

Name of Variety.	Date Ripened	Colour.	Shape.	Texture.	Yield per Acre. Bush.	Lbs.
Early Flat Danvers	Oct. 6	Deep yellow	Flat to globular.	Tight skin, firm flesh	435	36
Giant Prize Taker	" 10	Yellow	Globular	"	348	28
Yellow Globe Danvers	" 5	"	"	"	319	26
Southport Yellow Globe	" 10	"	"	"	363	..
Ohio Yellow globe	" 5	"	"	"	169	24
Giant Brown Rocca	" 15	Reddish brown	"	Flesh firm, skin rough.	444	29
Oregon Long Keeper	" 12	Light yellow	"	Tight skin, firm flesh	260	1
Italian Giant Rocca	" 16	Light red	Flattish	Loose skin, loose flesh.	174	14
Australian Brown	" 12	Light brown	"	Loose skin, firm flesh.	145	12
Early Cracker	" 4	Deep yellow	"	Firm flesh, tight skin.	290	24
Giant Red Tripoli	" 12	Light red	"	Rough skin, soft flesh.	484	..
Gibraltar	" 10	V'y l't yellow.	Flattish to glob'r	Tight skin, firm flesh.	622	17
Red Etna	" 16	Deep red	"	Loose skin, firm flesh.	275	52
Red Globe Danvers	" 5	"	Globular	Tight skin, firm flesh.	338	48
Red Victoria	" 13	Light red	Flat to globular.	Loose skin, firm flesh.	385	13
Southport Red Globe	" 6	Deep red	Globular	Tight skin, firm flesh.	406	33
Early Red Globe	" 6	"	"	"	314	36
Red Wethersfield	" 10	"	Flattish	"	207	25
Extra Early Flat Red	" 4	"	"	Loose skin, firm flesh.	203	16
Red Bassano	" 16	"	Globular	"	246	50
White Italian Tripoli	" 16	White	Flat	Loose skin, loose flesh.	311	8
White Lisbon	" 15	"	Flattish	"	145	12
White Bermuda	Sept. 25	Light yellow	Flat	"	116	9
New Queen	" 25	White	Pickling	Firm	101	14
White Portugal	Oct. 15	"	All thick necks.	Loose	174	14
Southport White Globe	" 10	"	Globular	Firm flesh, tight skin.	333	57
Silver Ball	Sept. 25	"	Pickling	Firm	140	19
Round White Dutch	" 25	"	"	"	147	58
Small Silverskin	" 25	"	"	Loose skin	114	2
White Maggiajola	" 25	"	"	Firm	120	56
Barletta	" 25	"	"	"	149	3
Yellow Danvers, fall sown	Oct. 2	Yellow	Globular	Firm flesh, tight skin.	435	36

NOTES ON ONION SETS.

Of the four varieties of sets tested, Yellow Dutch gave the highest yield. It has the merit also of ripening earlier than the spring-sown product. English Potato Onions also did well. White Multiplier proved very inferior, both in texture and yield, while Shallots, though low yielders, have the merit of being excellent keeping bulbs. All were planted on May 2, in rows 18 inches apart.

ONION SETS.

Name of Variety.	Date Ripened.	Colour.	Texture.	Shape.	Yield per Acre. Bush.	Lbs.
English Potato	Sept. 10	Light Brown	Firm flesh, Light skin	in clumps	375	4
White Multiplier	" 15	White	"	"	150	39
Shallots	" 10	Light Brown	"	"	163	21
Yellow Dutch	" 20	Yellow	"	Globular	594	23

CUCUMBERS.

Name of Variety.	Ready for use.	Length.	Diameter.	Weight.	Productiveness.
Early White Spine	July 30	7½ inches	3 inches	8½ ounces	Fairly Prolific.
White Wonder	" 29	6½ "	3 "	10½ "	Very "
Chicago Pickling	" 23	9 "	2 "	7 "	Very "
Giant Pera	Aug. 5	15 "	2½ "	17 "	Fairly "

The cucumber crop was again a most satisfactory one, both in yield and quality. The method of sowing was similar to that described in last years report, and judging from the results, this manner of cultivation, leaves little to be desired. White Wonder again proved to be a desirable variety for slicing purposes, and Chicago Pickling, was unexcelled as a pickler, its corrugated skin, and dense spines, contributing largely to this result. Giant Pera was the finest specimen grown outside and, although somewhat later than the others, mentioned, is deserving of cultivation, on account of its exceptionally fine quality.

CAULIFLOWER.

Name of Variety.	Date Ready.	Average Weight.	Colour.	Texture.
Extra Early Erfurt	Aug. 4	6½ lbs	Fairly white	Fairly close.
Early Whitehead	July 20	5 "	"	"
Early Snowball	" 24	7 "	Very white	Very close.

Of the three varieties of Cauliflower tested this season, Early Snowball, again headed the list, and was conspicuous by its snowy whiteness, and firm texture. From the varieties mentioned above, heads were procured until severe weather set in, showing that successive planting is not always necessary here.

Magnificent heads were exhibited by the Farm at the Annual Horticultural Society's Show, and called forth much favourable comment. In order to produce a fine head, it is necessary to protect the flower from the rays of the sun, and from dust, the most convenient mode of doing which, is to break the midrib of a few of the leaves, allowing them to bend over and rest on the centre.

CABBAGE.

Name of Variety.	Earliness.	Weight.	Shape.	Percentage Headed Out.
Sugar Loaf	very early	7½ lbs.	conical	85 p.c.
Winningstadt	2nd early	8 "	pointed	93 p.c.
The Lupton	late	14 "	flattish	100 p.c.
Red Drumhead	late	12 "	"	78 p.c.

NOTES ON CABBAGE.

All of the varieties mentioned above did well the past season, and may safely be depended upon for a succession in this province. Sown in hotbed on April 20, and planted outside on May 27.

BRUSSELS SPROUTS AND KALE.

One variety of Dwarf Brussels Sprouts was grown, but did not arrive at fit condition for table use. The Kale, however, was excellent, producing large plants, with finely curled leaves.

TOMATOES.

Tomatoes, this season, were a failure from the standpoint of ripe fruit, as practically none ripened. The yield was exceptionally heavy, and it is no doubt due to this fact, coupled with cool fall weather, that the fruit failed to ripen.

PARSNIPS.

Only one variety of parsnips was tested, viz., Hollow Crown, and the sample of roots was far above the average, the yield being 366 bush. 40 lbs. A noticeable feature of this test was the superiority of the product which was thinned early, which points to the necessity of early thinning for this crop to produce the best results.

BEETS.

Two varieties of beets were sown May 6, viz., Edmand's Blood Turnip and Long Smooth Red. The results of this season show the superiority of the latter in colour, texture and all points necessary to a good table beet. The sowing was made in rows 30 inches apart, the yield from Edmand's Blood Turnip being 670 bushels 35 lbs. per acre, and that of Long Smooth Red 795 bushels 24 lbs.

KOHL-RABI.

This vegetable was tested during the past season and succeeded well. The quantity grown, however, was too small to permit of an estimate being formed as to the yield per acre.

SQUASH, PUMPKINS AND GOURDS.

As the test of these vegetables was very comprehensive last season, embracing nearly every variety obtainable, it was not deemed necessary to test many sorts this year. Two varieties of squash, Extra Early Orange Marrow and English Vegetable Marrow, two varieties of pumpkins, Connecticut Field and Sweet Sugar, and three of gourds, Sugar Trough, Dipper and Nest Egg, were sown. The sowing was made on May 31, and, with the exception of the gourds, all germinated well. Special attention is again drawn to the Extra Early Orange Marrow Squash as useful for pies, filling the place of the pumpkin in this respect very well. The English Vegetable Marrow was the best of the varieties tried. Pumpkins failed to ripen, the only sort approaching ripeness was Sweet or Sugar.

TURNIPS.

Two varieties of turnips were sown on May 25, one, a strap-leaved variety Early Snowball, the other, a white-fleshed swede, Hazards. After some years of experiment with the strap-leaved or garden turnips, as they are only in fit condition for table for an extremely short period, they seem scarcely worth growing here. Hazard's Swede, although usually considered superior to the yellow-fleshed swedes, was also poor this season, being in many cases hollow and stringy; while the yellow-fleshed varieties, were in fine condition for table use.

ASPARAGUS.

This valuable vegetable grows in favour from year to year. Every farmer should have a bed of asparagus, it is so easily grown and entirely hardy and furnishes a healthful article of diet so early in the season.

RHUBARB.

The old beds of this useful plant have been kept up to their usual standard, and a new bed, containing representatives of all the varieties growing here, has been set out. Tottle's Improved, Victoria and Strawberry still take the lead.

SALSIFY.

This vegetable was tried again, but proved very unsatisfactory, the roots being small and much branched.

BEANS.

Four varieties of beans were planted on May 28, Golden Wax, Scarlet Flageclet Wax, Early Red Valentine, and Early China. Golden Wax was the only variety deficient in germinating power. Early China was slightly the earliest, but Scarlet Flageolet was decidely the best, both in productiveness and flavour. Bean rust was not troublesome this season.

RADISH.

Earliest Deep Scarlet was the only variety grown this year, and a succession was obtained by sowing every three weeks, as long as required.

LETTUCE.

Two varieties of lettuce were grown viz., Big Boston, a cabbage variety, and Trianon, belonging to the Cos Section. The latter produced the finest and best flavoured heads.

FALL SOWN LETTUCE.

As the soil in the spring of the year is often too wet to permit of the early sowing of lettuce, fall sowing was tried. On October 28, a piece of ground, which had been selected, not liable to spring wash, was sown with lettuce. Although the difference in results

between spring and fall sowing was not very marked this season, as the soil was in better condition for spring sowing than usual, but the spring sown product was later than that which was fall sown. Germination of the latter was more even, and the heads were superior.

CARROTS.

Three varieties of carrots were sown on spring ploughing on May 5, viz,, Oxheart, Half Long Scarlet Nantes and New French Bellot. The last mentioned is a recent introduction, tested here for the first time. It is of the oxheart type, and seems to be an improvement on that variety, being broader at the base and more uniform throughout. Half Long Nantes gave the largest yield viz., 563 bushels 38 lbs. New French Bellot 368 bushels 23 lbs., and Oxheart 320 bushels 40 lbs. per acre.

PEASE.

Eight varieties of pease were sown on May 5. Two of these, Rennies Perfection and St. Duthus, germinated so badly that a comparative test was not practicable. The variety Gregorys' Surprise, was a round white pea of the first-early type, and in comparison with Alaska was ready for use on July 3, whilst Alaska was first pulled on July 6. In productiveness they were about equal. The best results have been again had from sowing in double rows, 6 inches apart, as the plants do not suffer so much from the wind as when sown in single rows.

TEST OF VARIOUS CUTTINGS OF POTATOES.

This test commenced last season with the object of finding out the most profitable size of cut for the seed potato, was continued this season with the results given in the following table. It will be noticed that, in nearly all cases, the percentage of germination was very high, no doubt accounted for by the moist condition of the soil at planting time. Contrary to last year's results, the whole potato gives the highest yield in each of the three varieties tested, although the difference is not very marked, the small sets giving very satisfactory returns. The product of seed ends only was again very even and smooth.

TEST OF VARIOUS CUTTINGS OF POTATOES.

Name of Variety.	Size of Cut.	Percentage of Germination.	Quality of Product.	Weight Planted.	Weight of Large Harvested.	Weight of Small Harvested.	Total Weight.
		Per cent		Ozs.	Lbs.	Lbs.	Lbs.
Carman No. 1	Seed ends	100	fairly even	3/4	7 1/2	1/2	8
"	1 eye	100	"	1 3/4	9 1/2	3/4	10 1/4
"	2 eyes	100	rather rough	3 1/2	9	1/2	9 1/2
"	3 eyes	100	"	5 3/4	10	1 1/4	11 1/4
"	4 eyes	100	fairly even	6 1/4	10	1 1/2	11 1/2
"	whole	100	"	16	12	none.	12
Daisy	Seed ends	100	very smooth	1/4	8	none.	8
"	1 eye	100	"	1 1/2	7	1/4	7 1/4
"	2 eyes	66 2/3	very even.	3 1/2	7	1/4	7 1/4
"	3 eyes	100	"	6 1/2	6	1/2	6 1/2
"	4 eyes	100	fairly even	7	7	3/4	7 3/4
"	whole	100	very even	11 3/4	6	2 1/2	8 1/2
Early Sunrise	Seed ends	100	"	3/4	7 3/4	1/4	8
"	1 eye	100	"	1 1/2	8 1/2	1/4	8 3/4
"	2 eyes	100	"	3 1/2	11 1/2	1/2	12
"	3 eyes	100	very smooth	5 1/2	8	3/4	8 3/4
"	4 eyes	100	"	6 3/4	11 1/2	1/2	12
"	whole	100	smooth and even.	11 3/4	11	1	12

SESSIONAL PAPER No. 8a

THE FLOWER GARDEN.

The flower garden was again a source of attraction to visitors, and drew forth much favourable comment. It is satisfactory to note the increased interest taken in Herbaceous Perennials, the numerous inquiries regarding this section during the past year, together with the increasing amount of applications for perennial flower seeds, showing that our farmers are gradually awakening to the value of this class of plants for home adornment.

Owing to one of the farm drains remaining frozen for a considerable time in the spring, the water on the low part of the farm, near where the flowers are planted, backed over a portion of the garden, injuring a number of Herbaceous Perennials and delaying spring work.

ANNUALS.

Thirty-three varieties of annuals were grown during the past season, all gave excellent results. Four varieties of chrysanthemum : *C. tricolor*, *C. hgbridum fimbriatum*, *C. atro coccineum* and *C. Burridgeanum* are worthy of special notice. The plants are easily grown, very robust and floriferous, and contain many charming combinations of colour. In verbenas *V. auriculæflora* was decidedly the best of the varieties tested, the individual flowers were exceptionally large and well formed. Attention is also called to the dwarf forms of *Antirrhinum* as being superior to the tall type for bedding purposes. A bed of *Salpiglossis variabilis* was noticeable on account of its great range and brightness of colour, and *Petunias*, *Phlox* and *Gaillardias* contributed greatly to the general effect of the garden. Excellent results were obtained from outside sowing, and those who cannot devote the time necessary for a hotbed need not be deterred from attempting the cultivation of annuals, as almost all varieties will flower well if sown early.

Asters, which for the past few years have suffered from a disease which deformed a large percentage of the flowers, were this year all that could be desired. Some that were sown as late as May 11 flowered well.

HERBACEOUS PERENNIALS.

There are now growing on this farm nearly 100 species and varieties of Herbaceous Perennials, comprising some of the best of their class. The following list includes a few of the best and most suitable for this province, their hardiness having been fully tested at Brandon :—

Paeonia Officinalis.—The common paeony of Europe. The average height is about 3 feet, and this flower can now be obtained in numerous shades of colour. The flowers are large, and vary in form from single to perfectly double. They are easily propagated by root division. The flowers appear early in the season.

Iris Germanica (German Iris).—The flowers are of varied shades, beautiful texture and sweet scented, and produced early in June. Propagated by root division.

Delphinium (Larkspur).—This is a very handsome perennial. The variety *grandiflora* grows to a height of 5 or 6 feet, and its long flower spikes are covered with flowers of a brilliant blue. *Cashmerianum*, a dwarf variety, has a different and paler shade of blue. Propagation is easily effected from seed which is produced freely.

Convallaria Majalis (Lily of the Valley).—This charming old favourite needs no description. Suffice it to say, that it is thoroughly hardy.

Lychnis Haageana Hybrids.—A much better variety than the old fashioned *L. chalcedonica*. The flowers are much larger, and are produced more abundantly. Height about 18 inches, the plants are easily propagated from seed.

Platycodon grandiflorum (Chinese Bell Flower).—Produces large blue bell-shaped flowers in profusion, about the second week of July. Height about 2 feet. Propagated from seed.

Aquilegia (Columbine).—There are numerous varieties of this beautiful flower, all of which are quite hardy. They include quite a range of colours, and are easily grown from seed.

Campanula Grosseckii (Grosseck's Bell-flower).—An extremely vigorous and floriferous variety. Flowers are of a deep blue, and borne on a long spike. Propagated either from seed or by root division.

Hemerocallis flava. (Yellow Day Lily).—Height from 3 to 4 feet. Flowers of a bright orange colour, and somewhat sweet scented. Propagated by root division.

Coreopsis lanceolata. (Lance-leaved tickseed).—Produces charming yellow flowers on long delicate stems, throughout the entire season. Propagated from seed.

Dictamnus fraxinella. (Ash leaved Gas Plant).—A very handsome and striking plant with a strong aromatic fragrance. The flowers are purplish with darker markings. Propagated from seed.

Aconitum Napellus. (Common Monkshood).—A fine of species Aconite producing bright flowers on a terminal spike.

ROSES.

The four varieties of roses enumerated on page 322 of last year's report viz:

Baron Prevost.
Mad. Plantier.
Gem of the Prairies, and
Stevenson's Rose (unidentified.)

came through the winter in good condition and flowered freely. Eleven rose plants were received from Mr. J. Murray, of Winnipeg, on May 14. Eight of these have grown well but did not produce flowers. The names of the varieties were not received with the consignment. A package of hybrid perpetuals was received from Ottawa on May 2, and planted in one of the hedge inclosures. The following thirteen varieties grew and six of them flowered during the season.

1. *Captain Christy.*
2. *Clothilde Soupert.*
3. *Mad. Moreau.*
4. *Enfant du Mont. Carmel.*
5. *Docteur Arnal.*
6. *Coquette des Blanches.*
7. *Aimè Vibert.*
8. *Souvenir de la Malmaison.*
9. *Mad. Gabriel Luizet.*
10. *Cheshunt Hybrid.*
11. *Comptesse de Durrenne.*
12. *Jean Joubert.*
13. *Celine Forestier.*

All were laid down and covered with soil on the approach of winter.

IRIS HISPANICA—Spanish Iris.

As mentioned on page 322 of last year's report, a test was made of the efficacy of heavy covering as a means of bringing these tender bulbs through the winter, and was reported as successful. In the fall of 1898 only a light covering was given, with the result that all the bulbs were destroyed.

CANNAS.

The following Cannas were received from the Central Experimental Farm on April 28:—

1. *Florence Vaughan.*
2. *Explorateur Campbell.*
3. *Burbank.*
4. *Egandale.*
5. *Souv de President Carnot.*
6. *Madagascar.*
7. *Italia.*
8. *C. Henderson.*
9. *Souv de Antoine Crozy*
10. *Baron de Poilly.*
11. *Austria.*
12. *Queen Charlotte.*
13. *Mad. Crozy.*
14. *C. Bernardin.*
15. *Paul Lorenz.*
16. *Count Horace Choiseul.*
17. *Kaiser Wilhelm.*
18. *First Bismarck.*
19. *Yellow Hybrid.*
20. *J. D. Cabos.*
21. *Capt. Duryon.*
22. *Kaiser Wilhelm II.*
23. *Paul Marquant.*
24. *Hortense Barbereau.*

These were potted on arrival and put into hotbed. As soon as the weather permitted, they were planted outside, and all flowered well. Those deserving special mention were:—

Florence Vaughan.
Italia.
Yellow Hybrid.
Austria.
Burbank.

On October 11 all were lifted and removed to the cellar of the Superintendent's house.

DAHLIAS.

On April 28, a consignment of Dahlias was received from the Central Farm, consisting of the following varieties:—

1. *Hector.*
2. *Hubert.*
3. *Lord Hawke.*
4. *Empress of India.*
5. *Perfect Vallon.*
6. *Aurata.*
7. *Paragon.*
8. *Modest.*
9. *Little Morris.*
10. *Mammoth Queen.*
11. *Wm. Pearce.*
12. *Lilliputian.*
13. *Queen of Primroses.*
14. *Mrs. Beadle.*
15. *Fairy Tales.*
16. *Guiding Star.*
17. *John Cowan.*
18. *Chairman.*
19. *Mrs. Wheeler.*
20. *Lurline.*
21. *Woman in White.*
22. *Fashion.*
23. *Sambo.*
24. *Snowflake.*
25. *Snowclad.*
26. *Victory.*
27. *Prince Imperial.*
28. *Exquisite.*

Eight varieties of the above were started in boxes in hotbed, on arrival, and planted outside about the end of the first week in June, the remainder were planted in the open on May 17. The tubers planted in hotbed were in bloom three weeks earlier than those planted outside. On October 11 all were lifted and stored in a well protected cellar.

GLADIOLUS.

The following varieties of Gladioli were received from the Central Farm on April 28, 1899.

1. *Sylphide* 7
2. *La Favorite* 3
3. *Thalia* 4
4. *Eugene Scribe* 3
5. *Gandavensis Hybrid* 52
6. *Gandavensis* 10
7. *Thorburn Seedling* 38
8. *Napoleon III* 100
9. *Reine Victoria* 3
10. *Mixed* 21

A portion of the above were put into pots and started in hotbed, the balance being planted outside as soon as weather permitted. The most noticeable feature was the early flowering of those accorded the hotbed treatment, they being fully three weeks earlier than those planted outside, some of which did not produce a flower spike. They were lifted October 11. 1899.

MONTBRETIA CROCOSMÆFOLIA.

Ten bulbs of the above were received from Central Farm on April 28, and started in pots in the hotbed. On May 27, they were transplanted to the open ground and all flowered well, the bright orange-coloured flowers attracting much attention. The treatment required for this bulb is similar to that for the Gladioli. The bulbs were lifted on October 11, and put into a well protected cellar.

TULIPS.

This flower still stands unrivalled as an early bloomer, its brilliance and variety of colour, its hardiness, and the fact of its flowering at a season when practically nothing else is available, making it particularly desirable, and worthy of much more extensive planting. By a judicious selection of varieties the blooming period can be made to extend for several weeks, and the low price of the bulbs now places them within the reach of most farmers. About 1,000 bulbs were received from the Central Farm this autumn, and planted in the flower garden and some fine results are expected in the coming spring.

DISTRIBUTION OF SEED GRAIN, POTATOES, ETC.

The distribution of both three-pound samples and larger lots of grain has increased this year, and many favourable reports have been received from parties supplied.

The following quantities were sent out to applicants :

Wheat, 2 bush. or more	25
Oats " "	99
Barley " "	54
Grain of all kinds in 3-pound bags	483
Trees, packages	331
Shrubs, "	217

Distribution of Potatoes, &c.—

Potatoes in 3-pound bags	167
Maple seed in 1-pound bags	154
Rhubarb seed, packages	80
Flower " "	29
Vegetable " "	57

GRASS SEED REPORTS.

Reports received of the 1-pound packages of grass seeds, distributed from the farm during the winter 1896-7.

These were sample lots of four different kinds (1 pound of each), Western Rye Grass (*Agropyrum tenerum*), Awnless Brome Grass (*Bromus inermis*) American Lyme Grass (*Elymus Americanus*), and Bald Rye or Wheat Grass (*Elymus Virginicus*).

No. of applicants supplied	560
No. of reports received	119

Preparation of land :—

	Reports of Success.	Reports of Failure.
Summer-fallow	53	7
Spring ploughing	44	5
Fall ploughing	14	5
Breaking	3	.
Not specified	5	.

Of those who specified their preference for either of the different grasses, fifty-eight preferred the Awnless Brome Grass (*Bromus inermis*), sixteen Western Rye Grass (*Agropyrum tenerum*), and four Wheat Grass (*Elymus Virginicus*).

Of those who reported their computed yields, forty had heavy, eleven fair, and four poor crops. 1897 was not particularly favourable for sowing with a nurse crop, yet of four who report having done so, only one failed to obtain a satisfactory catch.

REPORTS ON DISTRIBUTION OF POPLAR AND WILLOW CUTTINGS, SPRING, 1898.

Under instructions from Ottawa, a special distribution was made of cuttings from cottonwood, Russian poplar and willows.

No. of applicants supplied	502
No. of reports received	192

Condition of cuttings when received :—

Good	162
Fair	4
Bad	26

Average per cent of cuttings struck:—

Russian poplars	32 per cent.
Cottonwood	29 "
Willows	50 "

Maximum growth, summer, 1898 :—

Russian poplar	3 feet.
Cottonwood	3 "
Willows	4 "

The dry weather in the spring was not favourable to cuttings, and this, according to the reports, accounts for the limited success generally met with.

FRUIT TREE REPORTS.

During the spring 1898, seedlings of Siberian Crabs, Native Plums and Sand Cherries were distributed from this farm.

No. of applicants supplied	770
No. of reports received	219

Condition in which the trees were received :—

Good	213
Fair	2
Bad	4

Average per cent of trees living, summer, 1898 :—

Crab apples	83 per cent.
Plums	83 "
Sand cherries	90 "

Maximum growth, summer, 1898 :—

Crab apples	3 feet.
Plums	3 "
Cherries	3 feet 4 in.

Only one man reported his trees as having all died.

BOX ELDER OR MANITOBA MAPLE SEEDS.

Reports of Manitoba Maple Seeds distributed in 1-pound lots, spring, 1898.

No. of applicants supplied 152
No. of reports received 63

	Successes.	Failures.
Seeds sown on Summer-fallow	9	1
" " Spring ploughing	15	1
" " Fall ploughing	7	2
Breaking	11	1
Garden (digged with spade)	21	2
Largest No. of plants raised from 1-pound packet	1,243	
Maximum height, summer, 1898	2 ft.	

Farmers will do well to be patient and not plough up tree seed if it fails to germinate at once, as frequently the seeds will be dormant one season and germinate the following year.

The seed should not be deeply covered and the land around the young plants should be kept well cultivated.

SAMPLES FOR EXHIBITION PURPOSES.

This branch of the farm work is increasing materially and entails a considerable amount of work each year. Not only has the material to be raised on the farm, but the samples have to be carefully dried in the shade, then neatly arranged and shipped to their destination.

During the past year the Manitoba Government was supplied with a carload of samples to be used in the immigration offices throughout the United States and Great Britain, and also for use at the Paris Exposition. In this case the Manitoba Government sent their own men to collect and pack the samples.

This fall twenty-two boxes of samples, including grain threshed and in the straw, grasses, &c., was prepared and sent to the Paris Exposition through the Department of Agriculture at Ottawa. Twelve boxes containing six sets of samples have also been prepared for the High Commissioner's office in Great Britain.

NEW BREAKING.

Twenty-one acres of new land was broken up during the year, all of this was prairie, located in the valley, and was ploughed the first time during June, and the backsetting (2nd ploughing) was done during July and August.

After harvest all of it was thoroughly disc harrowed, making a fine seed bed all ready for spring sowing. The experience of several years has shown that it pays well to carefully backsett and disc harrow all new breaking before winter sets in; this plan destroys perennial weeds that may have started after breaking and thoroughly breaks up any tough sod, and leaves the land in the best condition for a crop of grain.

FENCING.

As much of the pasture land in the valley has been ploughed up for grain, it was found necessary to fence the broken land on the face of the hill for pasture purpose. Page wire fencing 57 inches wide, with 11 bars, was used and the posts placed two rods apart, every tenth post being well braced, this gives a pasture field of 65 acres, in close proximity to the stable, provided with a perennial spring of excellent water and good shelter.

A cattle yard has also been inclosed with Page wire fencing, this is also 57 inches high, but with 19 bars, the enclosed yard is found very useful for exercising all classes of stock.

FARMERS' MEETINGS.

Since my last report twenty-three meetings have been attended. The interest in these meetings continues, and at some of the places two sessions are held, one in the afternoon for men, when stock and general farm crops are dealt with, and another in the evening, which is attended also by the farmers wives and children as well as by the men; trees, shrubs and the general adornment of farm surroundings is taken up, and the attendance is always large.

Brandon, Jan. 7; Kildonan, Jan. 16; Emerson, Jan. 17; Morris, Jan. 18; Cartwright, Jan. 19; Pilot Mound, Jan. 20; Manitou, Jan. 21; Nelson, Jan. 24; Wawanesa, Jan. 25; Blyth, Jan. 26; Brandon, Jan. 28; Winnipeg, Feb. 7; Winnipeg, Feb. 8; Portage la Prairie, March 25; Rapid City, April 6; Virden, June 27; Arrow River, June 29; Hamiota, June 30; Birtle, July 2; Shoal Lake, July 3; Oak River, July 4; Strathclair, July 5; Bradwardine, Nov. 29.

METEOROLOGICAL RECORD.

Month.	Highest Temperature.		Lowest Temperature.		Total Rainfall.	Depth of Snowfall.	Total Amount of Sunshin
	On.	Degrees	On.	Degrees	Inches.	Inches.	Hours.
1898.							
November	3	53	23	—31	.....	14	104 9/10
December	28	38	31	—32	.....	4	115
1899.							
January	12	34	28	—39	.....	14	96 8/10
February	19	39	8	—47	.....	3	168 4/10
March	8	26	6	—32	.....	4	188 4/10
April	23	69	2	—11	1/4	3 1/2	192 8/10
May	28	75	13	12	2 1/2	.....	191 1/10
June	18	85	8	37	3 3/4	.....	227 1/10
July	11	89	29	38	1 1/4	.....	*
August	25	87	29	34	1 1/2	.....	223 1/10
September	1	85	29	19	1/2	.....	211
October	6	81	19	10	1 3/4	.....	113 4/10
November	5	58	2	8	.....	.....	111
					11 1/4	42 1/2	1,942 1/2

* Record accidentally destroyed.

CORRESPONDENCE.

This year 4,516 letters were received and 3,536 dispatched, irrespective of 1,389 circulars sent out.

I have the honour to remain, sir,

Your obedient servant,

S. A. BEDFORD,

Superintendent.

View on Experimental Farm, Indian Head, N.W.T. Showing Superintendent's House, Tree Plantations and Town in the Distance.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.
November 30, 1899.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twelfth annual report of the operations on the Experimental Farm for the North-west Territories at Indian Head, Assiniboia, during the year 1899.

The season has been a very exceptional one throughout the whole of the Territories. The winter of 1898-9 was long and cold, with sufficient snow for sleighing from November to April. Spring was late in opening, and on account of the large amount of moisture stored up by the soil in the previous autumn, very little seeding was done before the last week in April.

On May 3 a heavy snowstorm set in, putting a stop to seeding until the 10th. Again on the 15th and 16th snow fell and delayed work until the 18th, after which the weather continued fine until seeding was finished. The land, however, was cold and wet, and the growth consequently very slow. Rains commenced on May 31, and fourteen days in June were wet, the heaviest rain falling on June 12, when it fell to a depth of 1½ inches. Until the end of June the growth was very backward, but even. July was, on the whole, a dry month, and the growth rapid, but not excessive.

On the morning of August 4 a slight frost visited portions of Assiniboia, and, as the wheat was just forming, more or less injury was sustained by the districts struck. In Saskatchewan and Alberta, rain was excessive during August, and a frost toward the end of the month did some harm to the crops of wheat. The growth of straw was enormous, and on account of the ripening period being prolonged, the harvest in the two Territories was very late, as well as expensive. In Assiniboia the wheat harvest was one week later than usual, and very little was in stook before September 1. The grain on fallowed lands was particularly long in ripening, but almost the entire crop was secured before frost came, on September 15.

Fine weather followed harvest until October 14, when a heavy snowstorm set in, and lasting several days, delayed threshing for two weeks or more, and rendered the roads almost impassable.

On the whole, the season has not been an entirely satisfactory one throughout the Territories. In Assiniboia the wheat crop was an average one in point of yield, but unfortunately contains a considerable percentage of inferior grain. In many districts of Saskatchewan and Alberta the excessive rainfall of August was responsible for an enormously heavy crop of straw, and at the same time a somewhat inferior sample of grain.

The long period taken to mature the grain, and the delay and expense of harvesting, are three very undesirable features from a farmer's standpoint.

Stock did well in every part of the country and the good price secured for export and locally consumed beef has added considerable impetus to this very important industry.

EXPERIMENTAL FARM CROPS.

On the Experimental Farm, crops were uniformly good. The young plants were unimpaired by frosts or wind and made a fair and steady growth producing a good crop of straw, and with the exception of a few plots of wheat struck by rust, an excellent sample of grain. The cold wave on the morning of August 4 slightly injured one half of an acre of wheat, but did no material damage.

The crop of pease was lighter than the average, but the sample was good.

The hay crop of Bromus Inermis (Awnless brome grass) and *Agropyrum tenerum* (Western rye-grass) as was anticipated last fall from the large quantity of moisture then in the soil, was an exceptionally satisfactory one. The same may be said of the general crop of awnless brome grass throughout the Territories.

Winds gave very little trouble anywhere during the past season. Absence of winds and frosts in the spring permitted the grain crops to secure a good start, in consequence of which the weeds were kept almost entirely in check.

Roots, particularly carrots, were a good crop, but potatoes were almost a failure, accounted for, no doubt, by the cold and wet condition of the ground at the time of and subsequent to planting.

The crop of small fruits was very satisfactory with the exception of black currants and strawberries. Red and white currants, raspberries and gooseberries were very profitable and matured more evenly than usual. On many of the native plum trees the crop was abundant, but had not fully matured when frost came. It is to be regretted that the severe cold of last winter caused a very high death rate among the recently set out plum and crab-apple trees, but the older plantations which, beside being well established, were more or less protected by snow, came through the winter in fairly good order and made satisfactory progress during the growing season.

Forest trees and shrubs made a strong, healthy growth and were in excellent condition when winter set in. So excessive was the growth during the month of June, that many box-elder trees split their bark, but no permanent injury is anticipated, as the wood had thoroughly healed before the end of the season.

EXPERIMENTS WITH SPRING WHEAT.

Fifty-four varieties were tested in $\frac{1}{20}$ acre plots; two of the same varieties again in test of early, medium and late seeding; thirteen of the same varieties on plots ranging from one to ten acres. Red Fife wheat was used in the 'smut test, hoe drill' versus 'press drill,' 'sowing seed at different depths,' and 'sowing different quantities of seed per acre' tests.

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS OF WHEAT.

Red Fife and Stanley wheats were used in this test. The seed was sown by hoe-drill at the rate of $1\frac{1}{2}$ bushels per acre on a very uniform piece of land, soil clay loam, summer-fallowed in 1898. The first seeding was done on April 26 and the second on May 9, a snowstorm on May 3 causing the delay of six days. The grain came up evenly and matured in the order sown. All plots were cut before the frost came, and, as will be seen in the following table, the first seeding of both varieties gave the best returns. There was no rust on any of these plots.

SPRING WHEAT—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.		Weight per Bushel.
				Inches.	Inches.		Lbs.	Bus.	Lbs.	Lbs.
Red Fife	April 26	Sept. 5	133	47	3	Beardless.	5,740	36	..	63½
"	May 9	" 9	124	46	3	"	5,600	30	..	60½
"	" 10	" 9	123	45	3	"	5,140	31	..	60
"	" 17	" 11	118	46	3	"	5,500	35	..	60½
"	" 24	" 11	111	44	3	"	5,440	32	40	61
"	" 31	" 13	106	43	3	"	4,040	23	20	60½
Stanley	April 26	" 5	133	44	3½	"	3,560	30	40	62½
"	May 9	" 6	121	43	3½	"	3,340	27	40	62½
"	" 10	" 7	121	43	3	"	4,480	25	20	61
"	" 17	" 9	116	43	3	"	3,720	21	20	60½
"	" 24	" 11	111	44	3	"	3,540	21	..	60
"	" 31	" 11	104	43	3	"	3,940	24	20	57

Spring Wheat.

Test of Varieties in Uniform Plots.

Fifty-four varieties were sown on April 27, by hoe drill, at the rate of 1½ bushels per acre on $\frac{1}{20}$ acre plots of uniform clay-loam soil, fallowed in 1898.

The yield of straw was not heavy and many of the varieties were rusted. Some badly enough to seriously injure the quality of the grain.

All varieties were in stook before frost came. Red Fife headed the list in yield and was not affected by rust.

Spring Wheat—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
			Ins.		Ins.		Lbs.	Bush.	Lbs.	Lbs	
Red Fife	Sept. 4.	131	45	Strong..	3	Beardless.	4,020	39	40	63½	None.
Alpha	Aug. 31.	127	44	" ..	3	Bearded..	3,280	38	20	62	Considerably
Red Fern	Sept. 4.	131	45	Medium	3	" ..	3,200	38	20	60	None.
Wellman's Fife	" 6.	133	48	Strong..	3	Beardless.	3,620	36	20	62½	"
Dion's	" 4.	131	46	" ..	3	Bearded..	5,880	35	..	63½	"
Huron	" 3.	130	40	" ..	3½	" ..	3,700	35	..	63½	Considerably.
Hungarian	" 4.	131	42	Weak...	3	" .	3,600	34	40	63½	Slightly.
Rio Grande	" 2	129	46	Strong..	3	" ..	4,240	34	20	63	None.
Roumanian	" 2.	129	48	" ..	3	" ..	2,560	34	20	64	"
Monarch	" 4.	131	43	" ..	3½	Beardless.	4,820	34	20	62½	Slightly.
White Fife	" 7.	134	45	" ..	3¾	" .	6,380	33	40	62	None.
Blenheim	" 4.	131	44	Medium	3	Bearded..	3,760	33	40	62	Slightly.
Pringle's Champlain	Aug. 31.	127	42	Strong..	3	" ..	4,500	33	20	63	Considerably.
Preston	Sept. 4.	131	43	" ..	3	" ..	3,240	33	20	62	None.
Blair	Aug. 21.	117	34	" ..	2	Beardless.	3,400	33	20	57½	Considerably.
Stanley	Sept. 4.	131	47	" ..	3	" .	3,400	33	20	63	None.
Percy	" 4.	131	44	" ..	3	" .	3,420	33	.	63¼	"
Progress	" 4.	131	42	" ..	3	" .	3,440	32	40	63	Slightly.
Mason	Aug. 21.	117	37	" ..	2	" .	3,440	32	40	58½	Considerably.
White Connell	Sept. 7.	134	44	" ..	3	" .	3,280	32	..	62	None.
White Russian	" 7.	134	46	" ..	3½	" .	4,060	32	..	61½	"
Goose	" 4.	131	46	Medium	3	Bearded..	4,280	31	40	63¼	Considerably
Countess	Aug. 26.	122	40	Strong..	2½	Beardless.	3,700	31	20	62½	"
Admiral	" 31.	127	44	" ..	3	Bearded..	5,340	30	40	63	"
Beaudry	Sept. 4.	131	43	Weak...	2½	" ..	4,460	30	20	62½	None.
Crown	" 2.	129	46	Strong..	3	Beardless.	4,260	30	20	62½	Considerably
Emporium	" 4.	131	47	" ..	5	Bearded..	4,680	30	..	59½	None.
Clyde	" 4.	131	46	" ..	3	Beardless.	2,400	29	40	61½	Slightly.
Crawford	Aug. 21.	117	36	Medium	2½	" .	2,800	29	40	63½	Considerably
Laurel	Sept. 5.	132	46	Strong..	3	" .	3,200	29	40	59½	"
Beauty	" 2.	129	43	" ..	3½	" .	3,900	29	40	58	"
Captor	" 2.	129	45	" ..	3	" .	4,040	29	40	63	"
Rideau	" 3.	130	40	" ..	3	" .	3,340	29	20	61½	None.
Advance	" 4.	131	47	" ..	3	Bearded..	3,720	29	20	63	Considerably.
Dawn	Aug. 26.	122	39	" ..	2½	Beardless.	3,820	27	40	60½	"
Weldon	" 31.	127	41	" ..	2½	" .	3,280	27	20	62	"
Herisson Bearded	" 31.	127	43	Weak...	2	Bearded..	3,300	26	40	64½	"
Ladoga	" 26.	122	44	Strong..	3	" ..	3,420	26	40	59½	"
Colorado	" 26.	122	41	Weak...	2½	" ..	4,260	26	20	62	None.
Dufferin	" 26.	122	40	Strong..	2½	" ..	3,240	25	20	59	Considerably.
Golden Drop	" 26.	122	43	Medium	2½	Beardless.	3,760	24	40	58	"
Plumper	" 21.	117	38	Strong..	2½	Bearded..	4,240	24	20	60½	Slightly.
Fraser	" 19.	115	39	" ..	2½	" ..	4,360	24	20	61	"
Red Swedish	Sept. 4.	131	42	Medium	3	" ..	4,960	24	20	59½	Considerably.
Norval	Aug. 21.	117	47	Strong..	2½	" ..	3,640	23	..	59½	Slightly.
Byron	" 21.	117	37	Medium	3	" ..	2,400	22	20	61	"
Black Sea	Sept. 4.	131	41	"	3	" ..	3,340	22	20	60½	"
Ebert	Aug. 21.	117	46	Strong..	2½	Beardless.	2,920	21	40	60	"
Campbell's White Chaff	" 26.	122	46	" ..	3	" .	3,760	20	40	54½	Badly.
Early Riga	" 19.	115	32	Medium	2	" .	2,000	20	20	60	Considerably.
Polonian	Sept. 4.	131	44	"	5	Bearded..	3,200	19	20	52½	Badly.
Harold	Aug. 19.	115	31	"	2½	" ..	3,240	19	..	57½	Slightly.
Vernon	" 26.	122	39	Strong..	2	" ..	4,540	17	40	57¼	Considerably.

Spring Wheat—Test of Varieties in Fields of 1 to 10 Acres.

As heretofore, the more promising varieties were sown on larger areas, not only to test the grain, but for the purpose of securing seed in quantities for distribution of samples and for sale for seed.

The soil was clay loam, and the seed was sown by hoe drill at the rate of 1½ bushels per acre. All the varieties were free from rust excepting the Wellman's Fife, which rusted considerably.

Spring Wheat—Field Lots.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
Preparation.	Acres.				In.		In.		Lbs.	Bush. Lbs.	Lbs.
Red Fife—Fallow	3	May 1	Sept. 5	128	46	Strong.	3	Beardless.	3,680	33 20	62½
Stanley "	5	Apr. 29	Aug. 28	122	44	"	3	"	3,510	32 24	62
Preston "	6	May 1	Sept. 2	125	47	"	3	Bearded.	4,030	32	62½
Wellman's Fife, Stubble	3	Apr. 27	Aug. 30	126	43	Medium	3½	Beardless.	3,150	30 16	60
Percy—Fallow	4	May 1	Sept. 5	128	46	Strong.	3	"	3,940	27 30	63
Red Fife—Stubble	3	Apr. 26	" 6	134	44	"	3	"	3,490	27 25	63

Spring Wheat—1 Acre Plots.

Soil clay loam, all sown May 1.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
			Ins.		Ins.		Lbs.	Bush. Lbs.	Lbs	
Wellman's Fife	Sept. 6	129	48	Strong.	3	Beardless	4,340	36	62½	Considerably.
White Fife	" 6	129	43	"	3	"	4,860	34 6	63	None.
Hungarian	" 6	129	43	Weak.	2½	Bearded.	4,110	30 20	63	Considerably.
Dawn	Aug. 25	117	38	Strong.	3	Beardless.	3,230	29 48	60	"
White Russian	Sept. 6	129	47	"	3	"	4,180	28	61	"
White Connell	" 6	129	44	"	2½	"	3,990	26 43	62½	None.
Beauty	" 5	128	46	"	4	"	3,750	24 5	59	"
Harold	Aug. 23	115	32	Medium	2	Bearded.	2,890	23 8	56¾	Considerably.
Red Fern	Sept. 6	129	48	"	3½	"	4,440	22 40	60	"

SESSIONAL PAPER No. 8a

SPRING WHEAT.—TEST OF SOWING SEED AT DIFFERENT DEPTHS.

Sown on summer-fallow, clay loam, by hoe-drill, on $\frac{1}{20}$th acre plots, April 27, at the rate of 1½ bushels per acre.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			Ins.		Ins.		Lbs.	Bush. Lbs.	Lbs.
Red Fife, 2 inches deep	Sept. 8..	135	43	Strong.....	3¼	Beardless.....	4,420	37 40	62½
" 3 "	" 8..	135	46	"	3	"	4,780	35 ..	62

AVERAGE CROP FOR 8 YEARS.

—	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	Average.
Red Fife, 2 in. deep	27·	41·20	15·20	45·	39·15	40·40	32·	37·40	34·47
" 3 "	22·30	37·10	18·	37·30	38·50	33·50	34·	35·	32· 6

SPRING WHEAT.—TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Sown on summer-fallow, clay loam, by hoe-drill 3 inches deep, April 27, on plots of $\frac{1}{20}$th acre each.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			Ins.		Ins.		Lbs.	Bush. Lbs.	Lbs.
Red Fife, 1 bush. per acre..	Sept. 8..	135	43	Strong....	3	Beardless...	4,700	35 ..	62
" 1¼ " ..	" 8..	135	44	"	3	" ...	4,700	35 ..	62
" 1½ " ..	" 8..	135	44	"	3	" ...	4,790	35 20	62

AVERAGE CROP FOR 8 YEARS.

—	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	Average.
Red Fife, 1 bush. per acre..	35·50	28·20	14·30	35·50	38·30	38·30	34·50	35·	32·40
" 1¼ " ..	40·	28·	11·40	44·	40·10	38·50	39·10	35·	34·36
" 1½ " ..	39·40	26·30	13·20	42·20	38·20	38·40	42·10	35·20	34·32

SPRING WHEAT.—HOE-DRILL AS COMPARED WITH PRESS-DRILL.

Sown on summer-fallow, clay loam, April 27, at rate of 1½ bushels per acre. Size of plots $\frac{1}{20}$th acre each.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
Sown by			Ins.				Lbs.	Bush. Lbs.	Lbs.
Red Fife, hoe-drill	Sept. 5..	132	43	Strong....	3	Beardless....	4,440	36 ..	62
" press-drill	" 5..	132	43	"	3	"	5,060	35 40	62

AVERAGE CROP FOR 8 YEARS.

——	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	Average.
Red Fife, hoe-drill	24·	36·18	17·50	44·	40·40	39·	45·40	36·	35·26
" press-drill	30·20	38·20	18·40	45·	41·30	41·	42·40	35·40	36·38

TEST OF PREVENTIVES FOR SMUT IN SPRING WHEAT.

Bluestone, Formalin and Massel powder were tested as preventives of smut on seed of three grades—ordinary clean seed, slightly affected, and very smutty seed, with the following results :—

Variety.	Condition of Seed.	Treatment.	On 25 sq. ft.	
			Good Heads.	Smutty Heads.
Red Fife	Clean	1 lb. bluestone to 10 bush. seed	850	0
"	Smutty	1 " 5 " dipped 1 minute	520	300
"	"	1 " 5 " " 5 "	562	223
"	"	1 " 5 " " 10 "	807	24
"	"	Untreated	230	750
"	Slightly affected	4½ oz. formalin to 10 galls. water; seed, 10 bush., dipped 10 minutes	755	40
"	"	2 oz. Massel powder and 1 bush. lime to 10 gallons water. Seed dipped 10 minutes	825	80

The smutty seed used in this test was the product of untreated seed sown last year and every grain was black.

EXPERIMENTS WITH OATS.

The oat crop of the past year was uniformly the best ever grown on the farm. Of 72 varieties tested, the highest yield was 97 bushels 22 pounds, and the lowest 55 bushels 10 pounds per acre. Large yields were also obtained from one and five acre fields, and the sample in almost every case was good.

No wind or frost injured the crop in the spring, and the moisture, while abundant for the production of a good crop of straw, was not sufficient to cause any of the varieties to lodge until the grain was fully matured.

SESSIONAL PAPER No. 8a

Test of Early, Medium and Late Sowings.

As in former years, Banner and Abundance oats were sown on fallowed land, by hoe drills 2 inches deep; plots $\frac{1}{20}$ acre each; soil, clay loam. There was no rust on any of these plots.

The first seeding was done on April 26, the earliest practicable date. The second seeding which should have taken place on May 3, had to be deferred on account of a severe snow storm on that date, and was done on May 9. The third seeding, as well as the three subsequent seedings, were done on the proper dates.

Blackbirds, which early in the ripening season were very numerous, did considerable damage to the three first sown plots of each variety.

Oats—Test of Early, Medium and Late Sowings.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				Ins.		Ins.		Lbs.	Bush.	Lbs.	Lbs.
Banner	April 26	Aug. 26	123	45	Strong	9	Branching	3,080	68	8	40½
"	May 9	" 30	114	48	"	10	"	2,720	75	30	40½
"	" 10	" 31	114	48	"	10	"	2,680	74	4	40½
"	" 17	Sept. 5	112	53	"	11	"	3,700	76	16	40½
"	" 24	" 7	107	49	"	9	"	3,020	75	30	40½
"	" 31	" 7	100	47	"	9	"	2,940	70	20	39½
Abundance	April 26	Aug. 26	123	46	Medium	9	"	3,040	75	10	40½
"	May 9	" 31	115	48	"	9	"	2,920	78	28	40½
"	" 10	Sept. 5	119	49	"	9	"	3,040	68	28	40½
"	" 17	" 7	114	47	"	9	"	2,840	75	10	40½
"	" 24	" 7	107	44	"	9	"	2,740	78	8	39½
"	" 31	" 7	100	44	"	9	"	2,780	81	6	40½

Oats—Test of Varieties.

Seventy-two varieties were sown on $\frac{1}{20}$ acre plots on summer-fallowed land on May 12, by hoe drill, two inches deep and at the rate of 2½ bushels per acre. The soil was a uniform clay loam.

All the varieties came up evenly with the exception of some of the cross-bred sorts which germinated slowly, but all were fully matured before frost came in September.

Oats—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Golden Beauty	Sept. 7	119	52	Medium	14	Sided	3,580	97	22	39	None.
Abundance	Aug. 30	111	50	"	9	Branching	6,100	97	2	38	"
Holstein Prolific	" 30	111	48	Strong	8	"	5,900	97	2	40	"
Bavarian	" 30	111	48	"	8	"	5,620	96	16	38⅜	"
Banner	" 30	111	55	"	9	"	4,540	95	30	40½	"
New Zealand	Sept. 8	120	50	"	11	"	4,760	95	10	38	"
American Triumph	Aug. 29	110	51	Medium	9	"	4,920	93	18	39	"
American Beauty	" 30	111	51	"	9	"	4,040	92	32	40	"
Siberian O. A. C	Sept. 7	119	56	Strong	11	"	4,200	92	12	39½	"
Danish Island	Aug. 30	111	49	"	10	"	4,720	91	26	39½	"
Joanette	" 31	112	39	"	8	"	3,740	91	6	39½	"

OATS—TEST OF VARIETIES—*Continued.*

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Bonanza	Aug. 21	102	47	Strong....	12	Branching	4,120	90	20	45	Slightly.
Black Beauty	Sept. 4	116	55	Weak	15	" ..	3,580	90	20	38	None.
King	" 7	119	55	Strong....	11	" ..	4,740	90	..	39½	"
White Russian	Aug. 24	105	48	Medium..	8	" ..	3,760	90	..	44	"
Wide-awake	" 29	110	52	Strong....	9	" ..	4,240	90	..	43¼	"
Columbus	" 30	111	49	Weak	8	" ..	3,980	88	28	38½	Considerably.
Black Tartarian (Imported)	Sept. 7	119	55	Medium..	11½	Sided. ...	4,980	88	28	37	None.
Welcome	Aug. 21	102	47	Strong....	12	Branching	4,700	88	8	38	Slightly.
Scottish Chief	" 21	102	51	"	10	" ..	4,200	88	8	45	"
Buckbee's Illinois	" 29	110	52	"	10	" ..	5,100	88	8	40	None.
Newmarket	" 29	110	53	Medium..	9	" ..	3,340	88	8	43¼	"
Victoria Prize	" 21	102	48	Strong....	13	" ..	4,420	87	22	45½	Slightly.
White Schonen	" 30	111	51	Medium..	9	" ..	5,420	87	22	40	None.
California Prol. Black	Sept. 8	120	52	Weak	9	" ..	3,420	87	22	38	Considerably.
Early Golden Prolific	Aug. 30	111	49	Strong....	8	" ..	6,040	87	2	40	None.
Early Archangel	" 30	111	52	Weak	11	" ..	3,840	87	2	43¾	"
Melford	Sept. 7	119	57	Medium..	12	Sided. ..	4,460	86	16	38¼	"
Poland	Aug. 21	102	52	Strong....	14	Branching	4,060	86	16	46½	Slightly.
Imported Irish	" 21	102	51	"	12	" ..	3,660	86	16	46¾	"
Improved American	Sept. 1	113	57	"	11	" ..	3,220	85	30	40½	None.
Cream Egyptian	Aug. 21	102	46	"	9	" ..	4,540	84	4	45	Slightly.
Rennie's Prize	" 21	102	48	"	8	" ..	3,960	83	18	46¾	"
Miller	Sept. 7	119	51	"	9½	" ..	3,780	82	32	39	None.
Early Maine	" 1	113	54	"	10½	" ..	5,160	81	26	40	"
Lincoln	Aug. 30	111	53	"	9	" ..	4,420	81	26	42½	"
Winter Grey	" 21	102	49	"	12	" ..	3,960	80	20	47	Slightly.
Early Blossom	Sept. 7	119	56	"	11½	Sided.....	4,400	80	20	41½	None.
Kendal	" 7	119	57	Weak	10½	"	4,900	79	14	37½	"
Early Gothland	" 7	119	55	Strong....	12	"	3,160	78	28	38¾	"
Wallis	Aug. 30	111	50	Medium..	8	Branching	5,720	78	28	36¾	"
Prize Cluster	" 21	102	47	Strong....	8	" ..	4,520	78	28	46¾	Slightly.
Salines (Imported)	Sept. 7	119	60	Medium..	11	" ..	4,680	78	8	35¼	None.
California Prol. Black (Imported)	" 7	119	56	Strong....	11	Sided.....	2,740	78	8	35	"
Olive	" 7	119	52	Medium..	12	"	4,580	77	2	37¼	Considerably.
Doncaster	" 1	113	54	Strong....	10½	Branching	3,340	76	16	40½	None.
Holland	" 7	119	52	"	9	Sided.....	3,640	76	16	34½	"
White Wonder	Aug. 21	102	46	"	9	Branching	4,660	74	24	45¾	Slightly.
Flying Scotchman	" 24	105	45	Medium..	10	" ..	4,480	74	4	42½	"
Oxford	Sept. 7	119	55	" ..	10½	" ..	4,080	74	4	37¼	None.
Russell	" 7	119	56	Strong. ..	11½	" ..	4,540	72	12	38	"
Golden Tartarian	" 7	119	56	"	13	Sided.....	4,340	72	12	33¾	"
Mennonite	Aug. 24	105	49	Medium..	10	Branching	4,660	71	26	36½	Slightly.
Abyssinia	" 30	111	54	Strong....	9	" ..	4,880	71	6	38½	None.
Brandon	Sept. 7	119	55	"	11	" ..	4,580	71	6	35	"
Cromwell	" 7	119	54	Medium..	9	" ..	5,000	70	20	37½	Considerably.
Pense	" 7	119	54	" ..	10	Sided....	4,400	70	20	39¼	None.
Prolific Blk. Tartarian	" 8	120	48	Weak	10	"	3,840	69	14	38	Considerably.
White Giant	Aug. 30	111	48	Medium..	8	Branching	3,460	68	28	35½	None.
Rosedale	" 30	111	53	" ..	9	Sided.....	4,960	68	28	38½	"
Early Dawson	" 24	105	44	Weak	11	Branching	3,680	68	8	43¼	Slightly.
Mortgage Lifter	" 24	105	43	"	12	" ..	3,580	68	8	45	"
Coulommiers	Sept. 8	120	47	Strong....	11	" ..	2,320	66	16	38	None.
Golden Giant	" 7	119	52	Medium..	14	Sided. ..	3,580	66	16	33¾	"
Master	" 7	119	56	" ..	14	Branching	4,760	65	30	37	"
Black Mesdag	Aug. 24	105	41	Weak ..	11	" ..	5,400	65	30	40½	Slightly.
Improved Ligowo	" 21	102	50	Medium..	11	" ..	5,200	64	24	39¾	"
Medal	Sept. 7	119	56	Strong....	11	" ..	2,880	64	4	38½	None.
Thousand Dollar	Aug. 24	105	49	Weak	9	" ..	3,720	64	4	40¼	"
Oderbruch	" 31	112	51	"	10	Sided....	3,780	64	4	40	"
Hazlett's Seizure	" 24	105	48	Medium..	11	Branching	3,260	60	..	43½	Slightly.
Improved Ligowo (Imported)	" 29	110	48	" ..	9	" ..	3,860	55	10	42½	None.

OATS—FIELD-LOTS.

Thirteen varieties were sown in acre or larger lots on clay loam on summer-fallowed land, by hoe-drill, 2 inches deep, at the rate of 2½ bushels per acre. All varieties produced a heavy crop of straw, and, as will be seen in the following table the yields were very satisfactory, although the early varieties such as Bonanza, Improved Ligowo and Welcome were considerably injured by blackbirds. There was no rust on any of these varieties except Columbus, which was slightly rusted on the leaves.

OATS—FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
	Acres.				In.		In.		Lbs.	Bush. Lbs.	Lbs.
American Beauty..	2	May 13	Aug. 29	109	49	Strong....	10	Branching	4,080	91 14	40
Columbus	2	" 13	" 25	105	46	"	8	"	4,010	86 12	38
Banner.....	5	" 11	" 28	110	47	"	9	"	4,240	84 ..	41¼
Wide Awake.....	5	" 12	" 25	106	47	Medium..	8	"	4,040	79 ..	43
Abundance	5	" 11	" 26	108	45	Strong....	9	"	5,000	79 ..	37½
Bavarian.....	5	" 12	Sept. 7	119	56	Medium..	9½	"	5,100	73 14	38½
Improved Ligowo..	5	" 11	Aug. 24	106	44	Strong....	9	"	4,000	67 6	39
Holstein Prolific ..	1	" 13	" 29	109	48	Medium..	9	"	5,300	86 26	40
Oderbruch	1	" 13	Sept. 4	115	54	Strong....	11	"	4,000	78 23	40
Siberian O. A. C ..	1	" 13	" 5	116	53	"	11	"	3,980	76 26	39½
White Schonen ...	1	" 13	Aug. 29	109	48	Medium..	10	"	5,000	68 15	40
Bonanza	1	" 13	" 21	101	39	Strong....	10	"	3,190	64 24	44
Welcome	1	" 13	" 23	103	49	" ...	9	"	4,250	61 31	38

TEST OF FORMALIN AS A PREVENTIVE OF SMUT IN OATS.

Five varieties of oats were used in this test and the seed was all more or less affected with smut. The result as shown below very clearly demonstrates the efficacy of formalin as a preventive of smut in oats.

Variety.	Treatment.	Seed left in Solution.	Result.
Doncaster Prize.	At rate of 10 bush. seed to 4½ oz. formalin in 10 galls. water.	1 hour.	No trace of smut.
"	" " "	15 min.	"
Rennie's Prize..	" " "	1 hour.	"
"	" " "	15 min.	"
Imported Irish..	" " "	1 hour.	"
"	" " "	15 min.	"
Bavarian... ..	4½ " "	Sprinkled.	"
"	" " "	5 min.	"
Wide-awake ...	9 " "	Sprinkled.	"
"	" " "	5 min.	"

NOTE.—All the seed sown in the uniform test plots and field lots was dipped for 5 minutes in a solution of 6 oz. formalin and 10 gallons water, to 10 bushels seed. No smut was found in any of the crops.

EXPERIMENTS WITH BARLEY.

The barley crop was a particularly satisfactory one the past season, all varieties producing good yields of a very uniform sample. No injury was sustained from wind or frosts in the early part of the season and all the varieties matured and were secured in excellent condition.

TEST OF EARLY, MEDIUM AND LATE SOWINGS.

Odessa, 6-rowed, and Canadian Thorpe, 2-rowed, were again used in this test.

The seedings were made on same dates as the tests with oats and wheat, and they all ripened in the order of seeding.

The land was summer-fallowed, the soil clay loam, the plots $\frac{1}{20}$ acre each, and all were sown by hoe-drill at the rate of 2 bushels per acre.

BARLEY—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
				Ins.		Ins.	Lbs.	Bush Lbs.	Lbs.
Odessa (six-rowed)	April 26	Aug. 14	111	30	Strong	2½	4,340	63 36	49¾
" "	May 9	" 26	110	30	Medium	2½	3,200	56 12	51
" "	" 10	" 28	111	30	"	2½	3,146	55 20	51¾
" "	" 17	" 31	107	29	"	2¼	3,160	55 ..	52
" "	" 24	Sept. 1	101	30	"	2½	3,560	55 ..	51
" "	" 31	" 4	97	29	"	2½	3,780	54 28	50½
Canadian Thorpe (two-rowed)	April 26	Aug. 26	123	34	Strong	3	5,900	56 12	52¼
" "	May 9	" 31	115	36	"	3	3,900	52 4	52
" "	" 10	" 31	114	36	"	3	4,260	52 44	52½
" "	" 17	Sept. 1	108	37	"	3	4,080	52 24	52
" "	" 24	" 7	107	37	"	3	4,140	51 12	51½
" "	" 31	" 8	101	38	"	3	4,200	50 ..	49

BARLEY, TEST OF VARIETIES.

Thirty varieties of 6-rowed barley were sown on May 18, and 21 varieties of 2-rowed on May 19.

All were sown by hoe-drill, at the rate of 2 bushels of seed per acre on $\frac{1}{20}$ acre plots, of summer-fallowed land. The soil was a clay loam. The varieties sown were all bearded except Excelsior, Success, Champion, Black Hulless and White Hulless which were beardless.

BARLEY, SIX-ROWED—Test of Varieties.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs.
Rennie's Improved	Aug. 17	92	34	Medium	2½	3,660	69	28	52¼
Trooper	" 19	94	32	Strong	2	4,480	69	8	52½
Claude	" 24	99	35	"	2½	4,200	69	8	50¼
Argyle	" 19	94	34	"	3	3,900	68	36	52½
Mansfield	" 19	94	33	"	3	2,400	66	32	51¾
Blue Barley	" 18	93	31	"	2½	3,440	65	40	50
Baxter	" 18	93	32	"	2½	3,500	63	36	52¾
Summit	" 19	93	33	Medium	3	4,600	62	24	54¼
Mensury	" 18	93	36	Strong	3	3,810	62	4	52¼
Empire	" 19	94	30	Weak	2½	3,660	61	12	53
Stella	" 19	94	31	"	2½	3,760	61	12	53½
Odessa	" 19	94	30	Medium	3	2,860	61	12	52½
Phœnix	" 17	92	32	Weak	2½	3,700	60	20	53¼
Petschora	" 18	93	31	Medium	2	3,320	60	..	52¾
Royal	" 18	93	28	Strong	3	3,300	60	..	52¼
Oderbruch	" 18	93	31	Medium	2¼	2,980	58	36	54¾
Yale	" 24	99	36	Strong	2½	3,780	58	36	51½
Common	" 17	92	30	"	3	2,800	58	16	52½
Brome	" 30	105	35	Medium	2½	2,840	57	24	53
Surprise	" 18	93	32	Strong	2	3,700	56	12	53½
Pioneer	" 24	99	33	Medium	2	3,900	56	12	53½
Garfield	" 29	104	42	Strong	3	3,920	55	40	52
Nugent	" 19	94	30	"	2	3,760	55	..	53
Excelsior	" 14	89	36	Weak	3	3,520	55	..	45¼
Vanguard	" 17	92	31	Strong	2½	2,760	55	..	52½
Albert	" 24	99	34	Medium	2	2,740	50	40	54
Success	" 10	85	30	Strong	2	2,400	50	..	48¾
Champion	" 14	89	30	Weak	2½	4,380	46	12	47
Black Hulless	" 18	93	23	"	1½	3,320	44	40	65
White Hulless	" 17	92	26	Medium	2	2,500	40	20	64

BARLEY, TWO-ROWED—Test of Varieties.

Danish Chevalier	Aug. 30	104	36	Strong	4	4,000	66	32	53½
French Chevalier	" 31	105	35	"	4	2,340	65	40	53
Sidney	" 30	104	38	Medium	3¼	4,140	63	36	54½
Canadian Thorpe	" 24	98	40	Strong	3	4,580	58	36	53
Bolton	" 24	98	33	Medium	3½	4,000	58	16	55
Dunham	" 24	98	40	Strong	4	5,260	57	4	54
Thanet	Sept. 8	113	35	Medium	4¼	3,960	57	4	52
Prize Prolific	" 8	113	34	"	3½	4,480	56	32	52½
Leslie	Aug. 21	95	34	Strong	3½	5,120	55	40	53
Beaver	" 29	103	33	"	2½	4,940	55	20	53
Kinver Chevalier	Sept. 8	113	38	Weak	4½	4,260	55	..	51
Victor	Aug. 24	98	34	Strong	3	4,240	53	16	54¾
Jarvis	" 24	98	40	"	4	5,140	51	12	52½
Fulton	" 24	98	38	Medium	3½	3,620	50	..	53¼
Nepean	" 24	98	37	Strong	3½	4,600	50	..	54½
Clifford	" 24	98	37	"	3½	3,600	49	28	54
Harvey	" 24	98	36	Medium	3	3,820	49	28	54
Logan	" 21	95	37	Strong	3½	4,840	49	8	53
Monck	" 29	103	40	"	3	6,060	48	36	54½
Pacer	" 24	98	36	"	2½	4,520	45	20	53
Newton	" 24	93	37	"	3½	4,500	43	16	51

BARLEY, FIELD LOTS.

Thirteen varieties of barley were sown in acre or larger lots. In all cases the crop of straw was exceptionally heavy but only two varieties lodged slightly, these were Sidney (two-rowed) and Royal (six-rowed).

The land was summer-fallowed in 1898, the soil a clay loam. The seed was sown by hoe-drill at the rate of 2 bushels per acre. The crop was free from weeds and sustained no check from start to finish.

BARLEY—FIELD-LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
	Acres.				In.		In.		Lbs.	Bush. Lbs.	Lbs.
Canadian Thorpe	5	May 13	Aug. 30	110	47	Strong	3	Two-rowed	5,940	54 ..	52½
Sidney	5	" 13	Sept. 4	115	43	Medium	3½	"	4,120	48 ..	54
Trooper	3	" 17	Aug. 30	106	44	Strong	2½	Six-rowed	4,030	47 32	52
Odessa	5	" 9	" 18	102	28	"	2½	"	3,570	42 36	52½
Royal	1	" 17	" 21	97	32	Medium	2	"	3,420	60 24	52
Baxter	1	" 17	" 24	100	31	Strong	2	"	3,400	56 22	52½
Rennie's Improved	1	" 17	" 24	100	47	Medium	2½	"	4,110	52 ..	52
Canadian Thorpe	1	" 20	" 25	98	37	Strong	2½	Two-rowed	3,640	51 16	52½
French Chevalier	1	" 8	" 24	109	33	"	4½	"	3,000	51 14	52⅔
Oderbruch	1	" 8	" 16	101	30	"	2	Six-rowed	2,900	47 42	54½
Mensury	1	" 9	" 19	103	33	"	3	"	3,420	43 45	52
Beaver	1	" 8	" 26	111	35	"	3	Two-rowed	4,100	38 14	53
Common	1	" 17	" 19	95	33	"	3	Six-rowed	3,640	34 44	52¼

TEST OF FORMALIN AS A PREVENTIVE OF SMUT IN BARLEY.

Three varieties of rather badly affected seed were treated with formalin, with the following results :—

Variety.	Treatment.	Seed left in Solution.	Results.
Royal	At rate of 10 bush. to 4½ oz. formalin in 10 galls. water.	1 hour	No smut in plot.
"	" " 9 " 10 "	5 minutes	" "
"	Untreated		10 heads smut in 25 sq. ft.
Bolton	At rate of 10 bush. to 4½ oz. formalin in 10 galls. water.	15 minutes	No smut in plot.
"	" " 4½ " 10 "	Sprinkled	" "
Baxter	" " 4½ " 10 "	5 minutes	8 heads smut in 25 sq. ft.
"	" " 9 " 10 "	Sprinkled	No smut.

NOTE.—From the above it will be noticed that in the case of the Baxter barley dipped 5 minutes in the 4½ oz. solution, the treatment was not entirely effective. This was also found to be the case in several varieties in the uniform test plots, the seed for which had been treated in the same way. When more formalin was used, 5 minutes dipping was found to be sufficiently long to ensure good results, which, together with above table, indicates that longer soaking or a stronger solution than is used for oats is necessary to produce the same results with barley.

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EXPERIMENTS WITH PEASE.

None of the varieties of pease were equal in yield to those of last year, but the sample was finer and the crop on the whole was a satisfactory one.

TEST OF EARLY, MEDIUM AND LATE SOWINGS.

Golden Vine, a small variety, and Mummy, a medium-sized sort, were used in this test.

They were sown on the same dates as the oats, wheat and barley, at the rates of 2 bushels of Golden Vine and 3 bushels of Mummy per acre. The land was clay loam, summer-fallowed. The plots were $\frac{1}{20}$ acre each, and the seed was sown two inches deep by hoe-drill.

TEST of Early, Medium and Late Sowings.

Name of Variety.	Date of Sowing.	Date of Ripening.	No of Days Maturing.	Length of Straw.	Weight of Straw per Acre.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
				In.	Lbs.	In.		Bush. Lbs.	Lbs.
Golden Vine	Apr. 26	Aug. 27	124	36	2,540	2	Small	25 ..	65
"	May 9	" 30	114	36	2,120	2	"	21 40	65½
"	" 10	" 31	114	36	2,780	2	"	27 ..	64½
"	" 17	Sept. 5	122	34	2,240	2	"	22 40	65
"	" 24	" 7	117	40	2,840	2	"	24 20	65
"	" 31	" 10	113	37	2,940	2½	"	24 40	65
Mummy	Apr. 26	Aug. 29	126	34	1,080	2½	Medium	22 ..	64½
"	May 9	" 31	115	33	2,040	2½	"	19 20	65½
"	" 10	Sept. 1	115	36	1,580	2½	"	30 20	64½
"	" 17	" 5	122	30	1,920	2½	"	18 20	63½
"	" 24	" 7	117	37	2,040	2½	"	19 20	64½
"	" 31	" 10	113	33	2,540	2½	"	21 20	64

PEASE—TEST OF VARIETIES.

Fifty-nine varieties were sown on May 10 on summer-fallowed land by hoe-drill, 2 inches deep, at the rate of 2 bushels of small, 3 bushels of medium and 3½ bushels of large pease per acre. The plots were $\frac{1}{20}$ acre each, and the soil clay loam. None of the varieties germinated satisfactorily, probably on account of the wet and cold condition of the soil at the time of seeding. In other years the same quantities of seed per acre has been found abundant.

All the varieties matured before frost came. The exceptionally small yields were caused by the incomplete germination of the seed.

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw per Acre.	Length of Pod.	Size of Pea.	Yie per Acre.		Weight per Bushel.
				In.	Lbs.	In.		Bush.	Lbs.	Lbs.
Grey Spring	Sept. 3	117	Strong	40	4,200	2	Small	38	32	64 1/3
Picton	" 7	121	"	47	3,800	2 1/2	Large	38	..	65 1/2
Crown	Aug. 28	111	Medium	44	3,060	2	Small	35	40	65 1/2
Chelsea	Sept. 6	120	Strong	45	3,100	3	Medium	35	..	64
Carleton	" 2	116	"	50	3,520	3	"	34	40	64 1/4
Wisconsin Blue	" 3	117	Weak	35	3,140	2	Small	34	40	65
Macoun	" 4	118	Strong	50	4,240	3	Medium	34	20	64
Archer	" 6	120	"	43	2,540	2 1/2	"	34	20	64
Trilby	" 4	118	"	40	4,940	3	"	34	..	63 1/2
Grey Winter	Aug. 24	107	Weak	27	4,110	1 1/2	Small	34	..	65
German White	" 26	109	Strong	43	4,180	3 1/2	Large	33	40	62
Dover	Sept. 6	120	"	40	3,580	3	"	33	20	63 1/2
Agnes	" 1	115	"	47	3,640	3	"	32	40	64
Fergus	" 8	122	"	52	3,640	3	Medium	32	20	65 1/4
Chancellor	Aug. 24	107	Weak	37	3,100	1 3/4	Small	31	40	64
Gregory	Sept. 7	121	Strong	43	2,720	2 1/2	Large	31	..	64
White Wonder	Aug. 26	109	Weak	26	4,180	2 1/2	Medium	30	20	65 1/2
Creeper	" 26	109	Medium	35	3,180	2 1/2	Small	30	20	64 1/2
Prussian Blue	Sept. 5	119	"	48	2,600	3	Medium	30	..	65
Lanark	Aug. 26	109	Strong	42	2,820	2 1/2	"	29	40	64 1/2
Elder	Sept. 6	120	Medium	31	3,840	2 1/2	Small	29	20	64 1/2
Herald	" 5	119	Strong	47	4,080	2 1/2	"	28	20	65
Elliott	" 1	115	"	52	2,900	3	Medium	28	20	64
Field Maple	" 8	122	"	50	2,020	3	"	27	30	59
Pearl	" 5	119	"	36	3,140	3	Large	27	20	64 1/2
Bedford	" 1	115	"	49	3,800	3	Medium	27	..	63 3/4
Mummy	Aug. 25	108	Medium	31	2,580	2	"	27	..	64 1/4
Prince	" 26	109	Strong	42	3,280	2 1/2	Large	27	..	63 1/2
Early Britain	" 21	104	Medium	34	5,000	2	"	26	40	63 1/2
English Grey	" 24	107	"	30	3,000	2	Medium	26	40	63 3/4
Arthur	" 26	109	Strong	47	2,020	2	"	26	20	64 1/2
Golden Vine	" 27	110	"	51	2,020	2 1/2	Small	26	20	64 1/2
Daniel O'Rourke	" 27	110	Medium	44	2,640	2 1/2	"	26	..	64 3/4
King	Sept. 3	117	Strong	38	2,640	2 1/2	Medium	26	..	65 1/4
Pride	Aug. 25	108	Medium	32	2,600	2	"	26	..	65
Harrison's Glory	Sept. 5	119	"	28	2,360	2 1/2	Large	25	40	64
Nelson	" 2	116	Weak	27	3,060	2	Medium	25	40	65
Duke	" 1	115	Strong	38	2,660	3	Large	25	40	64
Prince Albert	" 4	118	"	50	3,240	3	Small	25	40	64
Cooper	" 3	117	"	45	4,480	2 1/2	Medium	25	20	64 1/4
Paragon	Aug. 30	113	"	41	2,940	3	Large	24	20	64
Centennial	Sept. 4	118	"	51	2,940	2 1/2	Small	24	20	64 1/2
French Canner	Aug. 24	107	Weak	28	3,400	2 1/2	"	24	20	64 1/2
Vincent	" 25	108	Strong	44	2,580	2 1/2	Large	23	40	65
Bruce	Sept. 1	115	"	44	2,560	2 1/2	"	23	40	63 1/2
Fenton	" 5	119	"	39	4,000	3	"	23	..	64
Large WhiteMarrowfat	" 6	120	"	56	2,420	3	"	22	40	63 1/2
Elephant Blue	" 5	119	Weak	28	2,440	2 1/2	"	22	40	65
Victoria	" 7	121	Strong	40	3,040	3	Medium	22	40	64 1/2
Perth	Aug. 25	108	Medium	32	1,840	2 1/2	Large	22	20	63 1/2
Multiplier	Sept. 3	117	"	46	2,960	2 1/2	Small	22	20	64
Kent	Aug. 31	114	Strong	42	4,880	3	Large	22	..	62 1/2
Blackeyed Marrowfat	Sept. 2	116	"	55	2,920	3	"	21	20	63 1/2
New Potter	Aug. 29	112	"	42	2,980	3	"	20	..	63 1/2
Oddfellow	Sept. 4	118	Weak	29	2,800	2	Small	19	40	65 1/4
Mackay	" 2	116	Strong	42	2,040	3	Large	19	..	63 1/2
Bright	" 4	118	"	45	2,960	3	Medium	18	40	63 1/2
Canadian Beauty	" 7	121	"	42	2,780	2 3/4	Large	17	20	63 1/2
Alma	" 6	120	"	40	1,700	2 1/2	"	14	40	64 1/4

SESSIONAL PAPER No. 8a

EXPERIMENTS WITH INDIAN CORN.

Thirty varieties were tested in uniform plots, on clay loam. The seed was sown on May 29 by the grain drill in rows three feet apart and planted by hand in hills three feet apart each way.

The land had produced a crop of pease in 1898 and was summer-fallowed in 1897. After the pease were taken off, the land was ploughed seven inches deep and well harrowed, and this spring it was cultivated three inches deep before the seed was sown. The plots were kept free from weeds and the scruffler and hoe were freely used during the growing season.

On the morning of August 4, a cold wind or slight frost cut back the leaves and stopped the growth for a week. On the 28th of the same month, another check in growth was sustained and no further progress was made.

The yield in each case was computed from the weight of two rows each 66 feet long.

CORN—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Height.	When Tasselled.	In silk.	Condition when cut.	Weight per Acre grown in rows.	Weight per Acre grown in hills.
		Ins.				Tons. Lbs.	Tons. Lbs.
Canada White Flint	Strong	65	Aug. 28	.....	Tassel	12 420	10 1,350
Early Mastodon	"	78	.....	.....	Not tasselled	12 200	16 330
Early Butler	Medium	70	Aug. 26	Sept. 9	Silk	11 770	10 900
Mammoth 8-rowed Flint	Strong	62	" 28	" 8	"	11 200	10 900
Cloud's Early Yellow	Medium	67	" 26	" 6	"	10 1,450	10 1,670
North Dakota White	Strong	64	" 26	" 6	"	10 1,350	8 1,600
Red Cob Ensilage	"	84	.....	.....	Not tasselled	10 900	13 730
Evergreen Sugar	"	68	Aug. 26	Sept. 4	Silk	10 900	12 750
Pearce's Prolific	"	60	" 29	.....	Tassel	10 570	8 1,380
Rural Thoro'bred White Flint	"	69	" 26	Sept. 4	Silk	10 350	12 1,520
Giant Prolific Ensilage	Medium	68	" 26	.....	Tassel	10 350	11 1,100
Champion White Pearl	Strong	79	" 30	.....	"	9 1,800	10 350
Sanford	Medium	76	" 30	.....	"	9 1,250	9 1,560
Mammoth Cuban	Strong	73	" 28	Sept. 9	Silk	9 1,250	10 350
Angel of Midnight	"	62	" 29	" 5	"	9 1,030	8 1,820
King of the Earliest	Medium	64	" 28	" 7	"	9 810	9 1,140
Pride of the North	Strong	74	" 26	" 6	"	9 700	8 1,600
Ruby Mexican	Weak	56	" 28	" 7	"	9 480	5 530
Selected Leaming	Strong	84	" 26	" 4	"	9 370	9 1,250
Longfellow	Medium	58	" 28	" 6	"	8 1,930	9 150
Compton's Early	"	60	" 29	.....	Tassel	8 1,820	7 1,620
Early Yellow Long-eared	Weak	50	Sept. 7	.....	"	8 1,600	9 300
Kendall's Early Giant	"	48	.....	.....	Not tasselled	8 1,380	11 .....
Extra Early Szekeley	"	52	Sept. 7	.....	Tassel	8 720	12 200
Mitchell's Extra Early	"	53	Aug. 31	Sept. 8	Silk	7 450	8 500
New Whitecap Yellow Dent	Strong	83	" 28	" 6	"	6 1,750	9 370
Iowa Silver Mine	Medium	51	.....	.....	Not tasselled	6 1,750	9 1,800
Extra Early Huron Dent	Strong	80	Aug. 28	Sept. 7	Silk	6 1,200	7 1,950
Yellow Six Weeks Early	Weak	47	" 29	.....	Tassel	6 320	7 1,620
Country Gentleman	"	37	.....	.....	Not tasselled	5 1,000	6 1,200

INDIAN CORN SOWN IN ROWS AT DIFFERENT DISTANCES.

Three varieties were sown in rows 21, 28, 35 and 42 inches apart on May 29 on land of similar character and prepared in the same manner as that for the test of varieties. The corn was cut for ensilage on September 9. The estimates of the yield per acre are based on the weight of crop produced by two rows each 66 feet long.

TEST of sowing Corn in Rows at different distances apart.

Name of Variety.	Distance in Rows.	Date of Sowing.	Character of Growth.	Height.	When Tasselled.	Condition when Cut.	Weight per Acre Grown in Rows.
	Inches.			Inches.			Tons. Lbs.
Selected Leaming	21	May 29	Strong	69	Aug. 30	Tassel	16 1,180
" "	28	" 29	"	76	" 30	"	14 1,420
" "	35	" 29	"	64	Not	Not tasselled	10 1,500
" "	42	" 29	"	66	Sept. 4	Tassel	10 1,970
Longfellow	21	" 29	Medium	65	Aug. 28	"	10 1,310
"	28	" 29	"	65	" 28	"	9 1,800
"	35	" 29	"	69	" 28	"	9 1,800
"	42	" 29	"	63	" 28	"	10 1,210
Champion White Pearl	21	" 29	Strong	65	Not	Not tasselled	12 1,160
" "	28	" 29	"	69	"	"	10 1,220
" "	35	" 29	"	63	"	"	8 630
" "	42	" 29	"	64	"	"	7 1,090

EXPERIMENTS WITH GREEN MANURES.

The following experiments were planned to gain information as to whether the ploughing under of green crops would increase the subsequent yield of wheat. Ten plots of half an acre each were devoted to this purpose; the field was clay loam. One of these was left as a check plot and was summer-fallowed. Six were sown with leguminous crops—which collect nitrogen from the air and store it up in their tissues—Common Red, Mammoth Red and Alsike clovers, Lucerne pease and tares. The other plots were sown with buckwheat, rape and brome grass. These crops were all sown in the spring of 1898 on stubble land which was ploughed four inches deep before sowing, and the resulting crops were ploughed under when they had attained their maximum growth. The Bromus Inermis was eight inches high when ploughed under, rape fourteen inches. Red clover, average height four inches, growth very thick and strong. Mammoth Red clover, three inches high, very thick but spindley. Alsike clover, six inches, but thin on ground. Buckwheat, thirteen inches high and a fair, even growth. Tares, fifteen inches and pease thirty-one inches, both having a good strong growth. Lucerne, three inches high with a thick growth of rather weak plants The plots were then harrowed. The check plot of summer-fallow was ploughed about seven inches deep in the spring of 1898 and harrowed or cultivated several times during the season.

This spring all the plots were sown with Red Fife wheat by hoe-drill on April 25 at the rate of one and one-half bushels per acre.

RESULTS of Crop following Green Manuring.

Green Crops sown 1898.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		In.	Lbs.	Bush. Lbs.	Lbs.	
Brome Grass (*Bromus inermis*)	Aug. 29	127	43	Strong	3	5,110	36 10	62½	Slightly.
Rape	" 29	127	43	"	3	4,930	36 55	62½	"
Clover—Common red	" 29	127	43	"	3	4,770	33 ..	62	"
" Mammoth Red	" 29	127	43	"	3	4,840	35 50	62½	"
" Alsike	" 29	127	43	"	3	4,920	35 44	62½	"
Buckwheat	" 29	127	43	"	3	4,740	33 20	62	"
Tares—White	" 29	127	43	"	3	4,700	31 40	62	"
Pease—Golden Vine	" 29	127	43	"	3	4,990	35 50	62	"
Lucerne	" 29	127	43	"	3	5,000	33 ..	62	"
Check plot—Summer-fallowed	" 29	127	43	"	3	5,110	36 30	62	"

These results seem to show that the soil experimented on was well supplied with humus and nitrogen.

EXPERIMENTS IN ROTATION OF CROPS.

In accordance with your instructions a system for a rotation of crops was inaugurated this year. For this purpose 11 acres of fallowed land clay loam were set apart and blocked out in plots of ½ acre each and marked by permanent stakes at the corners.

The main object in view in this arrangement is to ascertain what advantage, if any, would arise from the use of leguminous plants for ploughing under, using them every third year in place of the usual summer-fallow. The leguminous plants to be turned under in each instance at the time they reach their heaviest growth.

The Red clover is sown in the proportion of 12 pounds per acre and the mixed clovers in the proportion of 8 pounds of Alfalfa and 6 pounds of Alsike per acre. The soja beans are to be sown in rows 14 inches apart, using 60 pounds of seed per acre, on plots 11 and 22 rape and rye are used in place of the legumes. Plots 12 to 16 are intended to illustrate the results of continuous cropping with grain on spring or fall ploughing.

PLAN for Series of rotation of Crops beginning Spring of 1899.

Plot No.	1899.	1900.	1901.
1	Wheat	Oats	Soja Beans.
2	"	Wheat	Pease.
3	"	Oats	Tares.
4	"	Wheat	Red Clover.
5	"	Barley	Alsike and Lucerne.
6	Pease	Wheat	Wheat.
7	Tares	"	Oats.
8	Soja Beans	"	"
9	Red Clover	"	Wheat.
10	Alsike and Lucerne	"	Barley.
11	Rape	"	Summer-fallow.
12	Wheat	"	"
13	"	Oats	"
14	"	Barley	"
15	"	Wheat	Oats.
16	"	Barley	"
17	Oats	Soja Beans	Wheat.
18	Wheat	Pease	"
19	Oats	Tares	"
20	Wheat	Red Clover	"
21	Barley	Alsike and Lucerne	"
22	Rye	Summer-fallow	"

RESULTS of First Year on Rotation Plots.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
					In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Wheat—Red Fife	April 25..	Sept. 2..	131	48	Strong....	3	5,220	36 6	62½
2	" "	" 25..	" 2..	131	48	"	3	5,100	35 40	62
3	" "	" 25..	" 2..	131	48	"	3	5,300	36 ..	62
4	" "	" 25..	" 2..	131	48	"	3	5,190	35 46	62
5	" "	" 25..	" 2..	131	48	"	3	5,140	35 40	62
6	Pease—Golden Vine	May 19..	Ploughed under July			20.				
7	Tares—White	" 19..	"			" 20.				
8	Soja Beans	" 19..	"			" 20.				
9	Clover—Common Red	" 22..	"			Sept. 10.				
10	" Alsike and Lucerne	" 22..	"			" 10.				
11	Rape	" 22..	"			Aug. 15.				
12	Wheat—Red Fife	April 25..	Sept. 2..	131	48	"	3	5,000	36 6	62½
13	" "	" 25..	" 2..	131	48	"	3	4,960	35 36	62
14	" "	" 25..	" 2..	131	48	"	3	5,110	35 40	62
15	" "	" 25..	" 2..	131	48	"	3	5,190	36 ..	62½
16	" "	" 25..	" 2..	131	48	"	3	5,000	35 20	62
17	Oats—Banner	May 8..	Aug. 28..	113	48	"	10	4,240	85 ..	40¾
18	Wheat—Red Fife	April 25..	Sept. 2..	131	48	"	3	5,110	36 16	62½
19	Oats—Banner	May 8..	Aug. 28..	113	50	"	10	4,000	.....	.....
20	Wheat—Red Fife	April 25..	Sept. 2..	131	48	"	3	5,200	36 ..	62½
21	Barley—Canadian Thorpe	May 8..	Aug. 24...	109	43	"	3½	4,200	46 ..	52½
22	Rye—Spring	April 27..	Sept. 6..	133	50	"	3½	2,670	41 ..	40¾

EXPERIMENTS WITH FLAX.

TEST of sowing different quantities of seed per acre on different dates, on fallow land clay loam, sown by hoe-drill on $\frac{1}{10}$ acre plots.

Seed per Acre.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
				In.	Lbs.	Bush. Lbs.	Lbs.
80 lbs.	May 19..	Sept. 7 ..	112	30	2,100	16 .	54
40 "	" 19..	" 7..	112	31	1,700	14 40	55½
80 "	" 26..	" 9..	107	28	2,500	21 .	55¾
40 "	" 26..	" 9..	107	32	2,300	20 15	55½
80 "	June 2..	" 11..	102	30	2,400	19 20	55
40 "	" 2..	" 11..	102	30	2,100	18 10	55¾
80 "	" 9..	" 13..	97	30	2,500	21 10	55¾
40 "	" 9..	" 13..	97	30	2,200	20 40	55¼

EXPERIMENTS WITH BROOM CORN.

Plots $\frac{1}{20}$ acre each. Seed sown in rows at different distances apart. Sown May 27, cut Sept. 13.

Yield per Acre.

	Height.
Rows 21 inches apart,	56 inches, 3 tons 1300 lbs.
" 28 "	37 " 2 " 1100 "

SORGHUM.

Sown in drills 35 inches apart on May 27, cut Sept. 13.

Amber Sugar.	Height 26 inches.	Yield 1 ton	1200 lbs, per acre.
Orange Sugar.	" 28 "	" 1 "	500 " "

SOJA BEANS.

Plots $\frac{1}{10}$th acre. Seed sown in rows at different distances apart. The beans were sown on May 19, cut Sept. 13, and when partially dry were weighed and put in silo.

Yield per Acre.

Rows 21 in. apart.....	Height 24 in.	Per acre 2 tons	300 lbs.
" 28 "	" 25 "	" 2 "	1300 "
" 35 "	" 25 "	" 1 "	700 "

All were slightly injured by frost in August.

LUPINS.

White and yellow, sown May 30, germination very weak, growth very weak. This crop was a failure.

BUCKWHEAT.

Four varieties were sown in a sheltered plot on summer-fallowed land. Three sorts did well and the crop may be said to be the first ever grown on the farm, as in former years buckwheat has always been killed by blight or frost before the grain came to maturity. Sown June 3, ripe Sept. 8.

Variety.	Height Straw.	Weight Straw per Acre.	Yield per Acre.
			Bush. Lbs.
Rye	38 in.	2,295	20 46
Japanese	30 in.	2,660	15 36
Siberian	31 in.	2,300	25 42
Silver-hull, did not germinate			

CANARY SEED.

Plot $\frac{1}{10}$ acre. Sown May 22, ripe Aug. 26, straw 40 inches high, head 1 inch long, weight of straw per acre 4,900 pounds, yield of seed per acre, 13 bushels. Weight 52$\frac{1}{2}$ pounds per bushel.

SPRING RYE.

Two plots were sown on summer fallowed land. First seeding May 2, cut Aug. 16, yield per acre 21 bushels 12 lbs. Second seeding May 27, cut Aug. 27, yield per acre 20 bushels 20 lbs.

MILLETS.

Plots $\frac{1}{20}$ acre each sown on land used for vegetables in 1898, fall plowed and harrowed. The season was unfavourable for millets and all varieties suffered more or less from a slight frost in August. Sown May 27, cut green Sept. 13.

Variety.	Length of Straw.	Length of Head.	Condition when cut.	Tons per acre. (green.)
Siberian	34 inches.	3½ inches.	½ headed.	4 tons 1,490 lbs
Hungarian	31 "	3 "	⅓ "	3 " 700 "
Italian	31 "	.....	Not headed.	2 " 1,400 "
Japanese	33 "	.....	"	2 " 700 "
White Round French	22 "	9 "	All headed.	1 " 1,700 "
Algerian	28 "	3 "	$\frac{1}{10}$ headed.	1 " 1,100 "
Pearl	Not long enough to cut.			

HORSE BEANS.

Plots $\frac{1}{20}$ acre each, sown in rows at different distances apart. Sown May 19, cut Sept. 2.

Distance apart.	Length of Straw.	Length of Pods.	Tons-lbs. per acre.
21 inches	38 inches	3 inches	3 tons. 1,800 lbs.
28 "	38 "	3 "	3 "
35 "	40 "	3 "	2 " 1,950 "

TARES (WHITE).

$\frac{1}{20}$ acre plot sown on fallow, cut ripe for seed. Sown May 19, ripe Sept. 3, yield 24 bushels 20 lbs. per acre.

EXPERIMENTS WITH GRASSES.

AWNLESS BROME GRASS (*Bromus inermis*).

The past season was a favourable one for Brome Grass, and the results obtained in almost every portion of the country where the grass is cultivated have been entirely satisfactory.

The crop of hay was abundant, and where cut for seed very fair returns have been secured.

The demand for seed promises to exceed that of any previous year and large stocks are being laid in by seedsmen or held by growers in the eastern and southwestern portions of the Territories where the grass is more extensively cultivated than in the other parts of the country.

On the Experimental Farm the crop was the most satisfactory so far grown, and a large lot of excellent hay is stored in barn for use next year.

The heavy rains in the autumn of 1898 insured an abundant supply of moisture at the time in the spring when it is most needed by the grass-roots, viz., the month of May or before the June rains set in.

Eight acres of Brome grass sown in 1898 (two acres reserved for seed) produced when cut for hay in July 2 tons 490 lbs. per acre.

One half acre that had been cut for hay in 1898 yielded 2 tons 1,080 lbs. of hay, or 5 tons 160 lbs. per acre. The land on which this crop was grown had received a dressing of manure before seeding.

Thirty acres cut the third time for hay gave 56 tons 376 lbs.

Brome grass in head July 3, in flower July 10, cut for hay July 13, cut for seed August 10.

WESTERN RYE-GRASS. (*Agropyrum tenerum*).

Four and one-half acres were sown in 1898 (one-half acre of which was cut for seed) gave of hay 2 tons 1,620 pounds per acre.

In head July 5, in flower July 15, cut for hay July 16, cut for seed August 12.

ERADICATION, RENEWAL AND SEEDING OF BROME GRASS.

Two fields of brome sod were ploughed during the first week in June and backset during the last week in July and the first week in August. A 1½ acre plot of Brome-grass cut for hay on July 10 was ploughed 4 inches deep on 14th of same month and disc-harrowed on December 1. The plot is now in excellent shape for a crop, no sign of life being apparent in any of the grass roots. Six and one-half of the seven acres of Brome-sod broken and backset in April and June, 1898, were this year sown with barley. The yield of straw was not heavy, but the grain was a very fine sample. Yield 43 bushels 36 pounds per acre.

Of the two plots of Brome sod broken in fall of 1897 and spring of 1898, and left to renew without a seeding, one was cut for hay on July 11, yielding 1 ton 250 pounds per acre. The other a one-half acre plot remaining from the 7 acres broken in 1898 was ploughed up in June this year as it was in the centre of the field and it was not desirable that it should be left.

Ten acres were seeded down last spring, but the catch was a poor one and the growth in the fall was short and irregular.

For information regarding the seeding and cultivation of Brome grass, the following is quoted from report of 1896 :—

'This grass is better sown alone; at least it should not be sown with a grain crop. The grain takes too much moisture for the young grass-plants, only the most vigorous of which will survive the dry weather in September; whereas, if sown alone all the plants have an equal chance.

'It is also advisable to sow the seed on soil that does not blow. Summer-fallow would be the best preparation, but on account of its liability to drift it is not safe in many parts of the Territories to use this kind of land. Stubble land ploughed three or four inches deep in April or May, and well harrowed after the seed is sown, is found to be quite safe from winds as the stubble harrowed on top prevents all drifting.'

Ten or twelve pounds of seed is required per acre. 'More seed will give a better crop the first year, but less afterwards as the roots thicken up each year and in three or four years makes better pasture than hay.

'The seed being light, long and thin, seeding by hand is the only practicable method. To seed properly a calm day should be chosen, so that all parts of the land may be evenly sown.

'While the plants are young, weeds are sure to make great headway and it is necessary to keep them, at least from going to seed. The quickest way to accomplish this is to go over the field with a mower, cutting just above the grass-plants. If this operation has to be repeated it will be necessary to cut the tops of the grass, but this

will not injure the plants, in fact it is an advantage in the way of giving the roots a better hold.

'The first crop of hay can be cut the next year after seeding, and will, in ordinary years be ready early in July. Eight or ten days after being ready to cut for hay it will be fit to cut for seed if so desired.

'On this farm it has always been cut in first blossom for hay and ten days from this time it is considered in proper state to cut for seed.

'In cutting for seed a binder is used and the grass is cut, tied and stooked the same as wheat or other grain. In a week or ten days after cutting it is ready to thresh or store away as deemed best.

'For threshing small quantities the old-fashioned flail is suitable, but for large lots a threshing machine should be used on which the wind has been closed off as much as practicable. From three to six hundred pounds of seed may be expected from an acre.'

MEADOW-FESCUE, TIMOTHY AND ALSIKE CLOVER.

The plots of the above mentioned crops, which were favourably reported on in the report of 1898, were badly winter killed in the winter of 1898-9, and were this spring ploughed up.

TEST OF CLOVER TREATED WITH NITRAGIN.

In the spring of 1898, two plots were sewn with clover. The seed for one plot had been impregnated with nitragin germs, and for the other plot was untreated.

Both grew luxuriantly in 1898, the treated clover attaining a height of 12 to 15 inches and the untreated 12 inches.

Last spring both plots were found to have been winter killed with the exception of a small portion of each which had received the protection of a heavy bank of snow.

The portions not winter killed yielded as follows:—

Treated, 2 tons, 1,528 pounds per acre.
Untreated, 2 tons, 1,075 pounds per acre.

EXPERIMENTS WITH POTATOES.

One hundred and seventeen varieties were tested on land which was in roots in 1898, which was deeply ploughed in the fall and harrowed thoroughly. The soil was clay loam and a heavy dressing of manure had been applied to the land when it was being prepared for roots.

The crop was far from satisfactory, the cold wet condition of the soil at the time of planting causing many blanks in the rows through decay of seed and a crop of very small tubers. The potatoes were planted on May 25 and dug on September 29. The yield per acre in each case has been calculated from the weight of tubers obtained from two rows each 66 feet long.

POTATOES—Test of Varieties.

Name of Variety.	Character of Growth.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
American Wonder	Strong	435	45	330		105	45	Long, oval, white.
Burnaby Seedling	"	412	30	282	30	130	..	Long, flat, pink.
Bovee	Medium	390	30	214	30	176	..	Long, red.
Bill Nye	"	371	15	173	15	198	..	Long, pink.
Early Sunrise	"	354	45	184	15	170	30	Oval, red.
Brownell's Winner	Strong	352	..	173	15	178	45	Flat, dark red.
Carman No. 1	Medium	346	30	206	15	140	15	Oval, white.
Rochester Rose	Strong	343	45	187	..	156	45	Long, red.
American Giant	Medium	338	15	228	15	110	..	Long, flat, pink.
Beauty of Hebron	Strong	330	..	181	30	148	30	Long, flat, red.
Columbus	Weak	324	30	192	30	132	..	Oval, red.
White Beauty	Medium	321	45	176	..	145	45	Round, white.
Prize-taker	"	316	15	184	15	132	..	Oval, Red.
Burpee's Extra Early	"	305	15	222	45	82	30	Short, flat, red.
Carman No. 3	Strong	302	30	214	30	88	..	Round, white.
Crown Jewel	"	302	30	187	..	115	30	Long, red, white.
Early Harvest	"	302	30	189	45	112	45	Oval, white.
Vanier	Weak	302	30	239	15	63	15	Long, red.
Uncle Sam	Strong	302	30	244	45	57	45	Oval, flat, white.
Pride of the Market	Medium	302	30	184	15	118	15	Oval, white.
Victor Rose	"	302	30	181	30	121	..	Long, dark, red.
Pearce's Prize Winner	Strong	294	15	129	15	173	15	Oval, white.
Flemish Beauty	Medium	288	45	211	45	82	30	Long, red.
Late Puritan	Weak	288	45	195	15	93	30	Oval, white.
Seattle	Strong	288	45	181	30	107	15	Long, white.
Sharpe's Seedling	Weak	288	45	209	..	79	45	"
Seedling No. 230	Medium	280	30	178	45	101	45	Round, white.
Queen of the Valley	Strong	280	30	178	45	101	45	Oval, red.
I. X. L	"	280	30	181	30	99	..	Long, red.
Clay Rose	"	275	..	187	..	88	..	Round, red.
Peerless Junior	Medium	275	..	225	30	49	30	Oval, white.
Rose No. 9	Weak	275	..	184	15	90	45	Oval, red.
Vick's Extra Early	Medium	275	..	211	45	63	15	Flat, red.
Early Pride	"	275	..	173	15	101	45	Oval, pink.
Livingston's Banner	Weak	275	..	183	..	92	..	Oval, white.
Quaker City	Strong	272	15	178	45	93	30	"
Gem of Aroostook	Weak	269	30	101	45	167	45	Long, pink.
Reeve's Rose	Medium	269	30	178	45	90	45	"
State of Maine	Strong	269	30	195	15	74	15	Oval, white.
Clarke's No. 1	"	269	30	176	..	93	30	Long, red.
Early White Prize	Medium	261	15	173	15	88	..	Flat, white.
Everett	Strong	261	15	220	..	41	15	Oval, red.
Pride of the Table	Medium	261	15	181	30	79	45	"
King of the Roses	"	258	30	209	..	49	30	Long, pink.
New Queen	Strong	251	45	184	15	67	30	Oval, red.
Earliest of All	"	250	15	178	45	71	30	Long, red.
Stourbridge Glory	Medium	250	15	211	45	38	30	Flat, red.
Polaris	Strong	250	15	206	15	44	..	Oval, white.
Dreer's Standard	Medium	247	30	178	45	68	45	"
Early Six-weeks	Weak	247	30	184	15	63	15	Oval, red.
Lizzie's Pride	Strong	247	30	189	45	57	45	Long, white.
World's Fair	Medium	247	30	170	30	77	..	Round, white.
Rural Blush	Weak	247	30	189	45	57	45	Oval, red.
Prolific Rose	Medium	247	30	211	30	36	..	Long, red.
Pearce's Extra Early	Strong	247	30	110	..	137	30	Oval, pink.
Daisy	"	244	45	178	45	66	..	"
Early Puritan	Medium	244	45	178	45	66	..	Oval, white.
Houlton Rose	"	244	45	195	15	49	30	Long, flat, red.
Wonder of the World	Strong	242	..	181	30	60	30	Long, pink.
Irish Daisy	"	236	30	165	..	71	30	Round, white.
Early Rose	Weak	233	45	184	15	49	30	Long, red.
General Gordon	Medium	233	45	184	15	49	30	Oval, red.
Holborn Abundance	"	233	45	181	30	52	15	Round, red.
Troy Seedling	Weak	233	45	184	15	49	30	Long, white.
Russell Seedling	Strong	231	..	137	30	93	30	Oval, white.

POTATOES—Test of Varieties.—*Continued.*

Name of Variety.	Character of Growth.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Lee's Favourite	Medium	228	15	189	45	38	30	Long, red.
Good News	Strong	228	15	189	45	38	30	Long, flat, red.
Chicago Market	"	228	15	189	45	38	30	Oval, white.
Empire State	Strong	225	30	184	15	41	15	Long, flat, white.
Satisfaction	Medium	225	30	176	..	49	30	" white.
Thorburn	"	222	45	99	..	123	45	" red.
Ideal	Strong	220	..	203	30	16	30	Round, red.
Seedling No. 214	Weak	220	..	88	..	132	..	Long, red.
Country Gentleman	"	220	..	101	45	118	15	" pink.
Penn Manor	Medium	220	..	112	45	107	15	Oval, red.
Freeman	"	219	..	145	45	73	15	" white.
Early Gem	Strong	217	50	178	45	38	30	Long, pink.
Dakota Red	"	214	30	192	30	22	..	Round, red.
Burbank's Seedling	"	214	30	107	15	107	15	Long, red.
Irish Cobbler	"	211	45	165	..	46	45	Oval, white.
Early Michigan	Medium	209	..	180	..	29	..	" "
Vigorosa	"	209	..	104	30	104	30	Long, pink.
London	Strong	206	15	156	45	49	30	" red.
Rural No. 3	Medium	206	15	184	15	22	..	Round, white.
Reading Giant	Weak	206	15	154	..	52	15	Oval, red.
Table King	Strong	206	15	178	45	27	30	Round, white.
Northern Spy	"	206	15	145	30	60	45	Oval, red.
Early Ohio	"	206	15	173	15	33	..	Round, red.
Orphan's	Medium	206	15	154	..	52	15	Long, round, white.
McKenzie	"	203	30	154	..	49	30	Round, white.
New Variety No. 1	"	203	30	170	30	33	..	" pink.
Green Mountain	"	200	45	156	45	44	..	Oval, white.
Record	Strong	200	45	151	15	49	30	Round, white.
Sir Walter Raleigh	"	200	45	184	15	16	30	Oval, white.
Lightning Express	Medium	198	..	156	45	41	15	Long, red.
Harbinger	"	195	15	162	15	33	..	" pink.
Fillbasket	Strong	192	30	100	..	92	30	Round, red.
Money-maker	"	192	30	156	45	35	45	Long, white.
Delaware	Medium	192	30	181	30	11	..	Oval, white.
American Beauty	Strong	192	30	93	30	99	..	Long, white.
Cambridge Russet	Weak	187	..	72	..	115	..	" "
Great Divide	"	187	..	162	15	24	45	Round, white.
Maule's Thoroughbred	Medium	173	15	121	..	52	15	" red.
Early St. George	"	170	30	90	30	80	..	Long, pink.
Algoma No. 1	Strong	170	30	145	45	24	45	Oval, red.
Munroe County	Medium	167	45	126	30	41	15	Long, red.
Early Market	Strong	167	45	140	..	27	45	" "
20th Century	Weak	165	..	115	30	49	30	" white.
Maggie Murphy	Strong	154	..	123	45	30	15	Oval, red.
Ohio Junior	Medium	151	15	118	15	33	..	Round, red.
Enormous	Strong	151	15	118	15	33	..	Long, white.
Honeoye Rose	Medium	143	..	129	15	13	45	Oval, red.
Harvest King	Strong	143	..	112	45	30	15	" white.
Seedling No. 7	Medium	137	30	115	30	22	.	" red.
Hopeful	"	129	15	110	..	19	15	" white.
Hale's Champion	Strong	126	30	90	..	36	30	Round, white.
Charles Downing	Medium	123	45	101	..	22	45	Flat, white.

EXPERIMENTS WITH FIELD ROOTS.

The root crop was on the whole a good one—while the mangels and turnips were not large—the roots were very even, clean and sound. Carrots were much the finest crop ever grown on this farm.

Mangels and turnips were grown on the root land of the preceding year which had been ploughed and harrowed in the fall of 1898 and only required surface cultivation in the spring before seeding.

The carrots were grown on potato ground of preceeding year. The yields have been estimated from the weight of roots obtained from two rows, each 66 feet long.

Two seedings of each variety of mangels, turnips, carrots and sugar-beets were made about one week apart. The soil in all the plots was a clay loam and the seed was sown in drills two feet apart.

TURNIPS.—Test of Varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
					Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs
Bangholm Selected	May 23	May 29	Oct. 5..	Oct. 5..	29 905	981 45	21 1,890	731 30
Halewood's Bronze Top	" ..	" ..	" ..	" ..	27 285	904 45	21 240	704 ..
Selected Purple Top	" ..	" ..	" ..	" ..	25 1,315	855 15	18 795	613 15
Mammoth Clyde	" ..	" ..	" ..	" ..	25 1,150	852 30	22 715	745 15
Drummond Purple Top	" ..	" ..	" ..	" ..	25 490	841 30	19 1,105	651 45
Perfection Swede	" ..	" ..	" ..	" ..	24 1,005	816 45	24 1,830	830 30
Jumbo	" ..	" ..	" ..	" ..	23 1,685	794 45	16 1,600	561 ..
Prize Purple Top	" ..	" ..	" ..	" ..	23 1,355	789 15	21 735	712 15
Selected Champion	" ..	" ..	" ..	" ..	23 1,075	783 45	22 1,870	764 30
Skirvings	" ..	" ..	" ..	" ..	23 530	775 30	20 590	676 30
Hall's Westbury	" ..	" ..	" ..	" ..	22 1,705	761 45	20 1,250	687 30
Marquis of Lorne	" ..	" ..	" ..	" ..	22 1,540	759 ..	16 1,330	555 30
Hartley's Bronze	" ..	" ..	" ..	" ..	21 1,560	726 ..	21 1,065	717 45
Champion Purple Top	" ..	" ..	" ..	" ..	21 240	704 ..	18 1,455	624 15
Giant King	" ..	" ..	" ..	" ..	20 1,250	687 30	17 1,640	594 ..
East Lothian	" ..	" ..	" ..	" ..	20 1,085	684 45	21 1,560	726 ..
Imperial Swede	" ..	" ..	" ..	" ..	20 425	673 45	18 465	607 45
Prize-winner	" ..	" ..	" ..	" ..	19 1,930	665 30	21 1,560	726 ..
Shamrock Purple Top	" ..	" ..	" ..	" ..	19 1,600	660 ..	20 1,085	684 45
New Arctic	" ..	" ..	" ..	" ..	18 1,620	627 ..	16 1,000	550 ..
Hardy Goliath	" ..	" ..	" ..	" ..	18 795	613 15	17 1,970	599 30
West Norfolk Red Top	" ..	" ..	" ..	" ..	18 300	605 ..	21 1,725	728 45
Webb's New Renown	" ..	" ..	" ..	" ..	17 1,475	591 15	17 1,805	596 45
Carter's Elephant	" ..	" ..	" ..	" ..	16 1,495	558 15	16 1,000	550 ..
Monarch	" ..	" ..	" ..	" ..	16 835	547 15	17 1,310	588 30
Sutton's Champion	" ..	" ..	" ..	" ..	15 1,515	525 15	22 1,705	761 45

MANGELS.—Test of Varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
					Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Yellow Intermediate	May 23.	May 30.	Oct. 3..	Oct. 3..	35 1,940	1,199 ..	22 1,365	756 15
Champion Yellow Globe	" 23.	" 30.	" 3..	" 3..	32 1,340	1,089 ..	18 795	613 15
Yellow Fleshed Tankard	" 23.	" 30.	" 3..	" 3..	30 885	1,014 45	18 795	613 15
Ward's Long Oval	" 23.	" 30.	" 3..	" 3..	30 720	1,012 ..	25 160	836 ..
Giant Yellow Half Long	" 23.	" 30.	" 3..	" 3..	29 1,565	992 45	22 55	734 15
Gate-post	" 23.	" 30.	" 3..	" 3..	29 1,235	987 15	38 1,715	1,295 15
Selected Mam. Long Red	" 23.	" 30.	" 3..	" 3..	29 80	968 ..	20 1,085	684 45
Giant Yellow Globe	" 23.	" 30.	" 3..	" 3..	28 1,420	957 ..	30 390	1,006 30
Norbiton Giant	" 23.	" 30.	" 3..	" 3..	27 1,275	921 15	31 535	1,042 15
Golden Fleshed Tankard	" 23.	" 30.	" 3..	" 3..	27 780	913 ..	23 1,685	794 45
Mammoth Oval	" 23.	" 30.	" 3..	" 3..	25 1,795	863 15	18 1,305	602 15
Lion Yellow Intermediate	" 23.	" 30.	" 3..	" 3..	25 820	847 ..	26 1,295	888 15
Canadian Giant	" 23.	" 30.	" 3..	" 3..	24 1,830	830 30	18 465	607 45
Mammoth Long Red	" 23.	" 30.	" 3..	" 3..	24 1,665	827 45	21 75	701 15
Mam. Yellow Intermed'te	" 23.	" 30.	" 3..	" 3 .	24 1,335	822 15	19 1,270	654 30
Giant Yellow Intermed'te	" 23.	" 30.	" 3..	" 3..	24 675	811 15	24 1,170	819 30
Red Fleshed Tankard	" 23.	" 30.	" 3..	" 3..	23 35	767 15	23 1,685	794 45
Warden Orange Globe	" 23.	" 30.	" 3..	" 3..	21 1,230	720 30	23 365	772 45
Prize Mam. Long Red	" 23.	" 30.	" 3..	" 3..	21 405	706 45	20 920	682 ..
Gate-post Yellow	" 23.	" 30.	" 3..	" 3..	17 1,475	591 15	18 1,455	624 15

CARROTS—Test of Varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per acre. — 1st Plot.		Yield per acre. — 1st Plot.		Yield per acre. — 2nd Plot		Yield per acre. — 2nd Plot	
					Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Improved Short White	May 20.	May 29.	Oct. 4.	Oct. 4.	19	1770	654	30	15	690	511	30
Iverson's Champion	" 20.	" 29.	" 4.	" 4.	19	610	643	30	15	690	511	30
Half-long White	" 20.	" 29.	" 4.	" 4.	18	300	605	..	17	1970	599	30
Giant White Vosges	" 20.	" 29.	" 4.	" 4.	17	155	569	15	12	420	407	..
Yellow Intermediate	" 20.	" 29.	" 4.	" 4.	16	1990	566	30	14	710	478	30
Ontario Champion	" 20.	" 29.	" 4.	" 4.	16	1495	558	15	14	1370	489	30
New White Intermediate	" 20.	" 29.	" 4.	" 4.	16	1000	550	.	13	1060	451	..
Gren-top White Orthe	" 20.	" 29.	" 4.	" 4.	16	835	547	15	14	50	467	30
Large Short White Vosges	" 20.	" 29.	" 4.	" 4.	15	1350	522	30	12	255	404	15
Early Gem	" 20.	" 29.	" 4.	" 4.	15	525	508	45	10	130	335	30
Long Yellow Stump-rooted	" 20.	" 29.	" 4.	" 4.	14	1535	492	15	10	1450	357	30
Mammoth White Intermediate	" 20.	" 29.	" 4.	" 4.	14	1205	486	45	14	710	478	30
White Belgian	" 20.	" 29.	" 4.	" 4.	14	380	473	..	12	420	407	..
Guerande or Oxheart	" 20.	" 29.	" 4.	" 4.	13	1060	451	..	11	1100	385	..
Half-long Chantenay	" 20.	" 29.	" 4.	" 4.	11	605	376	45	8	500	275	..
Carter's Orange Giant	" 20.	" 29	" 4.	" 4.	11	110	368	30	9	480	308	..
Long Scarlet Altringham	" 20.	" 29.	" 4.	" 4.	10	460	341	..	8	500	275	..
Long Orange or Surrey	" 20.	" 29.	" 4.	" 4.	9	1635	327	15	9	1800	330	..
Scarlet Intermediate	" 20.	" 29.	" 4.	" 4.	9	1305	321	45	7	1510	258	30
Scarlet Nantais	" 20.	" 29.	" 4.	" 4.	8	500	275	..	3	1920	132	..

SUGAR BEETS—Test of varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
					Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	s
Danish Improved	May 25.	May 30.	Oct. 3.	Oct. 3.	22	500	742	30	20	920	682	
Wanzleben	" .	" .	" ..	" ..	15	1845	530	45	14	710	478	30
Danish Imp'd. Red Top.	" .	" .	" ..	" ..	13	1225	453	45	12	420	407	
Vilmorin's Improved	" .	" .	" ..	" ..	13	235	437	15	15	690	511	30
Improved Imperial	" .	" .	" ..	" ..	12	1740	429		13	1060	451	
Red Top Sugar	" .	" .	" ..	" ..	10	620	343	45	11	1100	385	

VEGETABLE GARDEN.

The vegetable crop was an average one.
Following will be found details of seeding and yield of the vegetables grown :—

ASPARAGUS.

Conover's Colossal.—In use from May 29 till July 15. Gave excellent cuttings and is a very desirable vegetable.

Donald's Elmira.—In use from May 29 till July 20.. Gave good cuttings.

Barr's Mammoth.—In use from June 10 to July 20. Large and later than the foregoing. Very successful. Fair crop.

Beans—Sown May 19.

Variety.	In use Green.	Ripe.	Remarks.
Challenge Black Wax	July 26..	Aug. 30 ..	Very productive.
Golden Wax	" 27..	Sept. 6	Fairly "
Best of all	" 27..	Did not ripen.	Good green bean.
Rustproof Golden Wax	" 26..	Sept. 6	Very productive, small.
Wardwell's Kidney Wax	" 26..	" 6	"
Dwarf White Butter	" 26..	" 6	" small.
Flageolet Scarlet Wax	" 26..	" 13	"
Early Giant Wax	" 25..	" 13	"
Early Red Valentine	" 28..	Did not ripen.	Good green bean.
Broad Windsor	" 8..	Sept. 6	Very productive.
Hardy Six Weeks	" 26..	" 6	Fairly "
Giant Dwarf Wax	" 27..	" 6	Very "
Dwarf Triumph	" 24..	" 13	Fairly " small.
Early Golden Cluster	" 24..	Did not ripen.	
Roger's Lima Wax	Aug. 2..	Sept. 13	Not productive.
Canadian Wonder	" 2..	Did not ripen.	Best green bean.
Burpee's Bush Lima	" 3..	" ..	
Stringless Wax	July 26..	" ..	Good green bean.
Cuban	Did not come up.	pod.	
Refuge	"		
Dwarf German Black Wax	July 30..	Sept. 9	Fairly productive.
Extra Early Red Valentine	" 30..	" 9	Very " The Best.
Dwarf Bush Golden Wax	" 30..	" 9	Fairly "
Mammoth Red German	" 30..	Did not ripen.	

Beets—Lifted October 3.

Variety.	Sown.	In use.	Yield in Bushels per Acre.	Remarks.
			Bush. Lbs.	
Long Smooth Blood	May 8..	Aug. 12..	618 ..	Coarse.
New Extra Early	" 8..	" 6..	564 30	Good shape and colour.
Crosby's Egyptian	" 8..	" 1..	537 30	"
Dobbie's New Purple	" 8..	" 12..	510 30	"
Bonsecour's Market	" 15..	" 1..	510 30	"
Detroit Dark Red Turnip	" 8..	" 6..	484 ..	"
Eclipse	" 8..	" 1..	457 ..	"
Nonsuch	" 15..	" 1.	430 ..	"
Dobbie's Long Smooth	" 15..	" 1..	430 ..	"
Dobbie's Selected Globe	" 8..	" 4..	403 ..	"
Gardener's Favourite	" 15..	" 1..	324 ..	"
Dewing's Blood	" 15..	" 1..	324 ..	"
New Cardinal	" 8..	" 12..	259 30	Small, good quality.

Cabbage Transplanted.

Sown in hot-bed, March 31; transplanted to cold-frame, April, 21; transplanted to garden, May 25; taken up, October 6.

Variety.	Fit for Use.	Average Weight.	Remarks.
		Lbs.	
Henderson's Early Summer	July 26	9	Very early, good.
Chester King	Sept. 15	10	Good heads.
All Head	" 18	14	Solid, good.
First and Best	" 9	9	Good heads.
Early Dwarf Flat Dutch	" 1	12	"
Mammoth Red Rock	Oct. 6	12	Very fine heads.
Marblehead Mammoth	Sept. 30	9	Fair.
The Lupton	" 30	19	Largest heads, solid.
Vandergaw	" 20	16	Very fine heads.
Burpee's All Head	" 8	17	"
Brunswick Shortstem	" 15	12	"
Early Jersey Wakefield	Aug. 5	13	" early.
Extra Early Express	" 5	8	" "
World Beater	Sept. 1	16	Good heads.
Early Etampes	Aug. 5	9	" early.
Winningstadt	Sept. 29	7	"

Sown in Cold-frame—Sown, April 1; transplanted, May 25.

Succession	Sept. 29	7	Fair heads.
Burpee's All Head	Aug. 11	8½	Very good heads.
Improved American Savoy	Oct. 6	7½	Fair heads.

Cauliflower Transplanted.

Sown in hot-bed, April 1; transplanted to cold-frame, April 25; transplanted to garden, May 26.

Variety.	In use.	Remarks.
Early Paris	July 17	Good.
Best of All	" 15	"
King of the Earliest	" 16	"
Snowball	" 17	Very good,
Autumn Giant		Too late.
Autumn King	Aug. 18	Good.
Gilt Edge	" 26	Very good.
Early Favourite	" 16	"
Snowball Danish	" 16	Good.
World's Best Snowball	" 18	"
Earliest Dwarf Erfurt	" 19	Very good.

Sown in cold-frame.—Sown, April 26; transplanted to garden, May 26.

Autumn King	Aug. 19	Large compact heads.
Extra Early Paris	July 18	"
Early Favourite	" 16	"

CARROTS.

Sown, May 1. In use, August 1. Lifted, October 2.

Variety.	Bushels per Acre.	Remarks.
Chantenay	726	Fine, large, smooth.
Early Gem	646	" "
Peer of all	537	" "
Half-long Danvers	484	" "
Market Garden	484	Fine, small, smooth.
Half-long Scarlet Nantais	430	Fine, small.

CELERY.

Sown in hot bed, April 1. Transplanted to cold-frame, April 19. Transplanted to trenches, June 12

Variety.	In use.	Remarks.
Giant Pascal	Sept. 29.	Large, solid heads.
Rose-ribbed Paris	" 29.	Extra fine.
Winter	" 29.	Fair.
Giant White Solid	Oct. 4.	Good.
White Plume	Aug. 1.	Extra fine.
Dwarf Golden-hearted	Oct. 4.	Good.
Golden Self-blanching	Aug. 29.	"
Paris Golden Yellow	" 29.	Extra fine.
Henderson's Pink Plume	" 29.	Good.

CORN.—Table varieties.—Planted, May 25.

Variety	In Use.	Ripe.	Remarks.
Squaw	Sept. 1.	Sept. 20	Earliest. Fair crop.
Mitchell's Extra Early	" 8.		Did not ripen. Good crop green.
First of all	" 1.		" Fair crop green.
Early Market			Did not cob fit for use.
New Early Giant			" "
Canada Yellow			" "
Mitchell's Red Cob			" "
Metropolitan			" "
White Pearl pop-corn			Did not germinate.
Striped pop-corn			"
Early Amber Rice pop-corn			Did not ripen.
White Rice pop-corn			"

CITRONS.

Preserving and Colorado Mammoth, planted April 10: Repotted April 25; Transplanted May 25. Very small crop of fruit set and only two citrons of Colorado Mammoth matured. Weight 7 pounds.

CUCUMBERS.

Sown in hot-bed April 10, transplanted to frames May 23, pulled September 2.

Variety.	In use.	Remarks.	Variety.	In use.	Remarks.
Early White Spine	Aug. 2	Good.	English Favourite	July 19	Extra early.
White Wonder	" 2	"	Improv'd Long Green	" 19	" "
White Pearl	" 2	" very prolific.	Early Siberian	" 19	" "
Cool and Crisp	" 5	" "	Westerfield's Chicago Pickling	"	" "
Giant Pera	" 10	Extra. "		Aug. 5	Good.
Albino	" 1	" early.	Boston Pickling	" 5	"

MARROWS AND SQUASH.

Sown April 20, transplanted May 23.

Variety.	Date of Ripening.	Weight.	Variety.	Date of Ripening.	Weight.
Golden Bush	August 30	6 lbs.	Bush Vegetable	Did not ripen	10 lbs.
Long White	" 30	10 "	Crookneck	"	5 "
Mammoth Whale	Did not ripen	12 "	Hubbard	"	5 "

LETTUCE.

Variety.	1st Seeding.		2nd Seeding.		Remarks.
	Sown.	In use.	Sown.	In use.	
Toronto Gem	May 8	June 20	May 26	July 1	Good.
All Heart	" 8	" 20			"
Gardener's Favourite	" 8	" 25			Extra.
Denver Market	" 8	" 25	May 26	July 1	Good.
California Cream Butter	" 8	" 20			Medium.
The Deacon	" 8	" 20	May 26	July 1	Very fine heads.
Prize Head	" 8	" 25			Good.
Nonpareil	" 8	" 25			"
New Morse	" 8	" 20			Medium.
New York Market	" 8	" 20	May 26	July 1	Extra.
Mammoth Butter	" 8	" 20			Medium.

MELONS.

Musk Melons.—Sown April 10. Transplanted May 25.—Tip Top, The Bouquet, Dominion Green-flesh, Extra Early Citron, Early Hackensack, of these none ripened.

Water Melons.—Sown April 10. Transplanted May 25.—Peerless, Black Spanish, The Dixie and McIver's Sugar, none ripened.

Mango Melon.—Sown, April 10. Transplanted, May 25. None ripened.

ONIONS.—Transplanted.

Sown in hotbed, April 3; transplanted to garden, May 26; in use, August 1; lifted, September 29.

Variety.	Yield per Acre.		Remarks.
	Bush.	Lbs.	
Large Red Wethersfield	537	30	Very fine crop.
Spanish King	510	30	"
Gibraltar	510	30	Large thick-necked.
Giant Prizetaker	484	..	Good.
Red Victoria	484	..	"
Early Red	457	..	" Very large.
Australian Brown	430	..	"
White Globe	430	..	"
New Giant Rocca	430	..	"
Yellow Globe Danvers	403	..	Extra.
White Queen	241	30	Good pickling.
White Silverskin	215	..	"
Welsh Red	.....		Did not germinate.
Dobbie's Selected Red	.....		"

ONIONS.

Sown in open. Sown, May 1; in use, August 10–30; lifted, September 29.

Variety.	Yield per Acre.		Remarks.
	Bush.	Lbs.	
Yellow Globe Danvers	564	30	Very fine crop.
Large Red Wethersfield	457	..	" "
Spanish King	457	..	" "
New Giant Rocca	430	..	Thick-necked.
Early Red	430	..	Good.
Giant Prizetaker	430	..	"
Gibraltar	403	..	Thick-necked.
Australian Brown	376	..	Good.
White Globe	376	..	"
Red Victoria	349	30	"
White Silverskin	215	..	"
White Queen	134	..	"
Welsh Red	.....		Did not germinate.

PEASE.

Variety	First Seeding.		Second Seeding.		Remarks.
	Sown.	In use.	Sown.	In use.	
First and Best	May 8..	July 15..	May 19..	July 15..	Small, prolific.
Shropshire Hero.	" 8..	" 22..	" 19..	" 26..	" "
Stratagem	" 8..	" 24..	" 19..	.....	Large, late.
Daisy	" 8..	" 28..	" 19..	.....	Large, prolific.
Yorkshire Hero	" 8..	" 28..	" 19..	July 26..	Good.
New Queen	" 8..	" 30..	" 19..	" 26..	Small, prolific.
Admiral	" 8..	" 22..	" 19..	" 25..	Large, "
Duke of Albany	" 8..	" 15..	" 19..	" 25..	" "
Gradus	" 8..	" 15..	" 19..	.....	Extra, late.
Heroine	" 8..	" 30..	" 19..	..... 15..	"
Anticipation	" 8..	" 23..	" 19..	" 31..	" late,
Laxton's Charmer	" 8..	" 22..	" 19..	" 26..	" "
Harrison's Glory	" 8..	" 22..	" 19..	" 28..	Good, prolific.
American Wonder.	" 8..	" 15..	" 19..	" 15..	" small.
Horsford's Market Garden	" 8..	" 23..	" 19..	" 28..	" "
Nott's Excelsior	" 8..	" 15..	" 19..	" 15..	" "
C.P.R.	" 8..	" 25..	" 19..	" 31..	Extra large, late.

RADISH.

1st seeding, May 8; 2nd seeding, July 8.

Variety.	1st Seed in use.	2nd Seed in use.	Remarks.
Non Plus Ultra	June 12..	Aug. 4..	Good.
White Turnip-rooted	" 16..	" 4..	"
Rosy Gem	" 12..	" 4..	"
Black Spanish	" 12.	" 7..	
Olive Gem	" 15..	" 6..	Extra.
California White Winter	" 12..	" 14..	
Early White	" 10..	" 7..	Good.
Scarlet Turnip	" 12..	" 4..	
French Breakfast	" 12..	" 6..	Extra.
China Rose	" 15..	" 10..	"
Early Scarlet Olive	" 10..	" 10..	Good.
White Tipped	" 15..	" 12..	"
California Mammoth	" 12..	" 4..	
White Olive Shaped	" 12..	" 4..	Good.

PUMPKINS.

Sown, April 20; Transplanted, May 28.

Quaker Pie. Did not mature.
Pumpkin Pie. Ripe August 30. Weight 10 lbs.
Grey Mammoth. Did not mature.
New Japanese. Weight 10 lbs.
Enormous. "

TOMATOES.

Planted in hotbed, April 1. Set out, May 26. Covered with glass, August 22.

Variety.	1st Ripe.	Size.	Remarks.
Earliest of All	Aug. 10	Small	Good crop, smooth.
Dominion Day	" 22	Large	Heavy, rough, late.
Early Ruby	" 18	"	Fair, smooth.
Atlantic Prize	" 5	"	Heavy, rough, early.
Dwarf Champion	" 23	Medium	Heavy, smooth, late.
Honour Bright	" 22	Large	" "
Canada	" 20	"	" "
Imperial	" 16	Medium	" smooth.
Paramount	" 21	Small	" " late.
Extra Early Atlantic	" 14	"	Fair, smooth.

PARSNIPS.

Sown, May 1. Lifted, October 2.

Variety.	Bushels per Acre.	Remarks.
Hollow Crown	510	Extra.
New Intermediate	510	"
Early Start Round	510	"
Dobbie's Selected	255	"

PEPPER.

Sown April 20. Did not mature. Varieties, Ruby King, New Celestial.

PARSLEY.

Sown May 8. Varieties, Moss Curled, Taber's Exquisite. Both did well.

SALSIFY.

Sown May 8. Did not germinate.

SAGE.

Sown May 8. Broad Leaved. Did well.

SUMMER SAVORY.

Sown May 8. Cut September 1. Did well.

THYME.

Sown May 8. Cut September 1. French. Poor crop.

TOBACCO.

Sown April 30. Transplanted June 2. Cut September 8. Connecticut Seedleaf. Did fairly well. Average height of plants, 4 feet. Some seed ripened.

RHUBARB.

Sown May 26. Transplanted July 22. Varieties, Myatt's Linnæus, Ideal Mammoth, Johnston's St. Martin. All made satisfactory growth. In old beds of rhubarb, Large Green, Victoria and Linnæus did not do so well as usual.

FLOWER GARDEN.

The display of flowers from the time the tulips bloomed in the spring until the first severe frost in September, was probably the finest we have ever had on the experimental farm. Absence of winds and frosts in the spring and an abundant supply of moisture throughout the season, rendered the work of setting out the garden a comparatively easy task, it not being necessary to replant or replace a single root.

ANNUALS.

Asters.—Seventeen different sorts of asters were sown. They all did well and made an excellent show during August and until frost came in September. Many of the German varieties were particularly fine and colours true to name. They were all sown on March 31 in hot-bed, and transplanted to garden. They came in bloom from August 1 to 10.

Pansies.—All the different varieties did well, producing many fine flowers of many colours. Sown in hot-bed March 31, and came in bloom from July 13 to 15.

Stocks.—Fifteen different varieties of stocks were sown, which produced a very fine show of flowers till frost came in October. The double flowered varieties were very beautiful. They were all sown in hot-bed on March 31 and came into bloom from July 1 to 5.

Verbenas.—Several different sorts were sown and all flowered well. They were sown in hot-bed April 19 and began to bloom about July 8, and continued to flower until October; a very desirable flower for this climate.

Petunia.—Several single and double varieties were sown. They did not do as well as usual, although some plants produced fine double flowers.

Pyrethrum.—Two varieties were tried. *P. uliginosum* and *P. carneanum* but they did not succeed.

Phlox Drummondi.—Fifteen sorts of this desirable flower were sown in hot-bed April 1 and transplanted to garden. They began to bloom July 10 and did particularly well, and produced some very fine flowers, which were in bloom when frost came. Worthy of a place in any garden.

Gaillardia.—*G. Picta Lorenziana* and *G. grandiflora*, also mixed varieties, were sown in hot-bed April 4. They were transplanted to garden and began to bloom on July 25. All the varieties were very fine.

Zinnia Elegans.—Double mixed was sown in hot-bed April 4, began to bloom June 30, and produced very fine flowers.

Marigolds.—Seed of both English and French were sown in hot-bed April 4 and did well. They began to flower June 30.

Dianthus Heddiwigii sown April 4; began to flower August 1; did well.

Godetias.—*G.primula hybrida*, *G. Whitneyi* and *G. rosea alba* were all sown Apri 4 and came into flower on August 1. They made a fine show.

Chrysanthemums.—*C. chameleon*, White Garland and Lorenz deep fringed, were sown April 4 and came into bloom July 5. They flowered abundantly and are very desirable.

Cockscomb.—Carter's Empress, Dwarf mixed and Ostrich Plume were tried, but the plants did not grow well and were not a success.

Balsams.—The varieties named Famous, Double Apple Blossom, Camelia and mixed were all sown on April 5 and began to bloom on July 2. The flowers were very fine. This is a very desirable flower for the North-west Territories.

Portulacas.—Double and single mixed sorts were sown April 5 and came into bloom July 1. They produced a very fine show of flowers.

The following additional sorts of annual flowers have been tried, with results as given below. They were all sown in hot-bed and transplanted.

Name of Variety.	Sown.	In Bloom.	Remarks.
Antirrhinum	Apr. 5	July 20	Did well.
Carnation	" 5	.....	Did not germinate.
Clarkia	" 5	.....	"
Salpiglossis	" 5	July 1	Good show of colour.
Nasturtium	" 5	" 7	Good show
Rudbeckia, Purple Centre	" 5	" 8	"
Bachelor's Button	" 5	" 8	"
Amaranthus Tricolour	" 5	.....	Did not germinate.
Abronia Umbellata	" 5	.....	"
Ice Plant	" 5	Aug. 15	Strong growth.
Calendula Trianon	" 5	July 7	Very fine.
Linum Flavum	" 5	.....	Did not germinate.
Delphinium	" 5	.....	"
Lobelia	" 5	July 3	Did well; fine show.
Brachycome	" 5	" 1	" "
Calliopsis	" 5	" 2	Very fine.
Mignonette	" 5	" 9	"
Poppy, Double	" 19	" 22	Extra fine show.
Alyssum	" 19	" 25	Did fairly well.
Candytuft	" 19	" 25	Large fine blossoms.
Morning Glory	" 19	" 1	Did fairly well.
Sunflower	" 19	" 20	Very fine.
Japanese Maize	" 24	.....	Strong growth, 30 inches.
Poppy Double Chamois	" 24	July 22	Very fine flowers.
Daisy, Large Double	" 24	" 13	Good show.

The following annual flowers were sown in the open ground on May 9. Several varieties, such as Dianthus, Godetia, Chrysanthemum, Sweet Pease, Pansies, also Antirrhinum, Salpiglossis, Mignonette, Nasturtium, Candytuft, Poppy and Ice Plant. All did well, but they bloomed later than those sown in hot-bed.

PERENNIALS.

The following varieties of perennial flowers which were sown in 1898 have proven hardy and have flowered well during the past season:—Hybrid Lychnis, Columbines, Everlasting Pea, Perennial Flax and Campanula Persica and Vidalii.

Living plants of many useful sorts in this group have been forwarded from the Central Farm at Ottawa, including Rudbeckia Golden Glow, Perennial Phlox, Dahlias, Gladioli, and Cannas, all of which have added to the attractions of the farm.

BULBS.

Tulips.—These do remarkably well in this climate, endure the winter without injury and flower profusely. Thirty-six named varieties were added to the collection in 1898, which made a magnificent and effective show for a month, beginning with May 10. The tulips were much admired by visitors.

Siberian Squills.—These have proven quite hardy and have bloomed well.

Iris Siberica.—Light blue—Blossomed June 23 to July 5.
White " " 30 " 15.

Does well and is a very desirable perennial.

FOREST TREES AND SHRUBS.

Since the farm was established, trees and shrubs of all varieties have never made more satisfactory progress than during the season just past. In the case of box-elder (*Acer negundo*) the growth was so fast that in many instances the bark split, and with many other sorts the growth was very strong. No apparent harm has, however, resulted as before the season was over the wood had ripened well.

In some varieties, especially American Cottonwood (*Populus deltoidea*). The growth of the preceding year, which was excessive, and did not ripen thoroughly, was cut back by the frosts of last winter, but the loss was more than made up this year.

The Elms and Ash were late in starting in the spring, but had made very satisfactory progress before the season closed.

Avenue trees, and particularly avenue hedges, did extra well. Out of three miles of the former and seven miles of the latter, only three trees on which the box-elder aphis (*Chaitophorus negundinis*) worked last year were lost. The hedges all received one thorough trimming during the season, and the benefit they derived from this was apparent.

TEST OF PLANTING TREES AT DIFFERENT DISTANCES APART.

In the spring of 1895, five half acre plots were set out with trees at different distances apart for the purpose of ascertaining the cost of planting and caring for the trees until the ground becomes sufficiently shaded to prevent the growth of weeds, and hence require no further cultivation.

So far as expenditure for cultivation is concerned, the test closed this year, as the trees now cover the ground and with the exception of a narrow strip of land on the borders, the plots are clean. No work was put on the plots this year and the results of the tests are as follows :—

Plot No. 1—One-half Acre.

Planted with box-elder, one year old, set out 2½ feet apart each way.—

Cost of taking up trees	$0 76
" planting	2 25
" keeping clean until further cultivation was unnecessary	4 35
	$7 36

Plot No. 2—One-half Acre.

Planted with box-elder, one year old, set out 3 feet apart each way.—

Cost of taking up trees	$0 70
" planting	1 80
" keeping clean until further cultivation was unnecessary	5 10
	$7 60

Plot No. 3—One-half Acre.

Planted with box-elder, one year old, set out 3½ feet apart each way.—

Cost of taking up trees	$0 61
" planting	1 35
" keeping clean until further cultivation was unnecessary	4 65
	$6 61

Plot No. 4—One-half Acre.

Planted with box-elder, one year old, set out 4 feet apart each way:

Cost of taking up trees	$0 55
" planting	1 35
" keeping clean until further cultivation was unnecessary	4 65
	$6 55

Plot No. 5—One-half Acre.

Planted with green ash, one year old, set out 2½ feet apart each way:—

Cost of taking up trees	$0 76
" planting	2 50
" keeping clean until further cultivation was unnecessary	4 35
	$7 61

While there is very little difference in the cost of labour expended on the respective plots, the trees in plots Nos. 1 and 2 have made a better and straighter growth than those in the remaining plots, which, having more room to spread, are growing very shrubby.

In addition to the five plots of trees referred to, the following two half-acre plots were sown with box-elder and ash seed. The trees on both plots are now covering the ground, which will require no further attention, although the plots were scruffled four times this year.

Plot No. 6—One-half Acre.

Sown with box-elder seed—

Cost of sowing seed	$1 80
" keeping clean until further cultivation was unnecessary	5 62
	$7 42

Plot No. 7—One-half Acre.

Sown with green ash seed—

Cost of sowing seed	$1 80
" keeping clean until further cultivation was unnecessary	8 76
	$10 56

FOREST PLANTATION.

The plantation of mixed trees, Sand Cherry, alternate rows; three Box-elder (*Acer negundo*) to one elm (*Ulmus Americana*), or one Ash (*Fraxinus Viridis*) in other rows) has made very satisfactory progress during the past season. The blanks caused by deaths in 1898 were this spring filled by trees of the same age and height as those growing in the plantation, which now presents a very uniform appearance.

ARBORETUM.

The Arboretum now contains 371 species and varieties of trees and shrubs, which have been planted as follows:—

In 1895, forty-one varieties; in 1896, sixty-five varieties, of which six replaced deaths of 1895; in 1897, seventy-five varieties, of which two replaced deaths of 1896; in 1898, sixty-two varieties, of which five replaced deaths of 1897; in 1899, 163 varieties of which twenty-two were used to replace deaths of 1898. A considerable proportion of these are likely to prove hardy in this climate.

HEDGES.

The hedges around the vegetable gardens and fruit plantations have made good progress. In the spring all the shelter hedges were cut back several feet by men standing on waggons and using sickles on long handles. Before the season was over the cutting was fully made up by a clear healthy growth, and the hedges were improved in every respect.

SAMPLE HEDGES.

The list of sample hedges now numbers thirty-four, eight of which have been added this year as follows:—

Sea Buckthorn.
Ptelea Trifoliata.
Viburnum Lantana.
Betula Papyrifera.
Betula Nigra.
" Lenta.
" Alba.

For beauty none surpass the Ginnalian Maple (*Acer Tatarica Ginnala*), and as a snow collector and wind break Russian Southernwood (*Artemisia Abrotanum Tobolskianum*) easily retains first place.

NURSERY PLANTATION.

One hundred and fifty-seven varieties and species of trees and shrubs, received in the spring from the Central Experimental Farm at Ottawa, were planted in nursery rows in a well sheltered spot. Next spring specimens of each of those that survive the winter, will be transplanted to the Arboretum and others to sheltered portions of the grounds.

ROSES.

Only one of the four varieties of roses planted in 1897 and reported as living last year survived the winter of 1898.

Madame Victor Verdier.

Killed back one-half, made strong growth and bloomed freely. Roses deep red and very fine.

Thirty-nine additional varieties were sent here from the Central Farm this spring—one of each sort—twenty-one of which are living. Some of these have made a strong growth, others only fair growth.

SESSIONAL PAPER No. 8a

TEN DESIRABLE TREES, SUITABLE FOR THE NORTH-WEST TERRITORIES.

Deciduous.

Box-elder (*Acer Negundo*).—Propagated from seed which is obtainable in valleys and coulées in the eastern portion of Assiniboia. This is perfectly hardy on open plains and is a most useful tree for wind-breaks or shelter hedges, as well as for ornamental purposes. It grows rapidly and is easily trimmed.

American Cotton-wood (*Populus Deltoidea*).—Hardy. Individual trees on this farm nine years planted are now 25 feet high, trunk, 1 foot from base, about 24 inches in circumference. Trees straight, branches well formed and altogether one of the most attractive trees in the collection. Useful for plantation or shade trees around buildings. This tree is easily propagated from cuttings.

Balm of Gilead (*Populus Balsamifera*).—A hardy, native species. Easily grown from cuttings and very attractive as a shade tree. A nine year old tree in a plantation here is 15 feet high, with a trunk, 1 foot from base, 13 inches in circumference.

American Larch (*Larix occidentalis*). A very desirable tree. This if transplanted from the Manitoba plains near Carberry, where it is native ; will be found hardy. It grows more rapidly than any other conifer suitable for this country.

American Elm (*Ulmus Americana*).—A very hardy and desirable tree for shade or avenue purposes. It grows more slowly and unevenly than the Box-elder, and requires more attention to produce a shapely tree. Seedlings may be obtained from nurseries in Manitoba or in the woods in several districts of that province. This tree is only hardy here when raised from seed ripened in this climate.

Green Ash (*Fraxinus Viridis*).—This native species is hardy, a fairly strong grower and very attractive. Five year old trees growing here are now 8 feet high. Propagated from seed ripened in this country. Young trees may be obtained from nurseries in Manitoba. Useful for shade or ornamental purposes or fuel.

Sharp-leaved Willow (*Salix Acutifolia*).—A very hardy and rapid-growing tree, useful for hedge or ornamental purposes; leaves dark green; propagated from cuttings or layers. The growth averages 24 to 36 inches each season, and a hedge requires frequent trimming to keep it compact and secure the best results.

Trembling-leaved Poplar (*Populus tremuloides*), native.—A hardy and easily grown tree. Propagated from cuttings or layers. Young trees of the proper size for transplanting may be secured in abundance in coulées or woods in most parts of this country. Trees six years old, grown here, are now 18 feet high and very attractive. Useful for plantations or wind-breaks.

Evergreens.

Riga Pine (*Pinus Sylvestris Rigaensis*).—This tree, where planted in moist ground and protected from winds when set out, has made good progress and is a valuable addition to the somewhat meagre list of evergreen trees that may be said to be useful for north-west cultivation. A hedge 66 feet long planted in 1892 is now 8 feet high, very even and attractive. Individual trees planted in 1889 are 16 feet high and are growing rapidly.

Norway Spruce (*Picea excelsa*).—As with the pine mentioned above this spruce requires protection from winds when first planted and does better in moist soil, provided it is not wet. A growth of 18 to 20 inches is made each season by trees set out in clumps on lawns where protection is afforded by buildings and hedges. Seedlings may be obtained from nurseries in Manitoba.

TEN DESIRABLE SHRUBS, SUTIABLE FOR THE NORTH-WEST TERRITORIES.

Ginnalian Maple (*Acer Tatarica Ginnala*).—A small shrub-like tree, leaves deeply cut, flowers from June 25 to July 5, is easily propagated from seed, which is produced in large bunches. Very useful as a hedge, and clumps or individual trees are much admired, especially when the leaves have assumed their deep red tints in the autumn.

Siberian Pea-tree *(Caragana arborescens)*.—This blooms from June 1 to July 1. The flowers are yellow and the foliage light green and graceful. Propagated from seed, which is produced abundantly. Useful for a low hedge or as individual specimens. Hedges of this shrub should be trimmed twice in the season.

Tartarian Honeysuckle *(Lonicera tatarica)*.—A very hardy shrub and a free bloomer. In flower June 25 to July 10, after which small red fruit forms and remains on the bush until late in the season. Very desirable in or around the flower garden or on the lawn.

Lonicera Alberti.—A small, low-growing shrub, with pendulous branches. The blossoms are pink and very sweetly scented. It flowers abundantly from June 15 to July 10. This pretty shrub is useful either for flower garden or lawn.

Common Lilac (*Syringa Vulgaris*).—This old-fashioned favourite is perfectly hardy here, and is in bloom from May 15 to June 25. It blossoms freely and the fragrant clusters are very attractive, but are liable to be injured by spring frosts. Foliage deep green A very useful and attractive shrub for general cultivation in the Territories.

Josika's Lilac (*Syringa Josikea*).—This is later in blooming than Syringa Vulgaris. and not so attractive, but on account of its lateness in blooming is less liable to be injured by spring frosts. Leaves thick, leathery and very deep in colour. Perfectly hardy and useful for hedge purposes. In bloom June 1.

Guelder-rose leaved Spiræa (*Spiræa opulifolia*).—A hardy and very ornamental shrub with large spread of branches. Flowers freely in large bunches. Propagated from seed or layers. Useful for lawn or low hedge.

Russian Southern-wood (*Artemisia abrotanum Tobolskianum*).—This shrub kills back about one-third each winter, but it starts very early in spring, and makes rapid growth, the dead wood at the same time forms an effectual wind break and snow collector. Foliage dark green. Requires regular trimming during the growing season to prevent seed from forming. This may be propagated from seed, cuttings or layers. Is useful chiefly for hedge, and for this purpose it has proved one of the most useful shrubs grown on the farm. A single row, set out 18 to 24 inches apart, around a garden will soon provide a most effective wind-break and snow-gatherer.

Rosa Rugosa (*Single rose of Japan*).—Flowers white or red. Very attractive and quite hardy.

Russian olive (*Elaeagnus angustifolia*).—A very hardy shrub which makes a most desirable hedge around a grass plot or small garden.

FRUIT-TREES AND BUSHES.

For cultivated varieties the past season was on the whole very favourable, and except in a few districts where the Saskatoon berry was a failure, the crop of native fruit was a satisfactory one.

SEEDLING APPLES.

Two seedlings of Arctic, planted in 1899, made fair growth. Two seedlings of Tonka, planted in 1899, made fair growth.

CRAB-APPLES. (*Pyrus Baccata*).

The trees planted in 1896 in a well sheltered plot, came through the winter in perfect condition, and the progress they have made during the season is very encouraging.

Following will be found notes on growth and fruiting :—

PYRUS BACCATA—Received from Central Experimental Farm. Planted 1896.

Name of Variety.	No. Planted. — Spring, 1896.	No. Living. — Fall, 1899.	Remarks.
Pyrus prunifolia	4	4	Strong growth from tips.
" baccata edulis	4	4	" "
" " flava	1	1	" "
" " sanguinea	8	7	Very strong growth from tips.
" " lutea regel	2	1	" " "
" " genuina	5	5	" " Fruited.
" " cerasiformis	7	6	" "
" " macrocarpa	3	2	" " "
" " aurantiaca	2	2	" "
" " conocarpa	1	1	" "
" prunifolia intermedia	4	4	3 strong, 1 fair growth.
" " xanthocarpa	4	4	Very strong growth. Healthy.

SEEDLINGS RAISED AT INDIAN HEAD.

Pyrus prunifolia	19	19	Strong growth. Fruited.
" baccata macrocarpa	8	8	" "
" " genuina	8	8	"
" " cerasiformis	13	13	"
" " sanguinea	5	5	" "

NOTES ON FRUITING.

Pyrus baccata macrocarpa (C.E.F.)—One tree fruited well. Fruit very small, red.

Pyrus baccata genuina (C.E.F.)—Two trees fruited very lightly. Fruit larger and flatter than Pyrus baccata and largest grown this year. Pale red and yellow with red cheek.

Pyrus baccata macrocarpa (I.H.)—Two trees fruited well. Fruit about size of a large cherry. Light red.

Pyrus baccata sanguinea (I.H.)—One tree fruited lightly. Fruit larger and flatter than Pyrus baccata. Bright red.

Pyrus prunifolia. (I.H.)—One tree fruited well. A little larger than Pyrus baccata. Colour bright red.

SEEDLING PLUM AND PYRUS ORCHARD.

These orchard plots suffered very severely during the winter and spring of 1898-9. On account of their exposed position very little snow remained on them and under such circumstances the hardiest trees are liable to be injured. Next spring it is proposed to move the surviving trees to the south-east square which is now considerably sheltered by a plantation of Box-Elder and other trees, and devote the three remaining squares to annual crops, until the hedges planted in 1897 are sufficiently high to break the wind and insure a covering of snow.

PLANTED 1898. ROOT GRAFTS.

(Made by grafting scions of some of the more promising cross-bred varieties on roots of Pyrus baccata or Pyrus prunifolia.) Of these the following have survived :—

No. 29	Pyrus baccata with Transcendent	3 fair growth.
" 117	" " Wealthy	1 "
" 19	" " Transcendent	1 " 1 strong growth.
" 118	" " Wealthy	1 weak growth, 2 "
" 137	" " Orange Crab	3 fair growth.
" 132	" " Wealthy	1 weak growth.
" 162	" " Red Anis	1 fair growth.
" 122	" " Wealthy	3 strong growth.
" 16	" " Orange Crab	1 "
" 79	" " Tetofsky	1 fair growth.
" 30	" " Hyslop	2 strong growth.
" 164	" " Red Anis	1 "
" 46	" " Tetofsky	2 weak growth.
" 53	" " "	1 fair growth.
" 107	" " Hyslop	2 "
" 64	" " Tetofsky	1 strong, 1 weak growth.
" 116	" " "	1 fair growth.
" 125	" " Wealthy	1 fair, 1 weak growth.
" 163	" " Red Anis	1 strong growth.
" 161	" " "	1 "
" 165	" " "	2 "

CROSS-BRED SEEDLINGS.

	Male.	Female.	
No. 95	Pyrus baccata with	Ball's Winter Crab	3 fair, 3 strong growth.
96	" "	Krimskoe	2 strong, 4 fair, 3 weak growth.
51	" "	Beautiful Arkad	2 " 1 weak growth.
	Rupert, root graft of Hybrid of Prunus pumila with American Plum		1 "

PLUMS.

Seedlings of Weaver—Planted 1894. A number of the trees were killed back more or less during the winter and a few did not recover. Forty trees, however, blossomed of which 21 bore fruit. In some cases the plums were a fair size, but on the majority of the trees they were about the size of Manitoba native plums. No fruit ripened.

Seedlings of Hungarian.—Planted 1894. All growth made in 1898 was killed during the winter and none of the trees blossomed. The growth this season was strong and well matured when winter set in.

Seedlings of Speer.—Planted 1895. Were slightly winter-killed and did not blossom. Made strong growth this season and the wood was thoroughly matured.

Seedlings of De Soto.—Planted 1895. Were living at tips spring 1899. Did not blossom. Made very strong growth.

Seedlings of Voronesh.—Planted 1895. Killed at tips. Did not blossom, but made healthy growth this year.

Seedlings of Imperial Blue.—Planted 1895. Killed at tips. Strong growth, well matured 1899.

From Central Experimental Farm, Ottawa.—Planted 1897. Hoskin plum, dead Aikin plum, hardy, made strong growth. De Soto, hardy, very strong growth.

PLUMS received from Chas. Luedloff, *Cologne, Minnesota.* Planted 1896.

Variety.	No. Planted.	No. Living Last Report.	Winter Killed.	Blossomed.	Fruited.	Size of Fruit.	Growth.
Anthony	2	2	Tips				2 strong growth.
Milton	2	1	"				1 "
Irene	2	2	½				1 " 1 fair growth.
Deep Creek	2	2	½	Lightly.	No fruit		2 "
Clinton	2	1	½				1 fair growth.
Purple Yosemite	2	2	Hardy.	Lightly.	Lightly.	Medium	2 strong growth.
Missouri Apricot	2	2	"	"	No fruit		1 " 1 killed by rabbits.
Cottrell	2	2	Tips	"	"		2 "
Weaver	2	2	Hardy.				2 "
Van Buren	2	2	Tips				2 "
Forest Rose	2	2	"				2 "
Reed	2	2	"				2 "
Esther	2	2	"				2 fair growth.
Van Deman	2	2	"				2 strong growth.
New Ulm	2	2	Hardy.	Lightly.	No fruit		1 " 1 fair growth.
Newman	2	2	½				2 "
Dr. Dennis	2	2	Tips				1 " 1 fair growth.
Yellow Sweet	2	2	"				1 " 1 "
Chas. Downing	2	2	"				1 " 1 "
Ocheeda	2	2	½	Lightly.	Lightly.	Medium	2 "
Speer	2	1	½				1 weak growth.
Col. Wilder	2	2	Tips				2 strong growth.
American Eagle	2	2	"				1 " 1 dead.
De Soto	2	2	½				2 "
Crescent City	2	2	Tips				2 "
Moldavka	2	2	"				1 " 1 fair growth.
Neil's	2	1	Hardy.				1 "
Illinois Ironclad	2	1	½				1 fair growth.
Wood	2	1	Tips				1 very strong growth.
Dunlop No. 1	2	1	"	Lightly	No fruit		1 strong growth.
Peffer's Premium	2	2	"				2 "
Large Red Sweet	2	1	"				1 "
Hammer	2	2	½				2 "
Silas Wilson	2	2	½				2 "
City	2	2	Tips				2 "
Hawkeye	2	2	"				1 " 1 fair growth.
Gaylord	2	1	"				1 "
Richland	2	1	Hardy.				1 "

NOTE.—No fruit ripened.

MANITOBA NATIVE PLUMS.

From Thos. Frankland, Stonewall, Man. Planted 1895.

Variety.	No. of Plot.	No. Living, last Report.	Winter killed.	Blossomed	Fruited.	Size.	Growth.
No. 60	2	1	Hardy	Well	Well	Large	1 strong growth.
" 27	3	2	½				2 "
" 7	2	2	½				2 "
" 38	2	2	½				2 "
" 29	2	2	½				2 "
" 47	3	1	Tips.				2 "
" 31	2	2	"				2 "
" 64	2	2	½	Lightly	No fruit		2 "
" 84	2	1	½	"	"		1 "
" 53	1	1	Tips.				1 "
" 63	1	1	"				1 "
" 59	1	1	½				1 "
" 21	3	1	½				1 "
" 36	3	2	½				1 " 1 dead.
" 15	1	1	Tips.				1 fair growth.
" 88	1	1	½				1 strong growth.
" 30	2	1	Tips.				1 "
" 51	1	1	"	Lightly	No fruit		1 "
" 40	1	1	½				1 "
" 69	1	1	Tips.				1 "
" 26	2	1	"				1 "
" 67	2	2	"				2 "
" 56	2	1	"				1 fair growth.
" 65	2	1	¾				1 "
" 91	2	2	Tips.				2 strong growth.
" 61	2	1	To ground				1 weak growth.
" 86	1	1	Hardy				1 strong growth.
" 85	1	1	½				1 "
" 89	2	2	½	Lightly	No fruit		2 "
" 57	2	2	½	"	"		2 "
" 81	1	1	Hardy	"	"		1 "
" 41	1	1	½				1 "
" 68	2	2	Hardy	Lightly	No fruit		2 "
" 39	1	1	"	"	"		1 "
" 67	2	2	"	"	Lightly	Large	2 "

NOTE.—No fruit ripened.

Seedlings.

Grown from seed planted on Experimental Farm, Indian Head, and transplanted in spring of 1895.

Eleven trees fruited this year, as follows :—

3 trees—Fruit small ; ripened ; poor quality,

5 trees—Fruit medium size ; two ripened fruit which was of fair quality and abundant.

3 trees—Fruit large ; two late, one almost ripe when frost came ; fruit apparently of good quality and trees bore very heavily.

CHERRIES.

Seedling of Carnation.—Planted 1894. Winter killed to ground. Made weak growth and is not in a healthy condition.

Seedlings of Lithaur Weichsel. Planted 1894. The six trees survived the winter but were more or less killed back. Fair to strong growth was made during the season and the trees are in good condition.

Seedling of Olivet.—Planted 1895. Winter killed to ground. Made strong growth from roots.

Seedlings of Minnesota Ostheim.—Planted 1895. Badly winter killed. Eleven trees are living and made fair growth during the season. but on the whole are making very little progress.

Wild Cherry from Nebraska.—Planted 1896. Three trees, hardy, strong growth, two trees blossomed and one fruited lightly. Fruit similar to Prunus Demissa, but slightly larger.

Prunus Pumila (Sand cherry) from seed of No. 9, C. E. F. Planted 1896. Tree No. 1. Hardy; strong growth; no fruit. Tree No. 2. Hardy; strong growth; large fruit of very fine quality. Named 'Wonder.' The seed of this bush was saved and will be sown next spring.

Tree No. 3.—Hardy, strong growth. Blossomed but did not fruit.

Tree No. 4.—Hardy, strong growth. Large fruit, very fine flavour, sweet. Named 'Northern Pride.' Seed saved.

Tree No. 5.—Hardy, strong growth. Fruit large but quality inferior to No. 4.

Tree No. 6.—Hardy, strong growth. Heavy cropper, fruit small and of very inferior quality.

Tree No. 7.—Hardy, strong growth. Good crop. Fruit small but pleasantly flavoured.

Rocky Mountain Cherry.—Planted 1895. The fruit appears to be the same as the sand cherry, but is larger and superior in quality to the ordinary wild type of the sand cherry. By propagation and the raising of seedlings of the larger and early ripening sorts it is hoped that valuable forms of this fruit will be obtained such as will be useful to the settlers in this country. The bushes are hardy and easily grown from layers.

APRICOTS.

Two trees from Turkestan. Winter killed at tips, but made strong growth during season.

PEARS.

Longworth.—Planted 1897. Winter killed to trunk. Strong growth.

GRAPES.

Gibb and Bacchus, planted 1895. Growing slowly.

Manitoba Native Wild, planted 1895. Strong growth, has not fruited.

SMALL FRUITS.

WHITE CURRANTS.

White Grape, planted 1896. Good crop of very fine fruit. Currants large and bunches well filled. Ripe July 25.

White Dutch, planted 1896. Light crop of fair sized fruit. Bunches not well filled and crop ripened rather unevenly. First ripe July 25.

White Transparent, planted 1896. Light crop. Good fruit. Ripe July 20.

White Imperial, planted 1897. Light crop, large fruit. Ripe July 28.

RED CURRANTS.

Fay's Prolific.—Planted 1891. Average crop of very fine large fruit. Ripe August 1.

Raby Castle.—Planted 1891. Heavy crop of good fruit. Bunches well filled and fruit ripened evenly. Ripe August 1.

Red Dutch.—Planted 1891. Good crop of small fruit. Ripened evenly about August 1.

La Conde.—Planted 1893. Made fair growth but did not fruit.

Knight's Early Red.—Planted 1893. Strong growth. Fruited lightly, good quality.

New Red Dutch.—Planted 1893. Strong growth. Fruited lightly, fruit small.

Native Red Currant.—Planted 1893. Strong growth but did not fruit.

London Red.—Planted 1895. Fair growth. Fruited lightly.

Raby Castle.—Planted 1896. Fair growth. Did not fruit.

Victoria.—Planted 1896. Strong " "

Fertile d'Angers.—Planted 1896. Weak growth. "

Fay's Prolific.—Planted 1896. Fair growth. Fruited lightly, very fine.

Cherry.—Planted 1896. Fair growth. " "

Prince Albert.—Planted 1896. Strong growth. Fruited lightly.

La Fertile.—Planted 1896. Fair growth. No fruit.

Red Dutch.—Planted 1896. Fair growth. "

Versaillaise.—Planted 1896. Strong growth. Fruited lightly.

North Star.—Planted 1897. Fair growth. Fruited lightly. Good size and quality.

Pomona.—Planted 1897. Fair growth. No fruit.

Wilder.—Planted 1897. Fair growth. Fruited lightly. Fair quality.

BLACK CURRANTS.

Lee's Prolific.—Planted 1891. Fair crop, but very uneven. Bunches not well filled, and crop ripened unevenly. First ripe August 3.

Black Naples.—Planted 1891. Fair crop. Bunches small and not well filled. Ripened unevenly about August 1.

Prince of Wales.—Planted 1893. Light crop of very uneven fruit. First ripe about August 5.

SAUNDERS' SEEDLING BLACK CURRANTS, PLANTED 1896.

The following varieties have all made strong growth but being young bushes, none of them have fruited heavily. Stewart, Clipper, Orton, Kerry, Eagle, Monarch, Charmer, Beauty, Winona, Ontario, Stewart, Lewis, Ethel, Standard, Sterling, Star, Madoc, Perry, Eclipse, Oxford and Climax.

Several bushes of Crandall and Victoria were planted in the spring of 1897, these have both made strong growth but have not fruited.

RASPBERRIES.

Dr. Reider.—Planted 1893.—Heavy crop, fine fruit, ripe August 4.
Philadelphia " " " inferior fruit, ripe July 28.
Turner " Very heavy crop, good fruit, ripe July 28.
Caroline (white).—Planted 1897.—Fair crop, large fruit, ripe August 10.
Lady Anne " No fruit.
Garfield " Heavy crop, coarse fruit, ripe August 10.
Miller's Red " Small crop, " " 12.
Kenyon " Good crop, large fruit " 12.

BLACK CAP RASPBERRIES.

These have borne a good crop of excellent fruit. The bushes appear to be acquiring hardiness and becoming more prolific.

GOOSEBERRIES.

Smith's Improved.—Planted 1893.—Heavy crop of fair sized fruit, ripe August 1, one of the best.
Lancashire Lad " Light crop of large fruit, ripe July 25.
Governess " Good " " " August 1.
Columbus " Fair crop of medium fruit, ripe August 1.
Houghton " Heavy crop of medium fruit, ripe July 25.
Native " " small fruit, ripe July 15.
Golden Prolific.—Planted 1896.—Strong growth, did not fruit.
Pearl " " "
Keepsake " " "

STRAWBERRIES.

		1st Pick.	Crop.	Fruit.
Capt. Jack....	Planted 1895.....	July 20	Fair	Medium.
New Dominion	"	" 20	"	"
Windsor Chief	"	" 20	"	"
Pineapple	"	" 25	Light	Poor.

A large crop of fruit set, but did not mature on account of dry weather.

CATTLE.

The herd on the farm at present consists of one pure-bred Shorthorn bull and eight females; one pure-bred Ayrshire bull; one pure bred Holstein bull; three grade Ayrshires; two grade Holsteins; one grade Polled Angus, and eleven grade Shorthorns in addition to which fifteen grade steers are being used in a feeding test.

Since last report, 'Knight of Qu'Appelle' the Shorthorn bull then at the head of the herd, has been sold and his place is now taken by 'Lord Woolsely' the short-horn obtained last year from the herd of Hon. Thos. Greenway, Crystal City, Manitoba.

'Lord of Qu'Appelle 2nd' a yearling Shorthorn was sold in November, this year, and last spring the young Holstein bull 'Prince of the Prairie 2nd' was sent to the Experimental Farm at Brandon, Manitoba.

The steers taken in for a feeding trial test have been tested with tuberculine and pronounced healthy.

EXPERIMENTS IN THE FEEDING OF STEERS, WINTER 1898-9.

Sixteen steers were divided into three groups of four animals each, and two lots of two each, and fed for four months, after a preparatory feeding of one month.

Fourteen of the sixteen steers were obtained from Messrs. Gordon and Ironside, of Winnipeg, Manitoba, who paid seven cents per pound for the increase in weight. The other two were Experimental Farm steers and were sold at conclusion of the test. In the test for tuberculosis, one of the Gordon and Ironside steers reacted and was killed by order of Hon. Minister of Agriculture.

FEEDING.

Lot No. 1. 4 steers—fed barley straw, ensilage and meal.
" 2. 3 " fed oat straw " "
" 3. 4 " fed wheat straw " "
" 4. 2 " fed native hay " "
" 5. 2 " fed brome hay " "

The rations were as follows :—

Lots No. 1, 2 and 3.—	Straw,	12	pounds	per day	during test.
	Ensilage,	24	"	"	"
	Meal,	2	lbs.	per day	for first month
	"	4	"	"	second "
	"	6	"	"	third "
	"	8	"	"	fourth "
Lots No. 4 and 5—	Hay,	12	"	"	first "
	"	15	"	"	2,3&4 "
	Ensilage,	24	"	"	first "
	"	30	"	"	2,3&4 "
	Meal,	2	"	"	first "
	"	4	"	"	second "
	"	6	"	"	third "
	"	8	"	"	fourth "

The hay and straw were cut and the meal consisted of two parts of ground barley to one part ground wheat.

The animals were fed three times daily and watered once.

MONTHLY AND TOTAL GAIN OF EACH LOT OF STEERS.

Lot No.	Principal Ration.	Gain. — January.	Gain. — February.	Gain. — March.	Gain. — April.	Gain. — Total.	Gain. — Average per steer.
1	Barley straw	205	55	100	145	505	126¼
2	Oat straw	75	55	60	85	275	91⅔
3	Wheat straw	120	80	230	220	650	162½
4	Native hay	75	40	70	70	255	127½
5	Brome hay	70	110	70	110	360	180

The total amount and estimated value of feed consumed during the feeding period of 112 days was as follows :—

Lot No. 1.—4 steers. Barley straw.

10,752 lbs.	Ensilage at $2 per ton	$10 75
5,376 "	Barley straw at $1 per ton	2 68
2,240 "	Meal at ⅔c. per lb	14 93
		$28 36

Lot No. 2.—3 steers. Oat straw.

8,064 lbs.	Ensilage at $2 per ton	$ 8 06
4,032 "	Oat straw at $1 per ton	2 01
1,680 "	Meal at ⅔c. per lb	11 20
		$21 27

Lot No. 3.—4 steers. Wheat straw.

10,752 lbs.	Ensilage at $2 per ton	$ 10 75
5,376 "	Wheat straw at $1 per ton	2 68
2,240 "	Meal at ⅔c. per lb	14 93
		$ 28 36

Lot No. 4.—2 steers. Native hay.

6,348 lbs.	Ensilage at $2 per ton	$ 6 38
3,192 "	Native hay at $5 per ton	7 98
1,120 "	Meal at ⅔c. per lb	7 46
		$ 21 82

Lot No. 5.—2 steers. Brome hay.

6,348 lbs.	Ensilage at $2 per ton	$ 6 38
3,192 "	Brome hay at $5 per ton	7 98
1,120 "	Meal at ⅔c. per lb	7 46
		$ 21 82

SUMMARY OF RESULTS.

Lot No.	Fed on	Value of Feed Consumed	Gain in Pounds.	At	$ cts.	Total on Lot.		Average.	
						Net Gain.	Net Loss.	Net Gain.	Net Loss.
		$ cts.		Cts.		$ cts.	$ cts.	$ cts.	$ cts.
1	Barley straw	28 36	505	7	35 35	6 99	.....	1 74¾	
2	Oat straw	21 27	275	7	19 25	.....	2 02	.....	0 67⅛
3	Wheat straw	28 36	650	7	45 50	16 14	.....	4 03½	
4	Native hay	21 82	255	7	17 85	.....	3 97	.....	1 98½
5	Brome hay	21 82	360	7	25 20	3 38	.....	1 69	

SWINE.

At this date the herd on the farm consists of :—

Improved Chester White, one boar; Berkshire, two boars, two sows; Large Yorkshire, one sow; Tamworth, two boars, two sows.

Since last report two Berkshire boars, one Berkshire sow, and three Tamworth sows have been sold to farmers for breeding purposes, and one Tamworth boar sent to the Experimental Farm at Brandon, Manitoba.

POULTRY.

Four breeds are kept, Plymouth Rock, White Wyandotte, White Leghorn Black Minorca, the flock consisting of :—

	Birds.
Plymouth Rock	14
White Wyandotte	14
White Leghorn	17
Black Minorca	17

Since last report, five Plymouth Rock cockerels, one White Wyandotte cockerel and five hens, one White Leghorn cockerel and six hens, and twenty-seven settings of eggs have been sold to farmers.

HORSES.

The working staff was increased last spring by a team of three-year-old colts bred on the farm, and now consists of ten work horses, in addition to which are two drivers, two colts and one pony.

One old mare was badly injured in March last, and on advice of veterinary was shot. One of the colts mentioned above was foaled in May, and the other is now two years old.

The horses are in good condition with the exception of three of the horses brought up when the farm was started, which are becoming almost useless from old age.

BEES.

Four hives of bees were put in cellar early in November of last year, when taken out on April 12, this spring, those in one hive were all dead, two very weak, and bees died shortly after, and the fourth swarm which was apparently strong with plenty of honey began to dwindle away and soon died out completely.

The cellar proved too damp, as there was mould found in all the hives.

During the summer one fresh swarm was obtained from the Experimental Farm at Brandon, Manitoba. At this date, November 21, the hive is still on the summer stand and the bees are flying about nearly every day.

MEETINGS.

In February last I had the pleasure of attending the annual meetings of the 'Pure-breed Cattle Breeders Association of Manitoba and the North-west Territories' and the 'Horticultural Association of Manitoba and the North-west Territories,' held in the city of Winnipeg.

In June the Farmers' Institutes of Yorkton and Saltcoats, Assiniboia, held meetings in their respective towns at which I spoke on Farm Topics and was accompanied by Mr. C. W. Peterson, Deputy Commissioner of Agriculture for the North-west Territories, and Mr. J. H. Mitchell, Superintendent of Dairies for Assiniboia.

In September I accompanied Hon. J. H. N. Bulyea, Minister of Agriculture for the North-west Territories, Mr. W. N. Willing, Territorial Weed Inspector, Mr. C. Marker, Superintendent of Dairies for Alberta and Mr. Wm. Trant, Secretary of the North-west Dairymens' Association at a series of Institute Meetings called by the Department of Agriculture of the North-west Government at the towns of Red Deer, Olds, Lacombe, Innisfail, Wetaskiwin, Strathcona, Edmonton, Fort Saskatchewan and St. Albert in Alberta, and spoke on matters appertaining to the work of the Experimental Farms and farming generally.

VISITORS.

Local visitors to the farm were very numerous during the summer months.

On August 2, excursions were run on the Canadian Pacific Railway from Moose-jaw and intermediate points on the west and Fleming and intermediate points east of here, to the farm. Nearly 2,000 came in on the trains and several hundred farmers and their families from the surrounding districts joined the excursionists and spent a considerable portion of the day in examining the various departments of work in progress, after which they visited the exhibition being held in Indian Head by the Central Assiniboia Agricultural Society.

On August 28 an excursion under the auspices of the combined Sunday-schools of Regina, Assiniboia, was run to the farm, and nearly 1,000 children, parents and teachers spent the day on the grounds. Tables were set in the barn which had been cleared for the occasion, but the majority availed themselves of the shade and fresh air afforded by the tree-belts and plantations.

On October 20 the Hon. Sydney Fisher, Minister of Agriculture, Canada, visited the farm and inspected the different branches of work in progress. The ground was unfortunately covered with snow from the storm of the preceeding week, rendering driving exceedingly unpleasant, and an inspection of the plots and fields, as well as the farms of the district, had to be deferred until a future visit.

In the afternoon, Mr. Fisher addressed the agricultural society of the district, on 'Agricultural Topics of the Day' and the very representative gathering of farmers very clearly demonstrated their appreciation of the address delivered by the Honourable Minister. Mr. Fisher very kindly expressed his pleasure at the arrangement and details of the work of the farm which had come under his notice during his visit.

In August, the Honourable A. E. Forget, Lieutenant-Governor of the North-west Territories and Madame Forget spent two days on the farm, and were driven to various parts of the district including the picturesque Qu'Appelle Lakes and the Indian Industrial School at Lebret.

During the summer several delegations of farmers from the United States visited the farm, and were afforded every opportunity for a thorough inspection of the soil and capabilities of the district.

DISTRIBUTION OF SAMPLES OF GRAIN, FOREST TREES, TREE-SEEDS POTATOES, ETC.

During the months of March, April and May the following distribution of samples was made to applicants throughout the territories of Assiniboia, Alberta and Saskatchewan. The number of applicants was, as usual, largely in excess of the supply available for this purpose.

SAMPLES.

Grain—Wheat, 238, 3-pound bags.
" Oats, 349, 3-pound bags.
" Barley, 183, 3-pound bags.
" Pease, 235, 3-pound bags.
" Flax, 16, 3-pound bags.
" Rye, 15, 3-pound bags.
Potatoes, 368, 3-pound bags.
Tree Seeds, ash, 192, 1-pound bags.
Tree Seeds, maple, 189, 1-pound bags.
Small Seeds, 225 packages.
Rhubarb Roots, 100 packages.
Asparagus Roots, 13 packages.
Tree-seedlings.—Packages containing Box-Elder seedlings, Cottonwood seedlings, Caragana arborescens seedlings, Plum seedlings and Artemisia cuttings, 321.
Tree-seedlings.—Packages containing Box-Elder seedlings, Caragana arborescens seedlings, Apple seedlings, Cottonwood cuttings and Artemisia cuttings, 276.

CORRESPONDENCE.

During the 12 months ending October 31, 1899, 5,103 letters were received and 4,976 mailed from this office. In letters received, circular reports on grain and other samples are not counted and in letters mailed, circulars of instruction sent with grain and other samples are not included.

METEOROLOGICAL.

Month.	Highest Temperature.		Lowest Temperature.		Snow-fall.	Rainfall.		Hours of Sunshine.
	On	Degrees	On	Degrees	Inches.	No. of Days.	Inches	
1898.								
November	3	51	22	—24	4	.....	.....	55·5
December	28	45	31	—26	.....	.....	.....	78·7
1899.								
January	21	37	31	—35	4	.....	.....	75·6
February	18	41	8	—43	0	1	0·1	131·9
March	9	29	3	—27	10	0	.....	139·1
April	25	65	1	—23	2	1	0·3	167·5
May	24	75	5	17	8	4	1·35	174·4
June	18	82	5	37	.....	14	5·24	211·5
July	18	95	29	41	.....	1	0·4	292·7
August	8	85	4	33	.....	5	0·9	211·4
September	26	81	18	22	.....	4	1·15	186·3
October	29	63	18	— 1	12	.....	.....	93·3
					40	30	9·44	1817·9

I have the honour to be, sir,

Your obedient servant,

ANGUS MACKAY,

Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., November 30, 1899.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report of the work done and the experiments carried on for the year 1899.

The winter of 1898–9 was not a very severe one; the lowest temperature registered was 5° above zero on February 3 and 4. There had been a short dip in January, but the lowest point in that month was 7° above on the 4th and there was a steady rise in temperature until the 30th, when it began to get colder and the above recorded point was reached in February, after which there was a steady record of mild weather, the lowest reached again being 28° above on March 25. The weather did not, however, become warm until the latter part of June. The rainfall was not excessive in any of the spring or summer months, had the showers been followed by bright drying weather; but, on the contrary, in almost every instance the rain was followed by dull cloudy days, and there were frequent showers, just enough to keep cut grain or hay unfit for storing, with the result that a considerable quantity of hay was spoiled throughout the province and a large percentage of the grain discoloured and in some instances it sprouted. Especially was this the case with pease and beans. The hay on the experimental farm was cut early, and the greater part of it cured and housed during the short spell of moderately favourable weather, and the second crop of clover was put into the silo.

The hay, grain and root crops, with the exception of potatoes, have been fairly heavy on the experimental farm and throughout the country generally, and the prices for farm products have been good with a large demand, and generally farmers are fairly prosperous.

The fruit crop has been an exceedingly poor one, and, as generally happens in such cases, the sample has not been good. On the whole, notwithstanding the frequent rains, the season has been fairly satisfactory, and, with the exceptions noted, the results good.

HEDGES.

The hedges have grown splendidly, and those composed of flowering shrubs were full of bloom in their season. Those most admired by visitors to the farm are the evergreen sorts. The best in popular estimation are the green holly and dwarf pine, both of which are very handsome, and being evergreen, look well in winter as well as in summer.

FOREST TREE PLANTATIONS.

These continue to make a strong healthy growth, the strongest growers being the Maples, Elms and White and Austrian pines. Many of the eastern forest trees, such as the Black Walnut, Sugar Maple, Elm and Ash, planted on the mountain are doing very well and a considerable number of seedling Walnuts, grown from nuts planted there, are making fair progress.

ORNAMENTAL TREES AND SHRUBS.

The shrubs and trees, planted about the grounds, have done very well, and many of them are fine specimens of their kind. The roses and Japanese hydrangeas are still in bloom. The variety of Hydrangea we have has usually been considered a house plant, but ours have been outside for five years, with no protection, and have grown and blossomed freely every year, and as they continue in bloom for more than two months in late autumn when flowering plants are scarce, this hydrangea is a very desirable shrub for the lawn.

NUT TREES AND BUSHES.

The heart-shaped Walnut trees fruited freely again this year, and the Japanese and English Walnuts, also the American Black Walnut, all bore a few nuts each. The Japanese and Spanish Chestnuts, owing to the cold wet spring, bloomed so late that the nuts did not come to perfection. The Filberts, of which there are now over forty varieties on trial, all old enough to produce nuts, have as yet produced very few. The bushes are very vigorous and healthy and are not troubled with either insect or fungoid pests, but the male blossom ripens and most of the pollen is blown away and wasted before the female blossom opens, and as a consequence very few flowers are fertilized. The hard shelled Almonds fruited again this year and a few blossoms appeared on several of the soft shelled varieties, but no fruit set.

FENCES.

Since my last report nine hundred and seventy-eight yards of outside fence has been built and the farm is now entirely inclosed in a strong substantial wire fence except on the Moutain side which does not need fencing. We have also built ten hundred and twenty-six yards of inside fencing, inclosing a pasture. This, like the outside fence, is substantially built of strong cedar posts set 9 feet apart with a 2 x 4 top rail, and a 1 x 10 board at the bottom and five wires between. A considerable portion of the ground where this fence is built was uncleared, and this entailed a great deal of grubbing, grading and burning off the stumps and timber.

LIVE STOCK.

CATTLE.

The cold wet season has been unfavourable for cattle, and on account of the prevalence of red water reported last year as existing in our herd a complaint which is common in this district, the Hon. Minister of Agriculture when on a visit to the Experimental Farm, in October, thought it would be better to fatten all of the cattle and dispose of them, this is being done as rapidly as possible, and several head have been already sold.

SHEEP.

The four aged ewes produced six lambs this season, four of which have been sold, and two remain on hand leaving eight in the flock at this time.

PIGS.

There are at present two Berkshire and two Tamworth aged animals and six spring pigs, and seventeen young ones, all of which are thrifty, the younger ones are being fed for market.

POULTRY.

Four breeds of poultry are kept on this farm, Light Brahmas, White Wyandottes, White Leghorns and Black Minorcas.

The Black Minorcas have been the best layers, Light Brahmas coming next.

The Light Brahmas are the best table fowls. White Wyandotte being nearly as good.

The White Leghorns are good layers of small white eggs, but are not good as table fowls.

A large per cent—over two-thirds—of the eggs of all four breeds hatched out, but the cold wet weather in May and June made it more difficult to rear the chickens, which under ordinary circumstances are strong and hardy.

BEES.

As stated in my report for last year, all the swarms then on hand were apparently well supplied with honey for the winter, but the spring continued cold and wet and bloom was so late that three swarms gradually weakened and died and the others were more or less reduced in numbers. No swarms have been added this season, and the quantity of honey made has been much less than usual. What has been made has been gathered mainly from clover and buckwheat.

BREAKING.

No new land has been brought under cultivation this year, but about six acres containing many heavy fir trees has been grubbed and is now nearly ready for ploughing. If the winter should be an open one it is expected that this will be ready for a crop by seeding time.

EXPERIMENTS WITH OATS.

Seventy-three varieties of oats were sown in plots of $\frac{1}{40}$th of an acre each on a rich clay loam, which has been in crop for a number of years, and is now in fairly uniform condition and the yields are in consequence a fairer test of the merits of the varieties tested than in any previous year. They were sown April 20 and 24 and May 1, and before sowing, the seed was treated with bluestone and there was almost absolutely no smut. Two varieties, Newmarket and Golden Giant, were slightly rusted, but not enough to materially lessen the yield in either case.

The heavy rains which came on during the ripening and before they were cut, caused some of them to lodge, and the long period between cutting and getting them housed, owing to the rains, made them shell a good deal. The yields, as will be seen from the following table, are very fair and the sample although discoloured, in most instances, is plump.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
California Prolific Black (Impt.)	May 1	Aug. 24	116	50	Stiff	10	Sided	5,520	91	6	34
Miller	Apr. 20	" 23	125	51	"	10	Branching	5,920	89	14	34
Salines	May 1	" 21	113	49	"	9	Half-sided	6,720	83	18	37½
New Zealand	Apr. 24	" 15	113	50	"	10		5,520	83	4	38
Black Tartarian (Impt.)	May 1	" 19	110	49	"	9	Sided	5,440	78	28	34
King	Apr. 20	" 24	126	58	"	10	Branching	5,200	78	11	37
Prolific Black Tartarian	" 20	" 23	125	51	"	9	Sided	5,280	78	2	33⅜
Golden Giant	" 20	" 23	125	61	"	11	"	5,000	76	16	36¾
Golden Tartarian	" 24	" 19	117	52	"	11	"	5,360	76	16	36
Abyssinia	" 20	" 24	126	50	"	10	Half-sided	5,340	75	33	34½
Early Blossom	" 20	" 23	125	52	"	10	"	4,960	75	16	36⅔

OATS—TEST OF VARIETIES—*Continued.*

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
Russell	Apr. 20	Aug. 22	124	50	Stiff	9	Half-sided	5,840	74	4	35
Danish Island	" 20	" 19	121	52	"	10	"	5,680	73	28	37
Holstein Prolific	" 20	" 19	121	52	"	9	Branching	5,120	73	18	36¼
California Prolific Black	" 24	" 22	120	48	"	9	Sided	5,360	72	32	35
Medal	" 20	" 22	124	62	"	11	Half-sided	5,240	72	12	37½
Oxford	" 24	" 16	118	60	"	9	"	5,440	72	2	36¼
Pense	" 20	" 24	126	50	"	9	Sided	4,920	71	26	36
American Beauty	" 24	" 19	117	52	"	11	Branching	4,720	71	16	35
Pearce's Black Beauty	" 24	" 21	119	48	"	10	"	5,080	71	6	37
Scottish Chief	" 24	" 21	119	48	"	10	"	5,120	70	30	37
Early Maine	" 20	" 23	121	48	Medium	9	"	5,080	70	20	36
White Giant	" 20	" 21	119	50	Stiff	9	Half-sided	4,720	70	10	36
Improved Ligowo (Impt.)	May 1	" 23	111	48	"	10	Branching	5,440	69	24	38
Holland	Apr. 20	" 22	120	52	"	11	Sided	4,680	68	18	34½
White Schonen	" 20	" 19	117	48	Weak	10	Branching	4,940	68	8	35½
Wallis	" 20	" 23	121	50	Stiff	10	"	4,720	67	32	36
Winter Grey	" 20	" 23	121	50	"	10	"	4,840	67	22	36
Banner	" 20	" 21	119	48	Medium	9	"	4,920	67	12	35
Doncaster Prize	" 20	" 22	120	48	"	9	"	4,960	67	2	38½
Oderbruch	" 20	" 19	117	60	Stiff	8	"	4,760	67	2	37
Mortgage Lifter	" 20	" 21	119	52	"	10	"	4,680	65	30	37½
Coulommiers	" 20	" 28	126	48	"	9	"	5,520	65	30	36
Early Gothland	" 20	" 19	117	68	"	10	Half-sided	4,920	65	20	36½
Lincoln	" 24	" 19	117	48	Medium	9	Branching	4,440	65	10	37
Columbus	" 24	" 22	120	50	"	11	"	5,440	65	10	34½
Improved American	" 20	" 24	126	46	"	10	"	4,920	64	24	36½
Mennonite	" 24	" 18	116	48	Stiff	9	"	4,720	64	4	36½
Olive	" 20	" 22	124	62	"	11	Sided	4,440	63	28	36
Kendal	May 1	" 23	115	50	"	10	"	5,340	63	8	36
Bavarian	Apr. 20	" 16	118	48	"	10	Branching	4,320	62	32	36
Thousand Dollar	" 20	" 19	119	52	"	9	"	4,640	62	32	36½
White Russian	" 20	" 17	119	48	Medium	9	"	5,040	62	22	35
Abundance	" 20	" 24	126	46	Weak	10	"	4,280	62	12	34¼
American Triumph	" 20	" 16	118	48	Medium	8	"	3,920	61	16	36½
Newmarket	" 20	" 22	124	48	"	8	"	4,320	61	6	38
Early Golden Prolific	" 20	" 23	125	48	"	11	"	4,680	61	6	36
Wide Awake	" 20	" 23	125	48	"	9	"	4,520	60	30	35½
Cromwell	" 20	" 22	124	56	Stiff	10	Half-sided	4,440	60	20	37
Hazlett's Seizure	" 20	" 17	119	50	"	9	Branching	4,480	60	10	37½
Flying Scotchman	" 20	" 23	125	62	"	10	"	4,720	60	..	38
Buckbee's Illinois	" 24	" 21	119	56	Medium	9	"	4,240	60	..	36
Siberian O. A. C	" 20	" 24	126	48	"	8	Sided	4,680	58	26	36
Victoria Prize White	" 20	" 21	123	47	Stiff	11	Branching	4,320	58	16	36
Improved Ligowo	" 20	" 21	123	48	"	9	"	4,640	58	6	36¾
Poland	" 20	" 18	120	50	"	9	"	4,240	58	6	37
Great White Maine	" 24	" 21	119	52	"	10	Sided	5,160	57	22	37½
Early Archangel	" 20	" 18	120	52	"	8	Branching	4,240	57	2	38½
Milford	May 1	" 24	116	42	"	10	Half-sided	4,320	57	2	36
Rosedale	Apr. 24	" 19	117	48	"	10	Sided	3,920	56	6	37
Welcome	" 20	" 23	125	52	Medium	11	Branching	4,320	55	10	36½
White Wonder	" 20	" 19	121	48	"	10	"	4,120	54	24	39
Cream Egyptian	" 20	" 19	121	50	Stiff	10	Half-sided	3,720	52	32	36½
Golden Beauty	" 20	" 23	125	48	Medium	9	Branching	4,760	52	2	35¼
Imported Irish	" 24	" 18	116	48	"	10	"	3,840	51	16	38
Early Dawson	" 20	" 22	124	54	Stiff	11	Sided	4,920	49	14	40
Joanette	" 20	" 21	123	36	Weak	8	Branching	4,240	48	18	36
Black Mesdag	" 20	" 16	118	50	Medium	10	Half-sided	5,520	48	8	....
Bonanza	" 20	" 19	121	48	"	9	Branching	3,560	46	26	36½
Prize Cluster	" 20	" 19	121	48	"	8	"	4,480	46	16	38¾
Brandon	" 20	" 23	125	50	"	12	"	4,040	44	4	37½
Master	" 24	" 17	115	52	Stiff	10	"	3,840	44	4	37
Rennie's Prize White	" 20	" 23	125	54	"	8	"	4,520	43	28	38

SESSIONAL PAPER No. 8a

EXPERIMENTS WITH BARLEY.

Fifty-one varieties of barley were sown in one-fortieth of an acre plots on April 25. Twenty-one varieties were two-rowed and the remainder, thirty in number, six-rowed. The land had produced a fodder crop of mixed grains in 1898, following clover in 1896, and was a loamy soil, fairly uniform in character and in moderately good condition. The yields are not heavy, but the grain is uniformly plump, it is, however, considerably discoloured. There was no rust on any of the plots.

BARLEY—TWO-ROWED—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			Inches.		Inches.	Lbs.	Bush. Lbs.	Lbs.
Newton	Aug. 17	114	34 to 40	Medium	2 to 3	3,760	39 8	50
Canadian Thorpe	" 18	115	36 to 40	Poor, weak	2 to 3	3,700	36 32	49
Logan	" 17	114	36 to 40	Medium	2½ to 3	3,920	35 40	49
Nepean	" 18	115	36 to 40	"	3 to 4	3,400	35 40	51
Jarvis	" 18	115	36 to 40	Stiff	3 to 4	4,080	35 ..	51
Harvey	" 18	115	40 to 44	Medium	2 to 3½	3,280	35 ..	51
Victor	" 17	114	40 to 42	"	2½ to 3½	4,080	34 28	48
Clifford	" 17	114	42 to 48	"	2 to 3	4,400	34 8	50
Dunham	" 18	115	40 to 46	"	2 to 3	3,960	34 8	48
Thanet	" 26	123	24 to 30	Weak	2½ to 3½	2,800	33 36	50
Danish Chevalier	" 25	122	30 to 36	"	3 to 3½	3,200	33 36	49
Sidney	" 24	121	38 to 46	Strong	3 to 3½	2,600	33 36	49
Leslie	" 17	114	28 to 34	Weak	2 to 3	3,600	33 26	48
Bolton	" 18	115	36 to 40	Medium	3 to 3½	2,560	33 16	45
Fulton	" 18	115	40 to 44	"	2 to 3	3,000	32 44	48
Beaver	" 17	114	30 to 36	Weak	3 to 3½	2,400	31 12	48
Prize Prolific	" 24	121	28 to 36	Medium	3 to 3½	2,320	30 40	48
Monck	" 24	121	42 to 46	"	3 to 3½	2,920	30 40	48
Pacer	" 26	123	30 to 36	"	3 to 3½	3,200	30 20	48
French Chevalier	" 18	115	40 to 44	Stiff	2 to 3	3,000	30 ..	48
Kinver Chevalier	" 24	121	40 to 44	Medium	3 to 4	3,000	29 8	48

BARLEY (SIX-ROWED).—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			Inches.		Inches.	Lbs.	Bush. Lbs.	Lbs.
Baxter	Aug. 16	113	36 to 40	Medium	2 to 3	4,360	40 40	47
Albert	" 10	107	34 to 38	"	2½ to 3	4,080	40 30	47½
Oderbruch	" 12	109	36 to 40	"	3 to 4	4,400	40 20	48
Nugent	" 16	113	30 to 34	Stiff	2½ to 3	4,080	40 ..	47½
Mensury	" 12	109	40 to 44	"	3 to 4	3,680	38 16	48
Argyle	" 12	109	38 to 42	"	2 to 3	3,400	37 44	47
Champion	" 11	108	40 to 44	"	2 to 3	3,800	36 22	44
Phœnix	" 14	111	36 to 40	"	2 to 3	3,400	35 30	46
Stella	" 17	114	34 to 38	Weak	2 to 3	3,400	35 20	46½
Yale	" 12	109	30 to 36	Medium	3 to 3½	3,560	35 10	47
Royal	" 9	106	36 to 40	"	2½ to 3	3,800	34 28	48
Surprise	" 18	115	39 to 42	"	2 to 3½	4,000	34 18	49
Brome	" 17	114	38 to 42	Stiff	2½ to 3	3,800	34 8	47½
Garfield	" 12	109	36 to 40	"	2 to 3	3,480	33 36	47
Empire	" 23	120	30 to 34	"	2½ to 3	3,320	33 36	48
Pioneer	" 12	109	39 to 42	Medium	2 to 3	2,920	33 16	47½
Mansfield	" 11	108	36 to 42	Stiff	2½ to 3	3,680	33 16	48
Trooper	" 25	122	30 to 36	"	2 to 3	3,200	32 44	47
Summit	" 17	114	28 to 36	Weak	2½ to 3	3,560	32 44	48
Excelsior	" 12	109	34 to 38	Stiff	2 to 3	3,600	32 34	44
Claude	" 16	113	30 to 36	Weak	2 to 2½	3,120	32 34	47
Success	" 7	104	36 to 40	"	2 to 2½	3,120	32 24	45
Blue Barley	" 16	113	38 to 42	Stiff	3 to 3½	3,440	32 24	44
Petschora	" 12	109	40 to 44	"	3 to 4	3,680	32 14	47
Odessa	" 12	109	30 to 36	Medium	2 to 3	3,200	32 4	48
Vanguard	" 12	109	40 to 46	Stiff	2 to 3½	3,120	31 12	47
Common	" 22	119	36 to 40	"	2 to 3	2,480	30 40	47½
Rennie's Improved	" 12	109	24 to 30	Weak	2½ to 3	3,560	30 ..	47
Hulless Black	" 12	109	30 to 36	"	1½ to 2½	3,760	29 8	55
Hulless White	" 22	119	24 to 30	"	2 to 2½	2,240	16 32	53

FORMALIN AS A PREVENTIVE OF SMUT.

Three varieties of oats and three of barley were used for these tests. Six plots of each sort were sown, the seed for each of the six plots being treated differently.

Plot No. 1 of each variety was soaked for one hour in a solution of 4½ oz. of formalin to 10 imperial gallons of water.

Plot No. 2 was soaked for fifteen minutes in a solution of the same strength and material as No. 1.

Plot No. 3 was soaked in same solution as No. 1 for 5 minutes.

Plot No. 4 was sprinkled so as to be thoroughly wetted with solution as in No. 1.

Plot No. 5 was sprinkled so as to be thoroughly wetted in a solution of formalin in the proportion of 9 oz. to 10 imperial gallons of water.

The grain in each case was allowed to dry before being sown.

Plot No. 6 was sown untreated. The seed for these tests was received from the Central Farm, sufficient seed of the same character being supplied of each variety for the six test plots.

The percentage of smutty heads was obtained by counting the good and bad heads in a square yard in each plot.

The land on which this grain was sown, had been in pease in 1898 and was fairly uniform in character, and all the plots were sown at the rate of two and a half bushels per acre.

TEST OF MASSEL POWDER AS A PREVENTIVE OF SMUT.

Two varieties of oats were tested with this fungicide at the rate of 2 ounces of massel powder, 1 pound of lime to 18 gallons of water. The seed was thoroughly dampened with the mixture and allowed to dry before sowing, and in each case a similar plot was sown with the same seed untreated.

The massel powder this season appeared to be more effective than the formalin, but the bluestone did the most thorough work.

The seed for all the other plots was soaked for half an hour in bluestone at the rate of 1 pound to 5 gallons of water and these were all practically free from smut.

This strength of solution and length of treatment did not appear to injure the seed as the stand was good in every instance.

TESTS of Formalin as a preventive of Smut in Oats.

Variety.	No. of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Percentage of Smutty Heads.	Percentage of Clean Heads.
Rennie's Prize White	Plot 1	May 1	Aug. 21	113	11	89
" "	" 2	" 1	" 21	113	16	84
" "	" 3	" 1	" 21	113	11	89
" "	" 4	" 1	" 21	113	11	89
" "	" 5	" 1	" 21	113	14	86
" "	" 6 untreated	" 1	" 21	113	20	80
Doncaster Prize	" 1	" 1	" 24	116	22	78
"	" 2	" 1	" 24	116	25	75
"	" 3	" 1	" 24	116	21	79
"	" 4	" 1	" 24	116	18	82
"	" 5	" 1	" 24	116	20	80
"	" 6 untreated	" 1	" 24	116	33	66
Improved Ligowo	" 1	" 1	" 20	112	17	83
"	" 2	" 1	" 20	112	25	75
"	" 3	" 1	" 20	112	20	80
"	" 4	" 1	" 20	112	20	80
"	" 5	" 1	" 20	112	19	81
"	" 6 untreated	" 1	" 20	112	35	65

Massel Powder as a preventive of Smut in Oats.

Bavarian	Plot 1	May 9	Aug. 24	107	8	92
"	" 2 untreated	" 9	" 24	107	21	79
Wide Awake	" 1	" 9	" 24	107	11	89
"	" 2 untreated	" 9	" 24	107	30	70

TESTS of Formalin as a Preventive of Smut in Barley.

Name of Variety.	No. of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Percentage of Smutty Heads.	Percentage of Clean Heads.
Bolton	Plot 1	May 1	Aug. 18	110	14	86
"	" 2	" 1	" 18	110	16	84
"	" 3	" 1	" 18	110	24	76
"	" 4	" 1	" 18	110	18	82
"	" 5	" 1	" 18	110	14	86
"	" 6 untreated	" 1	" 18	110	30	70
Baxter	" 1	" 1	" 18	110	15	85
"	" 2	" 1	" 18	110	14	86
"	" 3	" 1	" 18	110	16	84
"	" 4	" 1	" 18	110	20	80
"	" 5	" 1	" 18	110	15	85
"	" 6 untreated	" 1	" 18	110	35	65
Royal	" 1	" 1	" 18	110	15	85
"	" 2	" 1	" 18	110	14	86
"	" 3	" 1	" 18	110	14	86
"	" 4	" 1	" 18	110	16	84
"	" 5	" 1	" 18	110	17	83
"	" 6 untreated	" 1	" 18	110	25	75

EXPERIMENTS WITH SPRING WHEAT.

Fifty-five varieties of spring wheat were tested this year, all sown on the 15th of April, the same date as last year, but the plots this season have ripened from ten to fourteen days later owing to the very unfavourable weather. The soil was a sandy loam, and the size of the plots was one-fortieth of an acre each. Owing to the rainy weather during harvest there was considerable difficulty in curing the crop, but the yields have been fair in most cases, and there was no smut or rust worth speaking of on any of the varieties. The kernel was plump but not bright. The plots were sown on land that had been cropped with mixed grains for fodder in 1898, following clover and was in a fairly good and uniform condition.

SPRING WHEAT—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Bush. Lbs.	Lbs.
Monarch	Aug. 22	129	36—40	Med. stiff...	2½—3½	Bald ...	4,400	34 20	59½
Huron	" 18	125	40—46	" ..	2½—3½	Bearded	4,080	34 20	62
Red Fife	" 22	129	40—46	" ..	2½—3	Bald ...	3,800	31 30	60½
Red Fern	" 22	129	38—44	" ..	2 —3	Bearded	3,800	31 20	62
Preston	" 22	129	40—46	Stiff ...	2½—3½	"	3,600	31 10	61
Hungarian	" 22	129	40—44	Medium...	3 —3½	"	3,760	31 00	60½
Goose	" 19	126	40—44	" ...	2 —3	"	3,800	31 00	62
Clyde	" 19	126	40—46	"	2½—3½	Bald ...	3,760	30 50	62½
Roumanian	" 18	125	42—48	Stiff	2 —3	Bearded	4,200	30 40	61
Dions	" 19	126	36—44	"	2½—3½	"	5,200	30 10	59¾
Weldon	" 22	129	40—46	"	2 —3	Bald ...	4,160	30 00	61
Wellman's Fife	" 22	129	40—48	"	2½—3½	" ...	2,880	29 20	61½
Herisson Bearded	" 22	129	38—44	Weak	1½—2	Bearded	3,800	29 00	61
Black Sea	" 18	125	42—46	Fair	2 —3½	"	3,960	28 50	61
Red Swedish	" 19	126	38—42	Stiff	3 —3½	"	4,000	28 40	62
Rio Grande	" 18	125	40—44	Weak	2½—3	"	3,280	28 40	61½
Dawn	" 22	129	38—46	"	2 —3	Bald ...	3,400	28 30	61
Stanley	" 19	126	40—44	Medium....	2½—3	" ..	3,400	28 20	61½
Garnet	" 18	125	36—42	Weak	2 —3	" ..	4,000	28 20	61
Polonian	" 19	126	42—46	Strong	3 —4	Bearded	5,300	28 20	60
Fourteenth	" 22	129	42—46	"	2½—3	Bald ...	3,400	28 00	60
Countess	" 19	126	36—46	Medium...	3 —3½	" ..	4,040	28 00	62
Blair	" 19	126	36—40	Weak	2 —3	" ..	3,440	27 50	61
Ebert	" 19	126	40—46	"	2½—3	" ..	3,760	27 50	60½
Norval	" 12	119	40—46	Medium....	3 —3½	Bearded	4,200	27 40	60½
Progress	" 22	129	39—46	"	2 —3½	Bald ...	3,600	27 40	61½
Byron	" 12	119	36—40	Weak.....	2 —3	Bearded	3,560	27 40	60½
Pringle's Champlain	" 22	129	40—46	Strong	3 —3½	"	4,240	27 00	63
Advance	" 22	129	44—48	Medium...	2½—3	"	3,600	27 00	61
Crawford	" 11	118	46—50	"	3 —3½	Bald ...	3,400	26 50	61
Admiral	" 19	126	44—48	"	2 —3	"	3,000	26 40	59½
Dufferin	" 12	119	40—44	Weak.....	2½—3	Bearded	3,280	26 30	61
Mason	" 18	125	36—42	"	2½—3	Bald ...	3,000	26 20	61
White Russian	" 22	129	42—45	Strong.....	3½—4	" ...	4,160	26 20	62
Blenheim	" 22	129	44—48	Stiff	2½—3½	" ...	3,560	26 20	60½
Colorado	" 19	126	44—48	Medium...	3 —3½	Bearded	4,400	26 10	61½
Crown	" 19	126	38—44	"	2½—3	"	4,200	26 00	60½
Campbell's White Chaff	" 22	129	40—44	"	2½—3½	Bald ...	3,960	26 00	61½
Golden Drop	" 18	125	38—44	"	2 —3	" ...	3,600	25 40	61
Alpha	" 22	129	40—44	Stiff	2½—3	" ...	3,800	25 40	62
Percy	" 18	125	42—48	Medium...	2 —3	" ..	3,160	25 20	60
Ladoga	" 19	126	30—36	"	2 —3½	Bearded	2,800	25 20	62
Beaudry	" 22	129	40—44	"	2½—3	"	3,000	25 00	58½
Emporium	" 19	126	38—46	" ...	2½—3½	"	3,200	24 40	60
Rideau	" 19	126	38—44	"	2½—3	"	3,920	24 40	61
Vernon	" 18	125	40—46	"	2½—3½	"	3,600	24 40	59
Early Riga	" 11	118	36—40	Weak.....	2 —3	Bald ...	3,000	24 20	61
White Connell	" 22	129	40—46	Medium....	2½—3½	" ...	3,000	24 10	60
Harold	" 11	118	36—42	Weak.....	1½—2	Bearded	2,480	24 00	59
White Fife	" 22	129	36—44	"	2 —3	Bald ...	2,720	24 00	60
Plumper	" 19	126	42—46	Medium....	2 —3	Bearded	2,800	23 20	60
Beauty	" 19	126	40—44	"	2 —3	Bald ...	3,400	23 20	61
Fraser	" 12	119	42—48	"	2½—3	Bearded	3,000	21 40	61
Laurel	" 19	126	39—45	"	2½—3½	Bald ...	4,400	21 30	60
Captor	" 19	126	40—46	"	2 —3	" ...	2,600	20 50	62

EXPERIMENTS WITH PEASE.

Fifty-six varieties of pease were tested this year, fifty-two of which were sown April 17, and the remainder on the 27th. The delay was on account of the seed not having been received in time to sow all together. The soil was loamy and of fair quality, and the size of the plots one-fortieth of an acre each. The growth was very luxuriant and promised a fine yield, but the constant rains during ripening and harvesting caused a serious loss by shelling. In some cases this loss would amount to fully twenty-five per cent, and the sample is not nearly so clean and bright as in 1898.

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw Per Acre.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
					Ins.	Lbs.	Ins.		Bush. Lbs.	Lbs.
Victoria	April 17	Aug. 16	121	Strong..	54	6,800	3½	Small ..	47 20	63
King	" 17	" 15	120	" ..	52	4,800	3	Large ..	45 40	60½
Elder	" 27	" 24	119	" ..	54	5,960	3	Small ..	45 20	60
Gregory	" 17	" 15	120	" ..	60	5,720	3	Medium	44 20	60¼
German White	" 17	" 14	119	" ..	58	5,680	3½	"	43 30	61
Bedford	" 17	" 18	123	" ..	60	7,300	3	"	43 20	61
Multiplier	" 17	" 10	115	" ..	66	6,400	2½	Small ..	43	61
Golden Vine	" 17	" 8	113	" ..	58	5,800	3	" ..	42 40	61½
Pearl	" 27	" 24	119	" ..	60	5,920	2½	Medium	42 20	59½
Fergus	" 17	" 16	121	" ..	60	5,000	3½	Small ..	42	60½
Elliott	" 27	" 24	119	" ..	52	5,960	3	Medium	41 40	60
Mummy	" 17	" 8	113	" ..	50	6,600	3	"	41 20	60¼
Prince	" 17	" 16	121	" ..	46	6,600	2½	Large ..	41 10	60¾
Creeper	" 17	" 9	114	" ..	60	5,000	2½	Small ..	41	62
White Wonder	" 17	" 7	112	Medium	38	5,600	2	Medium	40 40	60½
Pride	" 17	" 14	119	Strong..	56	3,920	...	Large .	40 20	60½
Dover	" 17	" 16	121	" ..	48	5,400	3	.....	40 10	60¼
Centennial	" 17	" 15	121	" ..	58	4,200	3½	Medium	40	60½
French Canner	" 17	" 8	114	Medium	36	5,600	2½	Small ..	40	61
Macoun	" 17	" 18	124	Strong..	62	6,000	2½	Large ..	39 50	60½
Bruce	" 17	" 14	120	" ..	52	4,800	3	" ..	39 50	61
Herald	" 27	" 21	110	" ..	64	5,440	2½	Small ..	39 40	60
Picton	" 17	" 8	114	" ..	70	4,800	3	Medium	39 30	60
Black-eyed Marrowfat	" 17	" 14	120	" ..	50	5,320	3½	Large ..	39 20	61¼
Lanark	" 17	" 14	120	" ..	60	6,400	3	" ..	39 10	61¾
Duke	" 17	" 16	122	" ..	50	5,200	3	" ..	39	60¼
White Marrowfat	" 17	" 16	122	" ..	52	4,520	3	" ..	38 40	60
Bright	" 17	" 18	124	" ..	60	4,600	3	Medium	38 30	60
Prince Albert	" 17	" 12	118	" ..	56	5,600	2¾	Small ..	38 20	61
Early Britain	" 17	" 7	113	Medium	66	6,000	2½	Medium	38 20	60
Paragon	" 17	" 12	118	Strong..	56	6,600	3½	"	38 10	60
Wisconsin Blue	" 17	" 22	128	" ..	62	6,000	3	Small ..	38	60
Trilby	" 17	" 14	120	" ..	52	4,880	3	Large ..	38	61
Chancellor	" 17	" 18	124	Medium	62	4,400	3¾	Small ..	37 40	61
Canadian Beauty	" 17	" 10	116	Strong..	70	5,600	3½	Large ..	37 10	60¼
Chelsea	" 27	" 25	120	" ..	70	5,160	3	Medium	36 40	60½
Prussian Blue	" 17	" 14	119	" ..	72	5,200	3	"	36 40	61¼
English Grey	" 17	" 10	115	" ..	48	5,600	3½	"	36 20	61½
Fenton	" 17	" 14	119	Medium	50	4,400	3	Large ..	36 10	63
Arthur	" 17	" 11	116	Strong..	46	5,600	3½	Medium	35 40	60
Carleton	" 17	" 16	121	" ..	58	5,200	3½	"	35 30	62
New Potter	" 17	" 12	117	Medium	60	4,720	3	Large ..	35	60
Daniel O'Rourke	" 17	" 7	112	" ..	50	3,600	2½	Small ..	34 40	62¼
Alma	" 17	" 11	116	" ..	54	4,200	3	" ..	34	60¼
Agnes	" 17	" 14	119	" ..	52	5,200	3	Large ..	33 40	62½
Kent	" 17	" 16	121	" ..	50	5,400	3	" ..	33 20	60
Crown	" 17	" 10	115	" ..	52	4,200	3	Small ..	33	60½
Nelson	" 17	" 14	119	" ..	70	6,560	2½	Medium	32 50	61½
Oddfellow	" 17	" 17	122	" ..	54	4,600	3	"	32 30	60½
Vincent	" 17	" 11	116	" ..	52	4,200	3½	Large ..	32 10	60½
Archer	" 17	" 14	119	Strong..	60	4,960	2½	Medium	32	60
Harrison's Glory	" 17	" 8	113	Weak ..	36	3,920	3	"	32	59
Mackay	" 17	" 10	115	Strong..	50	5,200	3	Large ..	31 50	60½
Elephant Blue	" 17	" 12	117	" ..	50	3,560	3	Medium	31 20	60½
Cooper	" 17	" 12	117	Medium	50	4,400	3	Large ..	28	61
Perth	" 17	" 15	120	"	56	3,920	2¼	" ..	28	61

Results of Early, Medium and Late Sowings.

These experiments have been conducted on plots of one twentieth acre each. The soil was loamy and fairly uniform in quality and six successive sowings at intervals of a week were made in each case.

Oats.

The seed of the first sown plot in this series did not germinate well and the yields of all the plots are only fair. The grain however is plump and there was no smut or rust.

Spring Wheat.

The varieties used in this test were the Red Fife and Stanley. The yield of Stanley as in the same series of trials in 1898 is a little heavier than the Red Fife and it is also a little earlier than that variety, but both sorts took on an average about ten days longer to mature than they did last year. There was no rust or smut on any of these plots.

Barley.

The grain from each of the plots in this test was fairly plump, but owing to the wet weather all was discoloured but there was no rust or smut.

Pease.

The crops of pease on these plots were good. The yield of this crop is very much influenced by the weather during the blossoming period, and as a rule the moderately early sown crop gets the best chance of a dry harvest which in this climate is very important.

Oats sown at different dates.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw Per Acre.	Yield per Acre.	Weight per Bushel.
				Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.
Abundance.....	Apr. 5..	Aug. 12..	129	50	Stiff, clean and bright.	10	3,760	46 26	35
"	" 12..	" 15..	125	50	" " ..	11	4,040	50 20	35
"	" 19..	" 19..	121	50	" " ..	11	3,780	50 3	35
"	" 26..	" 23..	117	50	" " ..	11	3,720	48 28	35
"	May 3..	" 25..	112	50	" " ..	11	4,320	55 20	36
"	" 10..	" 28..	108	52	" " ..	11	4,240	57 2	36
American Banner...	Apr. 5..	" 14..	131	48	" " ..	11	4,120	53 18	34
" ...	" 12..	" 17..	127	48	" " ..	11	3,760	47 22	34
" ...	" 19..	" 21..	124	50	" " ..	10	3,720	46 26	34
" ...	" 26..	" 25..	120	48	" " ..	10	3,560	43 8	34
" ...	May 3..	" 26..	114	48	" " ..	11	4,120	54 24	35
" ...	" 10..	" 29..	110	50	" " ..	11	4,200	55 30	35

SPRING WHEAT sown at different dates.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw Per Acre.	Yield per Acre.	Weight per Bushel.
				Inch.		Inch.	Lbs.	Bush. Lbs.	Lbs.
Stanley	April 5..	Aug. 10..	127	50	Stiff and bright	3	3,360	25 40	60
"	" 12..	" 14..	124	50	" ..	3	3,320	25 20	60
"	" 19..	" 18..	121	52	" ..	3	3,400	26 20	60
"	" 26..	" 21..	117	52	" ..	3½	3,480	27	60
"	May 3..	" 24..	113	52	" ..	3	3.320	22 40	60
"	" 10..	" 26 .	108	52	" ..	3	3,440	26 40	60
Red Fife	April 5..	" 12..	129	52	" ..	3	3,840	26 40	60
"	" 12..	" 16..	126	52	" ..	3	3,920	26 50	60
"	" 19..	" 19..	122	52	" ..	3	3,600	24	60
"	" 26..	" 22..	119	52	" ..	3	3,640	26 20	60
"	May 3..	" 24..	114	50	" ..	3	3,480	23 40	60
"	" 10..	" 26..	109	50	" ..	3	3,560	25	60

BARLEY—Sown at Different Dates.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw Per Acre.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bus. lbs.	Lbs.
Odessa	April 5..	Aug. 5..	122	36	Weak	2½	6-rowed	3.120	27 44	46½
"	" 12..	" 12..	122	30	"	2½	"	3,160	25 20	46½
"	" 19..	" 15 .	118	38	"	2½	"	2,720	28 46	47
"	" 26..	" 18..	114	38	Medium..	3	"	2,760	27 4	47
"	May 3..	" 21..	110	36	" ..	2½	"	2,520	25	46⅔
"	" 10..	" 22..	104	36	" ..	2½	"	2,480	23 46	46⅔
Canadian Thorpe ..	April 5..	" 10..	127	36	Weak	2½	2-rowed	2,760	24 28	50½
"	" 12..	" 14 .	124	37	" ..	2½	"	2,920	26 12	50½
"	" 19..	" 18..	121	38	"	3	"	3,120	27 34	51
"	" 26..	" 21..	117	38	"	2½	"	2,440	25 20	51
"	May 3..	" 24..	113	36	"	2½	"	2,400	24 8	50½
"	" 10..	" 26..	108	36	"	2½	"	2,440	25	50½

PEASE—Sown at Different Dates.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw Per Acre.	Length of Pod.	Size of Pea.	Yield per Acre.
					In.	Lbs.	In.		Bush. Lbs.
Mummy	April 5..	Aug. 8..	125	Strong..	58	5,200	3	Medium	46 40
"	" 12..	" 10..	120	" ..	56	7,800	3	" .	42 ..
"	" 19..	" 11..	114	" ..	52	5,680	3	" .	38 40
"	" 26..	" 14.	110	" ..	56	5,360	3	" .	34 20
"	May 3..	" 16..	105	" ..	56	5,440	3	" .	33 ..
"	" 10..	" 19..	101	" ..	52	5,400	3	" .	31 50
Golden Vine	April 5..	" 9..	124	" ..	60	5,440	3½	Small ..	44 40
"	" 12.	" 10..	118	" ..	60	5,360	3½	" ..	38 20
"	" 19..	" 12..	113	" ..	60	5,960	3	" ..	39 40
"	" 26 .	" 14..	108	" ..	58	5,560	3	" ..	37 40
"	May 3..	" 15..	102	" ..	56	5,280	3	" ..	34 ..
"	" 10..	" 16..	97	" ..	56	4,940	3	" ..	33 ..

EXPERIMENTS WITH INDIAN CORN.

Thirty-two varieties of corn were planted and two tests were made of each variety; one sown in drills and one planted in hills. The rows in each case were three feet apart and the hills were three feet apart each way. When the plants were well up the drills were thinned to six or eight inches apart and the hills to three or four plants in the hill. The seed was thoroughly wetted in warm water and sufficient tar put on and stirred to thoroughly coat each kernel. This coating of tar has in previous seasons protected the crop from crows, but this year although they did not eat the grain, they pulled so much of it up that a large part of it had to be replanted. The season has been so wet and cold not only in the spring, but during much of the summer and autumn, that the ears did not develop and only a few varieties produced ears fit for roasting. The corn was all cut for ensilage on Oct. 10.

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
	Inches.							Tons.	Lbs.	Tons.	Lbs.
Red Cob Ensilage	110 - 120	Very leafy	Sept. 14	Sept. 18	Oct. 13	.....	Early milk	31	1,140	25	1,480
Champion White Pearl	120 - 130	" ..	" 1	" 22	.....	.....	Ears for'd	27	1,000	21	1,450
Cloud's Early Yellow	108 - 120	" ..	" 1	" 16	Oct 13	.....	Early milk	26	1,790	23	1,520
Pride of the North	100 - 106	" ..	" 4	.....	" 13	.....	Silk	26	580	25	710
Compton's Early	102 - 112	" ..	Aug. 25	Sept. 12	.....	.....	Early milk	26	250	15	360
Early Butler	108 - 120	Medium..	" 21	" 11	Oct. 1	.....	Roasting .	23	1,520	22	110
Pearce's Prolific	110 - 118	Very leafy	" 22	" 7	" 1	.....	" ..	23	1,300	17	210
Mammoth 8-Rowed Flint	90 - 100	"	" 18	Aug. 27	" 1	.....	" .	22	1,650	20	1,580
Sanford	108 - 120	Medium..	Sept. 2	Oct. 7	.....	.....	Silk	22	1,540	21	1,570
King of the Earliest	112 - 120	" ..	Aug. 18	Sept. 2	Sept. 20	Oct. 10	Late milk.	22	1,100	20	1,580
Giant Prolific Ensilage	120 - 140	" ..	" 28	" 14	Oct. 7	.....	Early milk	21	1,780	20	700
Mammoth Cuban	120 - 130	" ..	" 30	" 18	" 10	.....	" ..	21	1,450	22	....
Angel of Midnight	96 - 100	Very leafy	" 28	" 20	" 10	.....	" ..	21	1,450	20	40
Selected Leaming	110 - 120	Medium..	" 28	Oct. 4	.....	.....	In silk....	21	1,120	20	1,580
North Dakota White	90 - 100	" ..	" 28	Sept. 9	Sept. 20	Oct. 10	Late milk.	21	900	20	260
White Cap Yellow Dent	110 - 120	" ..	Sept. 4	Oct. 4	.....	.....	In silk....	21	760	17	650
Longfellow	98 - 104	" ..	" 1	Sept. 12	Sept. 24	Oct. 10	Late milk.	20	1,690	21	20
Country Gentleman	86 - 90	" ..	" 26	.....	.....	.....	Tasseled..	20	920	17	320
Rural Thoroughbred White Flint	100 - 110	" .	Aug. 30	Sept. 16	Oct. 8	.....	Early milk	17	1,200	17	100
Black Mexican	75 - 90	" ..	Sept. 20	" 28	.....	.....	Ears for'ed	17	1,090	11	1,320
Canada White Flint	80 - 90	" ..	" 4	" 20	Oct. 1	.....	Roast. ear	17	540	16	1,550
Iowa Silver Mine	90 - 100	" ..	Aug. 24	" 4	" 4	.....	Early milk	17	320	16	780
Evergreen Sugar	80 - 90	" ..	" 27	" 20	.....	.....	Ears for'ed	17	210	18	190
Early Mastodon	80 - 90	" ..	" 24	" 9	Oct. 8	.....	Early milk	16	1,990	16	780
Kendall's Giant	90 - 100	" ..	Sept. 24	Oct. 13	.....	.....	In silk....	16	1,440	18	80
Iowa Gold Mine	100 - 110	" ..	Aug. 30	" 13	.....	.....	"	16	1,220	16	670
Eureka	84 - 90	" ..	" 14	Sept. 4	Oct. 3	.....	Early milk	11	1,870	13	290
Cory	50 - 60	Very leafy	" 10	" 2	Sept. 18	.....	Roast. ear	11	1,210	10	1,670
Burpee's First of All	48 - 54	"	" 14	" 1	" 15	.....	" ..	11	....	9	1,580
Extra Early Szekeley	50 - 60	Medium..	" 28	" 11	Oct. 10	.....	Early milk	10	570	10	20
Early Yellow Long Eared	48 - 52	" ..	Sept. 15	" 29	" 10	.....	" ..	9	1,140	8	280
Early Yellow Six Weeks	48 - 52	" ..	Aug. 11	Aug. 29	Sept. 14	Sept. 28	Glazed ...	8	280	8	720

INDIAN CORN PLANTED AT DIFFERENT DISTANCES.

The following three varieties of corn were selected for this test, and each was sown in drills and planted also in hills, the rows in each ranging from 21 inches to 42 inches apart, the distance each way between the hills being the same as the width of the row in each case. The plants were thinned to six inches apart in the drills and four plants were left in each hill.

Four rows of each variety were planted in each test and the two centre rows were weighed for comparison.

In every case the stalks were leafier and the corn further advanced the wider the rows were apart.

The yield per acre was reckoned from 66 feet of the two centre rows of each test plot.

All were sown May 29 and cut October 13.

Name of Variety.	In Drills.			In Hills.		Remarks.
	Inches apart.	Tons.	Lbs.	Tons.	Lbs.	
Longfellow	21	19	1,033	20	165	Very green; no ears formed.
"	28	21	428	22	1,540	" in silk.
"	35	21	1,135	18	1,902	" ears only formed.
"	42	18	1,714	17	129	Very early milk when cut.
Leaming	21	34	318	28	948	Very green and soft; no ears formed.
"	28	28	1,985	26	1,460	" "
"	35	27	874	22	1,964	" "
"	42	18	1,903	14	27	In silk.
Champion White Pearl	21	33	.....	29	1,575	Very green and soft; no ears formed.
" "	28	26	1,190	24	1,782	" "
" "	35	23	1,520	22	1,110	" "
" "	42	20	1,957	17	1,640	Ears formed, but not in milk.

EXPERIMENTS WITH TURNIPS.

Twenty-six varieties of turnips were grown side by side under similar conditions as to soil and treatment. The soil was a sandy loam, which was in barley in 1898, being the fourth crop after clearing. Two sowings of each variety were made, the first on May 16, and the second on May 29. As in 1898, the early sowing gave a little higher average yield and the quality of the roots was as good. Four rows of each variety were sown and the yield per acre has been calculated from the weight of 66 feet of the two centre rows.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
					Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Perfection Swede	May 15	May 29.	Oct. 24.	Oct. 24.	58	1975	1966	15	51	795	1713	15
Bangholm Selected	" 15.	" 29.	" 24.	" 24.	58	1645	1960	45	45	420	1507	..
Sutton's Champion	" 15.	" 29.	" 24.	" 24.	56	1190	1886	30	46	1555	1559	15
Selected Champion	" 15.	" 29.	" 24.	" 24.	53	1910	1798	30	48	855	1614	15
Prize Purple Top	" 15.	" 29.	" 24.	" 24.	52	1600	1760	..	50	1640	1694	..
East Lothian	" 15.	" 29.	" 24.	" 24.	52	610	1743	30	47	1040	1584	..
Hardy Goliath	" 15.	" 29.	" 24.	" 24.	51	1455	1724	15	48	30	1600	30
Prize Winner	" 15.	" 29.	" 24.	" 24	51	1125	1718	45	50	320	1672	..
Purple Top Swede	" 15.	" 29.	" 24.	" 24.	51	135	1702	15	51	630	1710	30
Halewood's Bronze Top	" 15.	" 29.	" 24.	" 24.	50	1640	1694	..	48	1680	1628	..
Imperial Swede	" 15.	" 29.	" 24.	" 24.	50	980	1683	..	48	30	1600	30
New Arctic Swede	" 15.	" 29.	" 24.	" 24.	50	320	1672	..	42	1305	1421	45
Carter's Elephant	" 15.	" 29.	" 24.	" 24.	47	1370	1589	30	44	440	1472	20
Marquis of Lorne	" 15.	" 29.	" 24.	" 24.	46	1720	1562	..	40	1840	1364	..
Giant King	" 15.	" 29.	" 24.	" 24.	46	895	1548	15	55	880	1848	..
Mammoth Clyde	" 15.	" 29.	" 24.	" 24.	46	400	1540	..	48	1845	1640	45
Hartley's Bronze	" 15.	" 29.	" 24.	" 24.	45	90	1501	30	43	1450	1457	30
Skirving's	" 15.	" 29.	" 24.	" 24.	44	945	1482	25	42	975	1416	15
Shamrock Purple Top	" 15.	" 29.	" 24.	" 24.	44	780	1479	40	39	540	1309	..
Drummond's Swede	" 15.	" 29.	" 24.	" 24.	41	170	1369	30	43	1780	1463	..
Hall's Westbury	" 15.	" 29.	" 24.	" 24.	39	870	1314	30	37	250	1237	30
Jumbo	" 15.	" 29.	" 24.	" 24.	38	725	1278	45	37	580	1243	..
New Renown	" 15.	" 29.	" 24.	" 24.	37	250	1237	30	27	120	902	..
West Norfolk Red Top	" 16.	" 30.	" 25.	" 25.	35	1280	1188	..	31	370	1039	30
Monarch	" 16.	" 30.	" 25.	" 25.	34	1630	1160	30	31	370	1039	30
Champion Purple Top	" 16.	" 30.	" 25.	" 25.	27	1770	929	30	27	615	910	15

EXPERIMENTS WITH MANGELS.

Twenty varieties of mangels were tested under similar conditions as to soil and treatment. Two sowings of each variety were made, the first sowing on April 25, and the second on May 9. The soil was the same as that for the turnips and the treatment the same. Four rows of each sort were sown, and the average yield per acre has been calculated from sixty-six feet of the two centre rows. The early sown seed gave the best returns with a large proportion of the varieties sown.

MANGELS—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
					Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Yellow Intermediate	April 24	May 9	Oct. 24	Oct. 24	66 1,750	2,062 30	55 1,870	1,864 30
Ward's Large Oval Shaped	" 24	" 9	" 24	" 24	53 1,185	1,786 25	51 1,620	1,727
Giant Yellow Half Long.	" 24	" 9	" 24	" 24	51 1,125	1,718 45	50 1,310	1,688 30
Lion Yellow Intermediate	" 24	" 9	" 24	" 24	51 300	1,705	47 1,855	1,597 35
Giant Yellow Intermediate	" 24	" 9	" 24	" 24	49 1,165	1,652 45	39 540	1,309
Prize Mam. Long Red...	" 24	" 9	" 24	" 24	48 525	1,608 45	36 270	1,204 30
Mam. Selected Long Red	" 24	" 9	" 24	" 24	42 480	1,408	48 1,925	1,498 45
Yellow Intermediate.....	" 24	" 9	" 24	" 24	41 1,160	1,386	33 1,650	1,284 10
Yellow Fleshed Tankard.	" 24	" 9	" 24	" 24	41 500	1,375	42 975	1,416 15
Mammoth Long Red	" 24	" 9	" 24	" 24	41 170	1,369 30	41 995	1,382 15
Gate Post	" 24	" 9	" 24	" 24	41 170	1,369 30	39 540	1,309
Gate Post Yellow.....	" 24	" 9	" 24	" 24	38 1,388	1,289 45	37 250	1,237 30
Giant Yellow Globe.....	" 24	" 9	" 24	" 24	37 1,240	1,287 20	36 1,920	1,232
Red Fleshed Tankard ...	" 24	" 9	" 24	" 24	37 250	1,237 30	32 1,670	1,094 30
Canadian Giant.....	" 24	" 9	" 24	" 24	34 640	1,144	33 1,980	1,133
Warden Orange Globe...	" 24	" 9	" 24	" 24	29 1,400	990	27 285	904 45
Mammoth Oval Shaped ..	" 24	" 9	" 24	" 24	29 410	973 30	24 675	811 15
Golden Fleshed Tankard.	" 24	" 9	" 24	" 24	25 1,480	858	34 970	1,149 30
Norbiton Giant.....	" 24	" 9	" 24	" 24	25 1,480	858	28 1,420	957
Champion Yellow Globe.	" 24	" 9	" 24	" 24	24 1,830	830 30	24 1,005	816 45

EXPERIMENTS WITH CARROTS.

Twenty varieties of carrots were sown on a fairly uniform sandy soil. Two sowings were made in each case, the first on April 27 and 28, and the second on May 12 and 14. The sowings were interrupted on April 27, and again on May 12, by heavy rain. The seed germinated well and the stand was uniform. The half long carrots being easy to harvest and not so liable to get broken in handling and yielding as well or better are to be preferred. There were four rows sown of each sort in both early and late tests and the yield was calculated from 66 feet of the two centre rows.

CARROTS.—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
					Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Half Long White.....	April 27	May 12	Oct. 24	Oct. 24	34 1,520	1,158 40	32 1,340	1,089
Giant White Vosges.	" 27	" 12	" 24	" 24	33 1,650	1,127 30	33 550	1,109 10
Mam. White Intermediate	" 27	" 12	" 24	" 24	33 440	1,107 20	30 1,600	1,026 40
Improved Short White...	" 27	" 12	" 24	" 24	33 220	1,103 40	25 1,700	861 40
White Belgian.....	" 27	" 12	" 24	" 24	29 1,840	997 20	28 540	942 20
Iverson's Champion.....	" 27	" 12	" 24	" 24	29 1,400	990	28 1,970	966 10
New White Intermediate.	" 27	" 12	" 24	" 24	29 300	971 40	33 440	1,107 20
Ontario Champion.	" 27	" 12	" 24	" 24	28 1,200	953 20	31 1,800	1,063 20
Green Top White Orthe..	" 27	" 12	" 24	" 24	27 1,220	920 20	26 1,570	892 50
Yellow Intermediate.....	" 27	" 12	" 24	" 24	25 1,700	861 40	19 1,940	649
Guerande or Ox Heart. ..	" 27	" 12	" 24	" 24	25 160	836	22 1,870	764 30
Long Orange or Surrey...	" 27	" 12	" 24	" 24	25 160	836	17 650	577 30
Early Gem..	" 27	" 12	" 24	" 24	22 1,650	760 50	22 660	744 20
Long Yellow Stump Rooted.....	" 27	" 12	" 24	" 24	22 990	749 50	18 190	603 10
Half Long Chantenay....	" 27	" 12	" 24	" 24	22 770	746 10	22 550	742 30
Large Short White Vosges	" 27	" 12	" 24	" 24	22 550	742 30	22 1,100	751 40
Long Scarlet Altringham.	" 27	" 12	" 24	" 24	18 1,400	623 20	16 1,220	553 40
Carter's Orange Giant....	" 27	" 12	" 24	" 24	17 320	572	13 950	449 10
Scarlet Intermediate.....	" 27	" 12	" 24	" 24	16 1,440	557 20	18 1,400	623 20
Scarlet Nantais.....	" 27	" 12	" 24	" 24	11 110	368 30	10 1,340	355 40

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were sown, two sowings of each being made. The first seeding was on April 25, and the second on May 9. The soil and conditions were the same as those for the mangels and turnips. The yields are considerably heavier than last year, and the roots are smoother and not so rooty. The soil was a sandy loam and mellow which suited them well.

SUGAR BEETS.—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
					Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Danish Red Top	April 25	May 9	Oct. 24.	Oct. 24.	33	110	1,101	50	28	1,860	964	20
Danish Improved	" ..	" 9	" 24.	" 24.	29	960	982	40	29	310	971	50
Improved Imperial	" ..	" 9	" 24.	" 24.	28	210	936	50	25	1,370	856	10
Vilmorin's Improved	" .	" 9	" 24.	" 24.	26	250	870	50	25	1,480	858	
Wanzleben	" ..	" 9	" 24.	" 24.	25	160	836		24	1,500	825	
Red Top Sugar	" ..	" 9	" 24.	" 24.	18	1,860	631		23	1,080	784	40

EXPERIMENTS WITH POTATOES.

One hundred and twenty-five varieties of potatoes were tested this year. The soil was a warm loam which was comparatively new, none of it having borne more than two crops since clearing. One hundred and eleven varieties were planted on May 15 and the remainder on the 22nd. All came up evenly and were very promising up to the middle of August, when cold rains set in after a short period of very hot weather, and the stalks turned brown, the foliage fell off and the growth stopped.

This change took place so rapidly and the weather was so continuously wet that there was no chance to do any effective spraying. As will be seen by the following detailed report the yields are very much lighter than they were last year, but the quality is good and the proportion of rotten potatoes is small, and at this date all the varieties are keeping well.

The yields per acre have been estimated in each case from the weight of tubers dug from two rows each 66 feet long.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Planted.	Dug.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Charles Downing	May 13	Oct. 4	462	..	462	..	None...		347	30	114	30	Oval white.
Vigorosa	" 13	" 4	448	32	428	..	22	32	321		107	..	Rose.
Irish Daisy	" 13	" 3	428	16	428	16	None ..		299	49	128	27	White.
Prolific Rose	" 13	" 4	404	48	404	48	" ...		323	51	80	57	Rose.
Sharpe's Seedling	" 13	Sept. 28	403	20	403	20	" ...		302	30	100	50	"
Polaris	" 13	Oct. 4	397	16	385	18	11	58	245	31	139	47	White
Thorburn	" 13	Sept. 29	388	40	388	40	None...		286	32	100	40	Rose.
Early Puritan	" 13	" 29	387	12	387	12	" ...		271	3	116	9	White.
New Variety No. 1	" 13	Oct. 4	387	12	367	51	19	21	276	4	91	47	"
Brown's Rot Proof	" 13	" 3	384	16	384	16	None...		153	42	230	44	Dark red.
Pride of the Market	" 13	" 4	381	20	369	54	11	26	258	56	110	58	White.
Ohio Junior	" 13	" 3	375	28	360	28	15		252	20	108	8	Rose.
Gem of Aroostook	" 22	" 4	374		355	18	18	42	243	6	112	12	Pink.
White Beauty	" 13	Sept. 29	372	30	353	53	18	37	256	53	97	..	White.
Dakota Red	" 13	" 29	371	48	371	48	None...		250	16	111	32	Red.
Rose No. 9	" 13	Oct. 3	371	4	371	4	" ...		204	4	167	.	Rose.
Everett	" 13	Sept. 28	369	36	357	45	11	51	246	53	110	52	Pink.
Seedling No. 230	" 13	" 28	368	8	368	8	None...		276	8	92	..	Round white.
Hale's Champion	" 13	" 29	365	12	343	18	21	54	205	58	137	20	White.
Maggie Murphy	" 13	" 28	363	44	363	44	None...		216	24	127	20	"
Lee's Favourite	" 13	" 28	363		363		" ...		218	34	144	26	Rose.
Empire State	" 13	" 28	362	16	362	16	" ...		235	28	126	48	White.
Hopeful	" 13	" 28	360	48	342	48	18		222	37	120	11	"
Monroe County	" 13	Oct. 3	359	20	359	20	None...		197	38	161	42	Red.
Lopas White	" 13	Sept. 29	357	52	357	52	" ...		250	30	107	22	White.
Reading Giant	" 13	" 28	356	14	356	14	" ...		213	50	142	24	Pink.
Earliest of All	" 13	Oct. 3	356	14	338	25	17	49	196	22	142	3	Rose.
Dreer's Standard	" 13	" 4	354	56	337	12	17	44	236		101	12	White.
Wonder of the World	" 13	" 4	353	28	318	8	35	20	190	52	127	16	Rose.
London	" 13	" 4	350	32	315	32	35		220	50	94	42	"
Uncle Sam	" 13	" 3	349	4	328	8	20	56	196	52	131	16	White.
Stourbridge Glory	" 13	Sept. 28	346	8	346	8	None...		173	8	173	..	"
Maule's Thoroughbred	" 13	" 28	344	20	327	6	17	14	190	27	136	39	Rose.
Bovee	" 13	Oct. 4	343	12	326	3	17	9	228	14	97	49	"
Crown Jewel	" 13	" 4	341	44	324	39	17	5	211	..	113	39	Pale rose.
Early Pride	" 13	" 4	340	16	326	40	13	36	245	..	81	40	Rose.
Bill Nye	" 13	Sept. 28	337	20	317	6	20	14	190	15	126	51	White.
Burnaby Seedling	" 13	" 28	334	24	321	4	13	20	234	..	87	4	Rose.
Burpee's Extra Early	" 13	" 28	331	28	331	28	None...		165	30	165	58	"
Holborn Abundance	" 13	" 28	330		313	30	16	30	214	30	99	..	White.
Troy Seedling	" 13	" 28	327	4	317	16	9	48	228	56	98	20	Red.
Green Mountain	" 13	" 28	322	40	306	40	16		183	50	122	50	White.
Lizzie's Pride	" 13	Oct. 3	321	12	314	42	6	30	192	45	121	57	Pink.
Good News	" 13	" 3	319	44	303	44	16		153	44	150	..	Rose.
Northern Spy	" 13	" 3	315	20	315	20	None...		220	..	95	20	Red.
Satisfaction	" 13	" 3	312	24	312	24	" ...		187	26	124	58	White.
Rural Blush	" 13	Sept. 28	310	56	310	56	" ...		160	56	150	..	Red.
General Gordon	" 13	" 28	308	44	293		15	44	216	30	76	30	Pink.
Early Harvest	" 13	" 28	305	4	289	45	15	19	210	30	79	15	White.
Clarke's No. 1	" 13	Oct. 4	303	36	208	36	15		197	20	106	16	Rose.
Twentieth Century	" 13	" 4	299	56	270	..	29	56	202	30	67	30	Russet.
Freeman	" 13	Sept. 28	298	28	298	28	None ..		194	..	104	28	White.
McKenzie	" 13	Oct. 4	297	44	282	50	14	54	193	30	89	24	"
Houlton Rose	" 13	" 3	296	16	278	30	17	46	192	34	85	56	Rose.
Honeoye Rose	" 13	" 4	295	32	266	..	29	32	173	..	93	..	"
Country Gentleman	" 13	" 4	294	28	265	..	29	28	206	30	58	30	"
Late Puritan	" 13	Sept. 28	294	4	276	50	17	54	176	20	100	10	White.
Vanier	" 13	" 28	291	52	291	52	None...		116	40	185	12	Red.
Seattle	" 13	" 28	291	8	276	38	14	30	174	40	101	58	White.
Early Sunrise	" 13	" 28	289	20	289	20	None...		173	48	105	32	Rose.
Penn. Manor	" 13	Oct. 4	288	50	288	50	" ...		173	18	114	32	"
Early Michigan	" 13	" 4	287	28	273	..	14	28	191	..	82	..	White.
Foreman's Early	" 13	Sept. 28	286	44	272	14	14	30	136	14	136	..	"

POTATOES—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Planted.	Dug.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Chicago Market	May 13	Sept. 28	286		286	..	None	...	228	48	57	12	Red.
Ashleaf Kidney	" 13	" 28	286		286	..	"	...	185	50	100	10	White.
Rochester Rose	" 13	" 28	285	20	285	20	"	...	171	00	114	20	Rose.
Queen of the Valley	" 13	" 29	284	30	284	30	"	...	199	10	85	20	"
Money Maker	" 13	Oct. 3	283	48	283	48	"	...	156	48	127	..	White.
Abundance	" 13.	Oct. 3.	283	48	283	48	None	...	142	..	141	48	White.
Daisy	" 13.	" 3.	283	..	255	..	28	..	152	50	102	10	Rose.
State of Maine	" 13.	" 4.	282	20	282	20	...	...	206	..	76	20	White.
Harbinger	" 13.	" 4.	281	30	273	..	8	30	163	50	109	10	Pink.
Early St. George	" 22.	" 4.	281	..	269	30	11	30	218	30	51	..	Rose.
Early Market	" 22.	" 4.	280	.	266	..	14	..	168	40	97	20	"
American Beauty	" 22.	" 4.	278	42	260	..	16	42	178	20	84	..	White.
New Queen	" 13.	Sept. 28.	278	42	278	42	None	...	153	..	125	42	Rose.
Victor Rose	" 13.	" 29.	277	56	277	56	"	...	149	..	128	56	"
Lightning Express	" 13.	Oct. 4.	277	12	277	12	"	...	194	..	83	12	Red.
Orphans	" 13.	Sept. 29.	271	20	271	20	"	...	176	20	95	.	Pink.
World's Fair	" 13.	" 29	269	52	269	52	"	...	161	52	108	..	White.
Cambridge Russet	" 13.	" 29.	269	30	243	..	26	30	122	..	121	..	"
Early Ohio	" 13.	Oct. 3.	266	44	266	44	None	...	173	20	93	22	Rose.
Clay Rose	" 13	" 3.	266	22	254	..	12	22	178	30	76	30	"
Early White Prize	" 13.	" 3.	266	10	266	10	None	...	159	50	106	20	White.
Brownells Winner	" 13.	" 4.	266	10	252	20	13	50	186	20	66	30	Red.
Early Norther	" 13.	" 4.	265	30	238	..	26	30	172	..	66	..	Pink.
Vick's Extra Early	" 13.	" 4.	264	..	264	..	None	...	171	36	92	24	Rose.
Seedling No. 214	" 13.	" 4.	265	40	239	16	26	24	175	16	64	..	White.
King of the Roses	" 13.	" 4.	265	..	265	..	None	...	185	30	179	30	Rose.
Pride of the Table	" 13.	" 4.	265	..	265	..	"		159	..	106	..	Red.
Enormous	" 22.	" 4.	264	20	250	40	13	40	158	30	92	10	White.
Great Divide	" 13.	" 4.	251	16	238	40	12	36	179	45	58	55	"
Flemish Beauty	" 13.	Sept. 29.	250	48	250	48	None	...	163	..	87	48	Rose.
Algoma No. 1	" 13.	Oct. 4.	249	20	237	10	12	20	149	30	88	30	Pink.
Early Fortune	" 13.	" 4.	247	52	234	29	12	23	166	26	68	23	Rose.
Harvest King	" 22.	" 4.	247	8	234	47	12	21	135	55	98	52	White.
I X L	" 13.	Sept. 28.	244	12	236	53	7	19	134	18	101	35	"
Carman No. 1	" 13.	Oct. 3.	243	38	243	38	None	...	124	..	119	38	"
Hayden's Seedling	" 13.	" 4.	243	16	231	5	12	9	161	16	69	49	Purple.
Quaker City	" 13.	" 4.	242	..	242	..	None	...	157	18	84	42	White.
Early Rose	" 13.	Sept. 29.	237	36	223	21	14	15	106	55	116	26	Rose.
Prize Taker	" 13.	Oct. 3.	234	40	225	17	9	23	87	40	137	37	Red.
Irish Cobbler	" 13.	" 4.	233	56	222	15	11	41	133	21	88	54	White.
Rural No. 2	" 13.	" 3.	231	40	231	40	None	...	116	40	115	..	"
Peerless Junior	" 13.	" 3.	231	18	231	18	"		92	31	138	47	"
American Wonder	" 13.	" 4.	228	48	228	48	"		137	16	91	32	"
Seneca Beauty	" 22.	" 4.	228	48	216	42	12	6	109	..	108	42	Red.
Seedling No. 7	" 13.	" 4.	225	52	214	35	11	17	128	..	86	35	"
Carman No. 3	" 13.	Sept. 28.	222	56	222	56	None	...	164	48	58	8	White.
Table King	" 13.	" 28.	218	32	209	48	8	44	125	52	83	56	"
American Giant	" 13.	" 28.	215	36	215	36	None	...	97	..	118	36	"
Reeves' Rose	" 13.	Oct. 3.	215	36	204	50	10	46	71	10	133	40	Rose.
Delaware	" 13.	" 3.	212	40	212	40	None	...	106	40	106	..	White.
Early Six Weeks	" 13.	" 4.	212	40	202	2	10	38	141	25	60	37	"
Columbus	" 13.	" 3.	205	20	195	5	10	15	81	40	113	25	Rose.
Sir Walter Raleigh	" 13.	" 4.	190	40	190	40	None	...	85	48	104	52	White.
Livingston's Banner	" 22.	" 4.	183	20	174	10	9	10	121	15	52	55	"
Early Gem	" 13.	" 3.	181	52	181	52	None	...	109	7	72	45	Rose.
Beauty of Hebron	" 13.	" 3.	180	24	162	24	18	..	64	57	97	27	Pale rose.
Russell's Seedling	" 13.	" 4.	179	40	161	42	17	58	64	20	97	22	White.
Fillbasket	" 13.	" 4.	179	18	179	18	None	...	85	40	93	38	Red.
Pearce's Prize Winner	" 13.	" 4.	177	28	177	28	"	...	91	28	86	..	Pink.
Pearce's Extra Early	" 13.	" 4.	176	..	176	..	"	...	79	12	96	48	Rose.
Record	" 13.	Sept. 29.	155	28	149	15	6	13	82	5	67	10	White.
Soudan	" 13.	Oct. 4.	146	40	132	..	14	40	59	24	72	36	Russet.

EXPERIMENTS WITH FLAX.

Eight plots of flax were sown in all, in sets of two each. In one of each set the quantity of seed used was 40 pounds per acre in the other 80 pounds per acre. The first set was sown on May 12, the other sets following at intervals of a week, the object being to gain information as to the best time for sowing, and the quantity of seed to use per acre to obtain the best results. The land was loamy and of fair quality, the previous crop was pease. When ripe the flax was cut with a scythe, and on that account the gross weight given for the crop was much less than if it had been pulled. From the following results it will be seen that the lightest sowing has in most instances given the heaviest crop of seed.

EXPERIMENTS WITH FLAX.

Name of Variety.	Pounds of Seed per Acre.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Gross Weight per Acre.		Yield of Seed per Acre.	
					Inches.	Tons.	Lbs.	Bush.	Lbs.
Flax—Plot 1	40	May 12..	Sept. 19..	130	20 to 30	2	240	17	48
" " 2	80	" 12..	" 19..	130	20 to 30	2	1,360	15	40
" " 3	40	" 19..	" 22..	126	20 to 30	2	40	18	32
" " 4	80	" 19..	" 22..	126	20 to 30	2	1,760	16	24
" " 5	40	" 26..	" 25..	122	20 to 26	1	1,920	15	..
" " 6	80	" 26..	" 25..	122	20 to 26	2	1,480	14	16
" " 7	40	June 2..	" 26..	116	36 to 40	2	120	12	48
" " 8	80	" 2..	" 26..	116	36 to 40	3	320	15	..

EXPERIMENTS WITH BUCKWHEAT.

Four varieties of buckwheat were sown on a clover sod. Three of them have done very well, although owing to unfavourable weather during harvesting, a considerable loss was sustained by the grain shelling. The rye buckwheat was a failure, a few plants came up, made a feeble growth and died.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Weight of Straw.	Yield per acre.	
					In.	Lbs.	Bush.	Lbs.
Silver Hull	1/10 of an acre	June 3..	Sept. 18..	110	30 to 40	4,640	32	44
Siberian or Tartarian	"	" 3..	" 18..	110	30 to 40	4,160	32	10
Japanese	"	" 3..	" 23..	114	36 to 44	5,920	27	34
Rye Buckwheat	"	" 3..	*					

*Only a few seeds germinated and these made a feeble growth, but did not blossom.

EXPERIMENTS WITH FODDER CROPS.

MILLETS.

The following millets were sown in drills, all except the Japanese millet, having the drills seven inches apart. The Japan millet was in drills nine inches apart. The soil was a sandy loam and had produced a crop of roots in 1898, and was in good condition. The first sowing was made on May 2, and the seed failing to germinate the plots were resown on May 22, and again the third time on June 9, even then the crop was very thin and uneven. The yield was light as will be seen from the weights given below which are for the green crop. Owing to the lack of sunshine and drying weather it could not be cured, and was put green into the silo.

Plot No. 1.—White round extra French.—Length of stalk, 8 to 14 in. Length of head ¾ to 1½ in. Yield per acre when cut Oct. 28, 1 ton 40 pounds.

Plot No. 2.—Late Pearl.—Length of stalk, 10 to 14 in. Length of head, 2 to 3 in. Yield per acre when cut Oct. 28, 1 ton 920 pounds.

Plot No. 3.—Early Pearl.—Length of stalk 16 to 20 in. Length of head 3 to 3½ in. Yield per acre when cut Oct. 28, 2 tons 1,720 pounds.

Plot No. 4.—Italian Millet.—Length of stalk 16 to 20 in. Length of head 4 to 6 in. Yield per acre when cut Oct. 28, 3 tons 1,400 pounds.

Plot No. 5.—Japanese Millet.—Length of stalk 30 to 36 in. Length of head 3 to 4 in. Yield per acre when cut Oct. 28, 5 tons 400 pounds.

Plot No. 6.—Hungarian Grass.—Length of stalk 8 to 10 in. No heads formed. Yield per acre when cut Oct. 28, 1,800 pounds.

SOJA BEANS.

Plot No. 7.—Soja Beans.—Hills 21 inches apart.—Sown, May 1. Height 28 to 34 in. Weight per acre when cut Oct. 21, 2 tons 80 pounds. These beans did not make a strong growth or full foliage and there were very few pods on the plants.

Plot No. 8.—Soja Beans.—Drills 28 inches apart—sown May 1. Height 28 to 34 in. Weight per acre when cut, green, October 21, 2 tons 280 pounds. Pods not plentiful.

Plot No. 9.—Soja Beans.—Drills 35 inches apart—sown May 1. Height 30 to 34 in. Weight per acre when cut, green, Oct. 21, 2 tons 1,680 pounds. Pods fairly plentiful.

HORSE BEANS.

Plot No. 10.—Horse Beans.—Drills 21 inches apart—sown May 1. Height 30 to 36 in. Yield per acre when cut, green, Oct. 21, 2 tons 600 pounds. A very poor stand, pods few and small.

Plot No. 11.—Horse Beans.—Drills 28 inches apart—sown May 1. Height 30 to 36 in. Yield per acre when cut, green, Oct. 21, 2 tons 920 pounds.

Plot No. 12.—Horse Beans.—Drills 35 inches apart—sown May 1. Length of stalk 30 to 36 in. Yield per acre when cut, green, Oct. 21, 1 ton 1,200 pounds. The beans on all these plots germinated unevenly and the crop was a poor one.

SORGHUM.

Plot No. 13.—Early Orange sugar cane—sown May 29, in drills 36 inches apart and thinned to 6 to 8 inches in the row. The stalks were slender and not very leafy. Length of stalks 7 ft., 2 in. Yield per acre when cut, green, Oct. 30, 9 tons, 260 pounds.

Plot No. 14.—Early Amber sugar cane—sown May 29, in drills 36 inches apart and thinned to 6 to 8 inches in the row. Stalks moderately stout and leafy, tasselled Sept. 28. Length of stalk 84 to 90 in. Yield per acre when cut, green, Oct. 30, 13 tons 400 pounds.

CROPS OF MIXED GRAIN.

Plots of $\frac{1}{10}$ of an acre each were sown with the following mixtures of grain and cut when the oats were in the soft or dough condition.

Mixture No. 1, 1 bushel each of pease, oats and barley.

Mixture No. 2, 1 bushel each of pease, oats and wheat.

	Sown.	Cut.	Weight when cut. Tons.	Lbs.	Weight dry. Tons.	Lbs.
Mixture No. 1..	May 4	July 29	8	1,530	3	1,980
Mixture No. 2...	" 4	" 29	9	30	4	300

GRASSES.

The following grasses have been sown for a comparative test:—*Bromus inermis*, 1 acre; *Bromus pinnatus*, $\frac{1}{20}$th of an acre; *Bromus Schraederi*, $\frac{1}{20}$th of an acre and *Bromus giganteus* $\frac{1}{20}$th of an acre. These grasses were sown on a gravelly loam, and pease at the rate of 1 bushel per acre sown along with them as a nurse crop.

Bromus inermis has made a strong thick stand and looks very promising.

Bromus pinnatus seed did not germinate.

Bromus Schraederi. The seed of this grass germinated well and a fine even sod covers the plot.

Bromus giganteus. There is a fine growth of this grass, and should it stand the winter, it promises to be of value as a pasture grass, being very leafy.

BROOM CORN.

Two plots of broom corn were sown May 29. In one plot the drills were 21 inches apart and in the other 29, and in both cases the plants were thinned to from 4 to 8 inches apart in the rows. The seed was very slow in germinating and the plants made a very poor growth, cold wet weather does not suit broom corn.

Plot 1, 21 inches apart, stalks slender, 100–110 inches long, yield per acre 12 tons 1,268 pounds.

Plot 2, 28 inches apart, stalks medium slender, 100 to 120 inches long. Only a few plants tasselled, yield per acre 11 tons 313 pounds.

CANARY SEED.

An experimental plot of this seed was sown on May 1. It did not germinate and was resown twice, the last time on June 12. The stand was poor and the growth weak, cut October 28.

Yield per acre 1 ton 200 pounds. Yield per acre of seed 290 pounds.

CLOVER SEED INOCULATED WITH NITRAGIN.

Four plots of $\frac{1}{20}$th of an acre each were sown with clover seed, June 11, 1898. Two of these were sown with seed which had been inoculated with nitragin and two with untreated seed. Seven pounds of seed per acre was used in one set of plots and ten pounds per acre in the other set. The seed germinated well, but owing to dry weather after sowing there was not much growth and no crop was cut from three plots that year. The treated and untreated seed were both sent from the Central

Experimental Farm at Ottawa. Following is the yield of the first crop, both green and after it was cured :—

Seed per Acre.	Cut.	Weight, green per Acre.		Weight, cured per Acre.	
		Tons.	Lbs.	Tons.	Lbs.
Plot 1, 7 lbs. untreated	July 11..	11	1,700	3	1,960
" 2, 7 " treated	" 11..	10	1,740	3	1,340
" 3, 10 " untreated	" 11..	13	1,400	4	1,060
" 4, 10 " treated	" 11..	13	1,100	4	1,100

The soil where these plots were located has been cropped for ten years, and is uniform in character and condition, so that the test has been a fair one.

LUPINS.

Two varieties of lupins were sown on April 25. The growth of these plants was feeble and slow, and the pods were very short and frequently contained no seed.

White lupins, sown in drills 15 inches apart, growth from 6 to 10 inches high, did not branch well, and pods did not average more than two seeds. Ripe, August 18.

Yellow lupins, sown in drills 15 inches apart, made a feeble growth, and produced very little seed ; stalks, 6 to 12 inches high, with few branches ; pods short and very few seeds in them. Ripe, August 18.

DISTRIBUTION OF SEED GRAIN, ETC.

A summary is herewith submitted of the seed grain, scions, plants, &c., distributed in 1899 :

	3-lb. pkgs.
Wheat	27
Oats	74
Pease	67
Barley	34
Potatoes	243
Scions and cuttings	161
Small fruits	93
Tree seeds and nuts	48
	747

SUMMARY OF CROPS HARVESTED DURING 1899.

	Tons.	Lbs.
Clover hay cured	38	580
Mixed grains cured for feed	18	....
Clover in silo	18	1,665
Corn	26	1,600
Sugar beets	2	670
Mangels	13	150
Carrots	14	200
Turnips	24	1,300
Total	156	165

EXPERIMENTS WITH GARDEN VEGETABLES.

PEASE.

Thirty-five varieties of garden pease were sown April 24 and 25. The weather was so cold and wet that some varieties were almost a failure on account of the seed not germinating, and all suffered to a considerable extent from this cause. The following is a list of those sown with some notes on the quality of the crop:—

GARDEN PEASE—TEST OF VARIETIES.

Name of Variety.	Fit for Table.	Character of Straw.	Length of Straw.	Remarks.
			In.	
McLean's Blue Peter	July 4..	Medium..	12-18	Pods medium length, quality good.
Bliss' Everbearing	" 10..	" ..	30-00	" long, pea large " "
Early Premium Gem	" 8..	" ..	24-30	" " " medium " fair.
Tom Thumb	" 7..	Short....	10-15	" medium, pea medium, quality good.
Telegraph	" 20..	Medium..	36-42	" long " large "
Nott's Excelsior	" 7..	Weak	10-12	" medium " medium " very good.
Daisy	" 22..	Strong....	18-24	" long " large " "
Pride of the Market	" 27..	Medium..	16-24	" " " " " "
American Wonder	" 10..	Weak	10-14	" medium " medium " fair.
Rennie's Perfection	" 20	Medium..	30-36	" very long " large " good.
Duke of Albany	" 21..	" ..	30-36	" long " " " very good.
Yorkshire Hero	" 23..	Strong ...	30-40	" medium " medium " fair.
Champion of England	" 24..	" ...	36-48	" long " " " "
William Hurst	" 4..	Poor.....	6-12	" medium " " " very good.
Rennie's Queen	" 28..	Strong....	36-44	" " " large " "
McLean's Advancer	" 22.	Medium.	30-36	" very long " " " "
Dr. McLean	" 20..	" ..	16-24	" " " " " "
Horsford's Market Garden	" 18..	Strong....	30-40	" medium " " " fair.
Rennie's Extra Early	" 8..	"	44-54	" " " small " "
Telephone	" 24..	"	40-48	" " " large " good.
Alaska	" 8..	Medium..	20-30	" " " medium " "
Heroine	" 8..	" ..	18-24	" " " " " "
Extra Early Conqueror	" 10..	Strong....	30-36	" " " " " fair.
Gradus	" 6..	Medium..	20-28	" " " large " good.
C.P.R	" 20.	Strong....	30-36	" " " medium " fair.
Improved Daniel O'Rourke	" 7..	"	36-48	" " " small " good.
Blue Beauty	" 16..	Medium..	18-24	" " " medium " "
Carter's First Crop	" 11..	" ..	28-32	" " " " " fair.
Stratagem	" 30..	" ..	28-34	" " " large " good.
Eclipse	" 14..	" ..	24-30	" " " medium " "
The Queen	Aug. 1..	" ..	30-36	" long " large " very good.
Shropshire Hero	July 26..	" ..	16-24	" " " " " "
Rural New Yorker	" 10..	Strong....	30-36	" medium " medium " fair.
Admiral	" 20..	"	24-30	" long " large " good.
McLean's Little Gem	" 20..	Weak	10-12	" " " medium " "

BEANS—VARIETIES OF GARDEN.

The following beans were sown in drills 30 inches apart. The weather was so wet and cold for some time after they were planted that a large proportion of the seed did not germinate. In some varieties only a few plants came up and the growth was feeble, the pods short in length and few in number. Later in the season the continuous rains spoiled the beans, many of them sprouting in the pods, before they were quite ripe.

Sown May 19.

California Pea.—Only a few plants came up and these made a feeble growth, pods 1 to 1½ inches long.

Mexican Tree.—Very few plants came up and no pods were produced.

White Field.—These germinated fairly well, but the growth was slow and feeble and the pods were short, containing from one to three beans, and many sprouted before they could be harvested.

White Marrowfat.—A poor stand and very feeble growth, pods short and not well filled.

Dwarf or Bush Stringless Wax.—Only a few plants came up and no pods formed.

Cuban Asparagus.—Very few plants came up and these made a feeble growth and did not produce any beans.

Extra Early Valentine.—Of these there was a fairly good stand, and a fair crop of short pods was produced. They were fit for table July 22.

Refugee.—About half of the seed of this variety grew and a few of the plants were very well podded, but seed could not be saved on account of the rain. Fit for table August 12.

Dwarf Bush or Golden Wax.—Very few seeds germinated, the plants made a feeble growth and the pods were short and poorly filled. Fit for table July 20.

Dwarf German Black Wax.—Only a few plants came up and these were not well podded.

Mammoth Red or German Wax.—This seed did not germinate well, and the crop was poor. Fit for table July 25.

GARDEN CORN.

Three varieties of table corn were planted in a warm sandy loam. The Metropolitan and Cory produced ears fit for use, but were unusually late. The Early Giant is not early enough to be of value in this climate.

The pop corns have always ripened their grain in previous years, but this year the ears were not glazed when cut.

GARDEN CORN—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Character of Growth.	Description of Variety.	Height.	Remarks.
				Inches.	
Metropolitan	June 2.	Medium..	Sweet corn..	68-75	Fit for table Sept. 10. Ears 6 to 8 in. long and well filled.
Extra Early Cory	" 2.	" ..	" ..	60-65	Fit for table Sept. 1. Ears 4 to 6 in. long and well filled.
New Early Giant	" 2.	" ..	" ..	48-54	No ears fit for table when cut, Oct. 20.
Pop Corn, Striped	" 2.	.... .	Pop corn ...	50-56	Scarcely in milk when cut, Oct. 20.
" White Pearl..	" 2	....	" ...	50-60	Only in roasting ear when cut, Oct. 20.
" Early Amber.	" 2.	....	" ...	50-60	Very early milk, Oct. 20.
" White Rice ..	" 2.	.....	" ...	60-66	In milk when cut, Oct. 20.

LARGE FRUITS.

APPLES.

The cold, wet weather before, during and for a considerable time after blossoming is believed to be the cause of the very light apple crop. A number of the old trees bore a fair crop, amongst the best of these may be mentioned Belle de Boskoop, Duchess, Ben Davis, Jonathan, Salome, Smith's Cider, Scott's Winter, Stark, Wolf River, Grimes Golden and Sutton Beauty. The fruit is not so large nor of as good quality as in previous years, and is not keeping well. Quite a number of winter apples are matured at this date and showing signs of decay. The trees on the bench land, as well as those on the level are well furnished with fruit buds, and look promising for next year. Only a few of the young trees came into bearing this season.

Nancy Jackson.—A vigorous grower and an early bearer. Fruit above medium in size, rather flat, conical. Skin yellowish, with a little russet about the stem, and splashed and streaked with bright red. Flesh white, juicy, tender, mildly acid. Season December.

American Summer Pearmain.—Tree a moderate grower. Fruit of medium size, slightly conical. Skin yellow, streaked and spotted with red. Flesh yellow, tender, of high flavour. Season August.

Arabka (Budd and Gibb).—Tree a strong grower. Fruit of medium size, oblong, conical. Skin yellowish green, with a faint blush. Flesh white, tender, juicy, subacid. Season August.

Benoni.—Tree vigorous. Fruit small to medium, roundish, conical. Skin yellow, striped and spotted with red and sprinkled with dots. Flesh yellow, tender, juicy, subacid. Season August.

Cockle Pippin.—Tree a strong grower and productive. Fruit of medium size, roundish, conical. Skin greenish, with a brown russet nearly over the whole surface. Flesh yellow, firm, crisp, aromatic. Season January and February.

Cinnamon Pine.—Tree a vigorous grower and productive. Fruit of medium size, rather flat, conical. Skin yellowish green, with a faint blush. Flesh white, not juicy, nearly sweet. Season October.

Carmelite Reinette.—Tree a vigorous grower and an early bearer. Fruit large irregularly conical. Skin yellowish green. Flesh tender, white, not juicy, nearly sweet. Season August.

Cadeaux du General.—Tree a strong grower. Fruit large, roundish, conical. Skin dull yellow splashed with red and having a few gray dots. Flesh white, tender, juicy, mildly acid. Season January to March.

Crawford Pippin.—Tree a vigorous grower. Fruit above medium in size, globular. Skin yellow with a few red splashes on sunny side. Flesh white, crisp, juicy, nearly sweet, pleasant. Season December and January.

Dutch Mignonne.—Tree a moderate grower. Fruit medium in size, slightly conical, skin rough, yellow, striped with two shades of red. Flesh tender, juicy, mildly acid. Season January and February.

English Reinette.—Tree a medium grower. Fruit of medium size, nearly conical, skin bright yellow, with deep red nearly over the whole surface. Flesh yellowish, crisp, firm, juicy, acid. Season December and January.

Early May.—A moderate grower. Fruit small, nearly flat, skin yellow with a faint blush. Flesh crisp, not juicy, inferior in quality. Season August.

Gideon.—Tree a vigorous grower and a free bearer. Fruit large, oblong, conical, skin yellow, with a blush on sunny side. Flesh white, juicy, sprightly acid. Fruit becomes water cored soon after ripening. Season August.

Graham's Royal Jubilee.—Tree a vigorous grower. Fruit large, globular, inclining to conical, skin yellowish green, with a dull reddish blush. Flesh white, crisp, juicy. Season winter.

Koursk Anis.—Tree a vigorous grower. Fruit of medium size, rather flat, conical, skin green, nearly covered with dull purple. Flesh white, soft, sprightly, juicy and pleasant. Season last of August.

Little Red Romanite.—Tree a moderate grower. Fruit small, oblong, and flattened at calyx, skin green, nearly covered with purple and sprinkled with gray dots. Flesh white, firm, crisp, juicy, mildly acid. Season January to March.

Munson's Sweet.—A medium grower. Fruit of medium size, somewhat conical, skin pale yellow. Flesh yellowish, juicy, sweet. Season November and December.

Reinette de Caux.—Tree a vigorous grower. Fruit above medium in size, roundish, skin yellow with splashes of red. Flesh yellowish, tender, juicy, pleasant. Season December to January.

Summer Queen.—Tree a strong grower. Fruit large, broad and tapering to the eye. Skin yellow with red streaks. Flesh yellow, crisp, juicy, aromatic. Season August.

Winter May.—Tree a slow grower. Fruit small, conical, skin greenish yellow with a dull red cheek. Flesh white, solid, not juicy, but mildly acid. Season February.

CRAB APPLES.

Chase's Jelly.—Tree a strong grower. Fruit of medium size, skin greenish yellow, with a dull blush. Season September, not valuable.

From the Central Experimental Farm, there has been received this season forty-one varieties of apples. From English and French nurseries and other sources one hundred and ninety-eight varieties. None of these have yet been tested here, all have made a fair growth.

Red Winter Calville and Cantil Sinap, described in my report for 1898, and classed as winter apples, proved to be good keepers, both keeping in good condition until the middle of May. Cantil Sinap is above medium in size, free from scab, very juicy and firm, and as the tree is a vigorous grower and productive, it promises to be a desirable variety for this climate.

PEARS.

The pear trees bloomed very profusely last spring, especially many of the younger trees, but the cold wet weather during the blossoming period prevented the fruit setting, and only a few of the older trees had any fruit. In this respect the Russian pears do not appear to be any hardier than other varieties, as they all blossomed freely but only produced a few pears. A few of the pear trees were injured by the severe frost in November of 1897, making a feeble growth in 1898, and this year several of them died. Only one tree fruited this year which had not fruited before, Hohensaten Spath, No. 1,176. Fruit of medium size, obtuse pyriform, skin yellow with a faint blush, flesh white, juicy, buttery and of high pleasant flavour, season last of September.

Of the new varieties that have fruited for several seasons, the Dr. Jules Guyot, La France, Rivers' Princess and Durondeau are the most satisfactory. These produce crops of handsome fruit of good quality, and the trees are strong, healthy growers and productive.

The additions to the collection this year, are from French nurseries, 188 varieties, English nurseries, 18, and one from the United States, all of these trees have lived and the most of them have made a fair growth. The collection of pears now includes five hundred and seventy varieties.

PLUMS.

The plum crop has been the poorest we have had since the trees commenced fruiting, and the fruit was from ten days to three weeks later in ripening than in previous years. The following are the only new varieties which have fruited this year.

Dunlap.—Tree a strong grower, fruit above medium size, 1½ to 1¾ inches long, egg shaped. Skin clear golden yellow with a reddish cheek, flesh yellow, rich, juicy, sweet; ripe September 4.

Orange.—Tree a vigorous grower. Fruit of medium size, globular, skin deep yellow, flesh yellow, juicy, sprightly, ripe September 10.

Fursts Damson.—Tree a medium grower, fruit small, oblong, tapering to each end, skin purple, with a bluish bloom, ripe September 20.

There was much plum rot in the small plum crop this year. The following varieties although growing close to some which were affected, escaped the rot entirely.

Belgian Purple, Diamond, Dunlop, Kirkes, Grand Duke, Mallard, Monarch and Mitchelson. With the exception of Dunlop all of these have fruited for some years, and the trees are vigorous growers and productive, and the fruit is fine in quality and of good size. They are also good shippers.

There have been added to the collection this season fifty-two varieties mainly from European nurseries. This brings the collection up to 287 varieties.

CHERRIES.

The same causes which prevented the apples, pears and plums from fruiting affected the cherries also, and the crop was very small.

The following produced a few cherries for the first time :—

Mercer.—Tree a vigorous grower; fruit large, obtuse heart-shape, flattened; skin dark red; flesh firm, juicy, sweet and pleasant. Ripe July 26.

Early Mottled.—Tree a moderate grower; fruit of medium size, heart-shaped; skin yellow mottled with red; flesh yellowish, juicy, sweet and pleasant. Ripe, June 27.

Boppard.—Tree a vigorous grower; fruit large, obtuse, heart-shaped; skin dark glossy red; flesh red, firm, juicy and sprightly. Ripe June 27.

Beauty of Orleans.—Tree a medium grower; fruit above medium in size, nearly oval in shape; skin yellowish white, mottled with red; flesh whitish, tender, juicy and refreshing. Ripe June 27.

Red May.—Tree a vigorous grower; fruit of medium size, heart-shaped, glossy red; flesh reddish yellow, firm, juicy and sprightly. Ripe June 20.

Early Mathere.—Tree a vigorous grower; fruit medium in size, oval, glossy red; flesh yellowish-red, juicy, sweet; stone small. Ripe June 27.

The Russian cherries stood the unfavourable weather in the spring better than most of the other varieties, and the following sorts bore fair crops: Straus Wiechsel, Shadow Amarelle, Griotte du Nord and Gruner Glass.

Thirty-five varieties of cherries have been added to the collection since my report for 1898. Some have come from the Central Experimental Farm, and some from European nurseries.

PEACHES.

A very few Amsden Pine, Early Canada and Foster peaches and a fair crop of Amsden Pine on a tree on the first bench was all the crop of this fruit we had that ripened this year. The Chinese Blood and Indian Blood both fruited, but the fruit did not ripen. The peach trees were sprayed with Bordeaux mixture before blossoming and as soon as the bloom fell and twice afterwards, but the curl leaf was very bad, every tree being affected. The trees on the upper benches as in former years were nearly exempt from this disease. When the weather is showery, as it frequently is here in spring, the spraying does not appear to be effective in preventing fungus diseases. Twenty-nine varieties of peaches have been received and planted this year, all have made a strong growth and these have not been attacked by the curl leaf

NECTARINES.

Like the peaches, nectarines have been a failure. The old trees are being killed off gradually by fungoid diseases and although they blossom freely every season they do not fruit; one nectarine was the extent of the crop this year. Seven new varieties have been planted this season and all have made a fair growth.

APRICOTS.

The European and American apricots grow vigorously for a few years and bloom profusely, but after that the trunks begin to decay and the limbs die, and after a time the whole tree is gone. The Russian varieties appear to be hardier and more suited to the climate as far as tree growth is concerned, but none of the apricot trees ever produced more than a few inferior specimens of fruit. Five new varieties from Europe were received this year.

QUINCES.

The quince bushes are making a fair growth, but only the Orange quince has produced a few small specimens up to the present time.

MEDLARS.

All the medlar trees have made a strong growth, and the older trees fruited again this year.

This fruit is very little known and not valued as it will be when its merits are appreciated. It is vigorous in growth and productive, and up to the present time has had no insect enemies, and the fruit makes the finest flavoured jelly.

MULBERRIES.

The mulberry trees fruited freely again this year. The fruit began to ripen in July and continued up to October. The fruit of most of the varieties is large, sweet and of pleasant flavour.

GRAPES.

All the varieties made a vigorous growth and fruited freely this year, but the only sorts which ripened were:

Saunders Seedling No. 1.—This vine is very productive, cluster of medium size, very compact. Grape of medium size, white, thin-skinned and pure flavour, sweet. The finest grape for this climate and locality amongst all those which have fruited up to the present time.

Moyer and Poughkeepsie Red, both red grapes, ripened fairly well. Both are sweet and pleasant grapes, but the bunches are not compact, and they drop readily when fairly ripe.

Moore's Early, black, ripened, but is not early enough to mature its best flavour or its full sweetness.

Many other varieties produced full crops, and two weeks of sunshine in September would have ripened a large percentage of them.

SMALL FRUITS.

GOOSEBERRIES.

The gooseberry bushes were given a dressing of barn-yard manure last winter, and in spring one of wood ashes, in hopes that by promoting a vigorous growth and by careful spraying, the mildew could be controlled.

The results were not satisfactory, as all the European varieties were badly affected, both in the foliage and fruit.

The only bushes which escaped were those on the bench, which have always been free from this disease.

RED AND WHITE CURRANTS.

The red and white currants were a very good crop this year. The currants were large and most of the varieties were productive.

Black currants were also large and productive, but all were considerably later in ripening than in previous years.

RED AND WHITE CURRANTS.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
La Turinese (red.)	July 5	Vigorous ...	Medium	Cluster medium in length, well filled, of good quality.	Productive.
Moore's Ruby (red.)	" 5	Moderately vigorous.	"	Cluster medium, not well filled, a little acid, of good flavour.	"
Versailles (red.)	" 5	Vigorous ..	Large	Cluster long medium, well filled, of good flavour.	"
Fay's Prolific (red.)	" 5	" ..	"	Cluster long, well filled, of fine flavour.	"
Red Langtraubige.	" 5	" ..	"	" " ..	"
Admirable (red.)	" 6	Moderately vigorous.	"	Cluster long, well filled, of good flavour.	"
Victoria (red)..	" 6	Vigorous ...	Large, medium	Cluster long, moderately well filled, of good flavour	"
Eyatt's New (yellowish white.)	" 7	" ..	" ..	Cluster long medium, not well filled, sweet, of good flavour.	"
English Red ...	" 7	" ..	Small to large.	Cluster long, well filled, of fine flavour.	"
Large White Brandenburg.	" 7	" ..	Large	Cluster large and well filled, very fine and sweet, of good flavour.	"
White Kaiser.	" 7	" ..	Large, medium	Cluster long, but not well filled, of good flavour.	"
Raby Castle (red.)	" 8	" ..	Medium	Cluster long, not very well filled, of good flavour.	"
London Red ...	" 8	" ..	"	Cluster medium, well filled, sweet, and of good flavour.	Moderately productive.
White Transparent.	" 8	" ..	Large	Cluster long medium, not well filled, of good flavour.	Productive.
La Fertile (red.)	" 8	" ..	" .. .	Cluster medium, well filled, of very fine flavour.	"
White Gondoin.	" 8	" ..	Medium.....	Cluster medium, well filled, sweet, and ot good flavour.	"
La Hative (red.)	" 8	Moderately vigorous.	"	Cluster medium, fairly well filled, of good flavour.	"
Knight's Early Red.	" 8	" ..	Small.....	Cluster short, not very full, of good flavour.	Moderately productive.
Prince Albert (red.)	" 8	" ..	Medium.....	Cluster long, moderately full, of good flavour.	"
Esperen's White	" 9	" ..	Large	Cluster long medium, well filled, sweet and of good flavour.	Productive.
Large White...	" 9	" ..	Large, medium	" " ..	Moderately productive.
White Cherry..	" 9	" ..	" ..	Cluster long, well filled, sweet, and of good flavour.	Productive.
Red Cherry....	" 9	" ..	Large	Cluster long, fairly well filled, of good flavour.	"
White Pearl....	" 9	" ..	Medium.....	Cluster medium, fairly well filled, of good flavour.	"
Red Dutch.....	" 9	" ..	Large, medium	" " ..	"
White Dutch...	" 9	" ..	Medium... .	Cluster long, not very well filled, sweet and of good flavour.	"
North Star (red)	" 9	" ..	"	Cluster long, fairly well filled, of good quality.	"
La Conde.....	" 9	" ..	"	Cluster long, fairly well filled, and of good flavour.	"
Rankin's Red ..	" 9	" ..	Small.....	Cluster medium, fairly well filled, acid, but of good quality.	"
Frauendorfer (red.)	" 10	" ..	Large	Cluster long and well filled, a little acid, but of good flavour.	"
Verrier's White.	" 10	" ..	Large, medium	Cluster long, but not well filled, sweet and of fine flavour.	"

RED AND WHITE CURRANTS—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Chenonceau (red.)	July 10	Moderately vigorous.	Very large....	Cluster long, and fairly well filled, of very fine flavour.	Productive.
Ringen's (red)..	" 10	Vigorous ...	Large, medium	Cluster long, not well filled, a little acid, of good flavour.	Moderately productive.
Beauty of St. Giles.	" 10	Moderately vigorous.	Large	Cluster long, well filled, a little acid, of good flavour.	Productive.
Large White Dessert.	" 11	Vigorous ...	"	Cluster long, well filled, acid, but of very good flavour.	"
De la Rochepoze (pink.)	" 12	Moderately vigorous.	Small.....	Cluster medium, not well filled, quality inferior.	Moderately productive.
White Champaigner.	" 12	Vigorous ...	"	Cluster long medium, fairly well filled, of good flavour.	Productive.
White English..	" 12	Moderately vigorous.	Medium.....	Cluster long and fairly well filled, of good flavour.	"
Red Champaigner.	" 12	Vigorous ...	"	Cluster long, well filled, acid, but of good flavour.	"
Red Gondoin...	" 12	" ..	Small	Cluster short, not well filled, quality inferior.	Not productive.
Large Red.....	" 12	" ..	Medium.....	Cluster long, fairly well filled, of good flavour.	"
White Grape...	" 12	" ..	Above medium	Cluster long and well filled, of good flavour.	"

BLACK CURRANTS.

Victoria.....	July 15	Vigorous...	Medium.....	Cluster long, medium, of mild flavour, sweet, of good quality.	Productive.
Ambrafarbige..	" 15	" ...	"	Cluster short, medium, mild, of good flavour.	Moderately productive.
Gewohnliche..	" 15	" ...	"	Cluster short, sweet, with a mild pleasant flavour.	Productive.
Dominion.....	" 15	" ...	"	Cluster short, with a fine mild pleasant flavour.	"
Star..	" 15	" ...	"	Cluster long, medium, sweet, of mild flavour.	Moderately productive.
London.....	" 15	" ...	Medium to large.	Cluster long, medium, mild sweet, and of pleasant flavour.	"
Success.....	" 15	" .	Medium.....	Cluster long, sweet, with a mild flavour.	Productive.
Prince of Wales	" 15	" ...	Large.....	Cluster long, sweet, with a mild fine flavour.	"
Ruler....	" 15	" ...	Medium.....	Cluster long, medium, mild, flavour, sweet, of good quality.	"
Norton.....	" 15	" ...	Large, medium	Cluster long, of good flavour...	"
Middlesex. ...	" 15	" ...	" ..	Cluster medium, sweet, and of fine flavour.	Moderately productive.
Kentish Hero..	" 15	" ...	Medium.... .	Cluster medium, rather acid....	"
Pearce.....	" 15	" ...	Large.....	Cluster medium, sweet with a mild flavour.	Productive.
Bang Up.....	" 16	" ...	Very large....	Cluster long, medium, with a mild flavour, sweet and good.	"
Merveille de la Gironde.	" 16	" ...	Medium	Cluster long, medium, and of good flavour.	Moderately productive.
Lennox.. ...	" 16	" ...	"	Cluster long, medium, and of fair flavour.	Productive.
Lewis.....	" 16	Moderately vigorous.	Small	Cluster medium and of good flavour.	Moderately productive.
Eagle..... ...	" 16	Vigorous ...	Large	Cluster long, of a rather strong flavour.	Very productive.

BLACK CURRANTS—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Baldwin	July 16	Moderately vigorous.	Large, medium	Cluster long, medium, sweet, and of good flavour.	Moderately productive.
Pomona	" 16	Vigorous	Very large	Cluster long, mild, of fine flavour, sweet, of good quality. Probably the best black currant in the collection.	Very productive.
Stirling	" 16	"	Large, medium	Cluster long, medium, flavour a little rank.	Productive.
Stewart	" 16	"	Medium	Cluster medium, flavour a little rank.	"
Climax	" 16	"	Large	Cluster long, sweet, and of good flavour.	Moderately productive.
Ontario	" 17	"	"	Cluster long, flavour a little rank.	Productive.
Lanark	" 17	"	Medium	Cluster short, flavour a little rank.	"
Wood	" 17	"	Large, medium	Cluster medium, and of good flavour.	"
Louise	" 17	"	Medium	Cluster medium, of fair flavour.	"
Ogden's Black	" 17	"	Medium to large.	Cluster short, flavour, a little rank.	"
Henry	" 17	"	Large	Cluster long, sweet, and of good flavour.	"
Oxford	" 17	"	Medium	Cluster medium, of fairly good flavour.	Moderately productive.
Parker	" 17	"	"	Cluster medium, flavour a little rank.	"
Bella	" 18	"	Small	Cluster medium, of fairly good flavour.	Productive.
Eclipse	" 18	"	Large	Cluster long, and of good flavour.	"
Lee's Prolific	" 18	"	Large, medium	Cluster medium, of fairly good flavour.	"
Monarch	" 18	"	"	Cluster long, a little acid with a pleasant flavour.	"
Black Naples	" 18	"	"	Cluster long, sweet, with a mild flavour.	"
Kentville	" 18	"	Medium	Cluster short, rather rank	Moderately productive.
Beauty	" 18	"	Small	Cluster short, of fair flavour	Very productive.
Clarence	" 18	"	"	Cluster short, of fairly good flavour.	Not productive.
Ethel	" 20	"	Large, medium	Cluster long, medium, a little acid, but of good flavour.	Productive.
Manitoba Wild	" 25	"	Small	Cluster short, rank and of poor quality.	Not productive.

RED AND YELLOW RASPBERRIES.

The red and yellow raspberries were a good crop, the berries were large and of good quality.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Hansel	July 5	Vigorous	Medium	Bright red, round, large, with a poor flavour.	Productive.
Crimson Beauty	" 7	Moderately vigorous.	"	Bright red, firm, of good flavour	"
Champion	" 7	Vigorous	Large	Red, sweet, of good flavour, but soft.	"
Thompson	" 10	"	Medium	Bright red, firm, but crumbly, with a sprightly and rich flavour.	"
Paragon	" 10	Moderately vigorous.	Large	Bright red, of fairly good quality	Moderately productive.
Baumforth Seedling.	" 10	Vigorous	Medium	Dark red, crumbly, but of good flavour.	Productive.
Brinckle's Orange.	" 10	"	Large	Firm, sweet and of good quality	"
Fastolf	" 10	"	"	Clear red, moderately firm and of good quality.	"
All Summer	" 10	"	Above medium	Red, firm, with a rich flavour, continues in bearing nearly six weeks.	"
New Fastolf	" 10	"	Large	Dark red, conical, sweet, with a moderately good flavour.	"
Large Yellow	" 10	"	Large medium	Soft and not of very good flavour	"
Heebner	" 10	"	Above medium	Red, firm, sweet and of good flavour.	"
Franconia	" 10	"	Medium	Dark purplish red, acid and of fair quality.	"
Turner	" 10	Moderately vigorous.	Small	Crumbly, but of fair flavour	"
White Antwerp	" 10	Vigorous	Above medium	Yellowish white, round, sweet, rather soft, of fair flavour.	"
Phœnix	" 10	"	"	Dark red, firm, sweet and of good flavour.	"
Northumberland Fill Basket.	" 12	"	Very large	Dark red, firm, sweet and of fine flavour.	"
Battler's Giant	" 12	"	Above medium	Dark red, sweet, firm and of good flavour.	"
Muskingum	" 12	"	"	Dark red, round, sweet and of good flavour.	Very productive
Hornet	" 12	"	Large	Dark red, round, firm, sweet and of very good flavour.	Productive.
Golden Queen	" 12	"	"	Firm, sweet, of good flavour, the best yellow berry in the collection.	"
Marlboro'	" 12	"	Small	Too small to be of much value, of fair flavour.	Very productiv
Lord Beaconsfield.	" 12	"	Large	Bright red, firm, of very good quality.	Productive.
Yellow Antwerp	" 12	"	Medium	Soft, liable to spoil on bush as soon as ripe.	"
Spineless Yellow	" 12	"	Large	Sweet, soft, a good home, yellow berry.	"
Autumn Surprise.	" 12	Moderately vigorous.	Small medium.	Sweet and of fair flavour	"
Miller	" 12	Vigorous	Medium to large.	Bright red, firm and of pleasant flavour.	"
Sugar of Metz	" 12	Moderately vigorous.	Medium	Yellow, nearly conical, soft, crumbly, not of much value.	"
Duke of Brabant	" 13	Vigorous	Large	Bright red, firm, sweet, with a rich flavour, quality very good.	"

RED AND YELLOW RASPBERRIES—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Sir John	July 13	Vigorous	Medium	Bright red, large, crumbly, inferior in quality.	Moderately productive.
Belle de Fontenay.	" 14	"	Above medium	Bright red, large and of good flavour, rather soft.	Productive.
R. B. Whyte	" 14	"	Medium	Dark red, round and of good flavour but a little soft.	"
Barnet	" 14	Moderately vigorous.	Small	Poor in quality, crumbly	Not productive.
Shaffer's Colossal.	" 14	Vigorous	Large	Dark purplish red, firm, acid, of fairly good flavour when very ripe.	Very productive.
Lady Anne	" 14	"	Medium	Yellow, crumbly, of fair flavour.	Productive.
Craig	" 14	"	Above medium	Clear red, of good flavour, but soft and crumbly.	"
La Mercier	" 14	Moderately vigorous.	Large	Red, round and of good flavour.	Moderately productive.
Malta	" 14	Vigorous	Small	Yellow, soft, crumbly, sweet and of good flavour.	Productive.
French Vice-President.	" 16	"	Very large	Dark red, conical, firm, with a rich flavour—a very good berry.	"
Knevit's Giant	" 18	"	Large	Bright red, firm, acid, but of very good flavour.	"
Prince of Wales	" 18	Moderately vigorous.	Small	Of fair quality	"
Red Herrenhauser.	" 18	Vigorous	Medium	Sweet and of fair flavour	Fairly productive.
Col. Wilder.	" 18	Moderately vigorous.	Large medium	Pale yellow, soft, sweet, with a pleasant flavour.	Not productive.
Arnold's Hybrid	" 18	Vigorous		Dark red, soft, crumbly, with a pleasant flavour.	Productive.
Clarke	" 18	"	Medium	Firm, sweet, of fairly good quality.	"
Carter's Prolific	" 18	"	Large medium	Firm, sweet and of good quality.	"
Chili	" 18	"	Large	Light red, of good flavour	"
Garfield	" 18	"	Medium	Bright red, round, firm, with a good flavour.	"
Muriel	" 18	"	Above medium	Dark red, conical, firm and of good flavour.	"
Conrath	" 18	"	Large	Red and of fine flavour, a little acid.	"
Columbian	" 18	"	"	Dark purplish red, firm, but dry and acid.	"
Beehive	" 18	"	Medium	Dark red, sweet and firm	Moderately productive.
American Yellow.	" 18	"	Small	Sweet and of pleasant flavour	Productive.
Sarah	" 20	"	Large medium	Red, round, sweet and of fine flavour, keeps long in bearing.	Very productive.
Billard's Perpetual.	" 20	"	Large	Clear red, of good flavour, but a little crumbly.	Productive.
Cuthbert	" 20	"	"	Dark red, firm and sweet, of very good quality.	Very productive.
Queen Victoria	" 24	"	Medium	Poor quality, soft and crumbly.	Not productive.
Hudson River Antwerp.	" 24	"	Small medium.	Dark red, soft and of fair flavour	Productive.
Garnet	" 24	"	Small	Dark purplish red, firm and of fair flavour.	"

BLACK CAP RASPBERRIES.

During the time that the black caps were ripening the weather was favourable, dry and hot, and as they had had quite sufficient rain for their full development, they were on the whole larger, better flavoured, and more productive than at any time during the last two or three years.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Smith's Prolific.	July 7	Vigorous	Medium	Of fairly good quality	Productive.
Early Ohio	" 8	"	"	Not of very good quality	"
Nemaha	" 15	"	Large	Of fine flavour and good quality	"
Lovett	" 16	Moderately vigorous.	Medium	Of good quality	"
Older	" 16	Vigorous	Large to medium.	" "	"
Palmer	" 17	"	Medium	Of fairly good quality	"
Kansas	" 17	"	"	Sweet, and of good quality	"
Cromwell	" 17	"	"	Of fairly good quality	"
Ada	" 20	"	"	" "	"
Gregg	" 21	"	Large	Of very good quality	"
Progress	" 22	"	"	Sweet, and of good quality	"
Jackson's May King.	" 23	"	Small to medium.	Of poor quality	Moderately productive.
Minnie	" 23	"	Medium	Dark purple, rather acid and apt to be crumbly.	Productive.
Hopkins	" 23	"	"	Of good quality	"

BLACKBERRIES.

Blackberries were a good crop and promised well, but there was so much rain after they commenced to ripen that they became very soft and were almost spoiled, and could only be picked for the local market.

Name.	Date of Ripening.	Growth of Plant.	Size of Berries.	Quality.	Productiveness.
Early King	July 31	Vigorous	Large medium	Glossy black of good flavour	Productive.
Minnewaska	Aug. 1	"	Large	" "	Fairly productive.
Early Harvest	" 2	Moderately vigorous.	Small medium	Of fair flavour	Not very productive
Hansel	" 5	Vigorous	Large	Glossy black with a fine flavour	Not productive.
Snyder	" 7	"	Large medium	Of very good quality	Productive.
Early Cluster	" 7	"	Medium	Of good flavour, sweet	"
Agawam	" 8	"	Large medium	Of very good quality	"
Erie	" 8	"	Small to large.	Acid and of fair quality	Not productive.
Taylor's Prolific	" 8	"	Large	Sweet of very good quality	Productive.
Stone's Hardy	" 10	"	Large medium	Glossy black of good quality	"
Eldorado	" 10	"	Very large	Sweet, of fine flavour, best table blackberry tested here.	Very productive.
Lawton	" 12	"	Large	Of good quality	Productive.
Crystal White	" 12	"	Small	Of fair quality	Fairly productive.
Wilson's Early.	" 12	"	Large medium	Of good quality	Productive.
Tecumseh	" 12	Moderately vigorous.	Small	Quality inferior	Not productive.
Thompson's Mammoth.	" 14	Vigorous	Medium	Of inferior quality	"
Kittatinny	" 14	"	Large	Acid but of fair quality	Productive.
Ohmer	" 14	"	"	Fair in quality	"
Wilson Junior	" 16	"	Medium	Quality fair	Not productive.
Oregon Everbearing.	Aug. 16 to Oct. 5	Very vigorous.	Large	Acid, but of good flavour when well ripened.	Very productive.
Maxwell	Aug. 16	Moderately vigorous.	Medium	Not very good in quality	Productive.

STRAWBERRIES.

During the time in which the strawberry plants were in bloom there was almost constant cold rains which prevented the perfect fertilization of the flowers, and consequently many of the berries were imperfect in shape and they were also uneven in ripening. The continued cold weather and frequent rains up to the time of ripening, injured the flavour and dwarfed the size of the berries. They were fully two weeks later in ripening than the average of previous years.

The following varieties were planted this year :—

Enchantress, British Queen, Crocketts Choice, Louis Geauthier, Phœnix, Arkansas Traveller, Rising, Lloyds Favourite, Imperial, Newman, Devereau, Kansas Prolific, Laxtons Noble, Imperial, Westbrook.

STRAWBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Berry.	Quality.	Productiveness.
Daisy	June 17	Vigorous	Medium	Of fine flavour, firm and good	Productive.
Chairs	" 17	"	"	Of good flavour, firm, continues long in bearing.	"
Van Deman	" 18	"	Large medium	Of good flavour, firm, a little acid	"
Omega	" 19	"	"	A fine berry of good flavour, firm.	"
Warfield	" 20	"	Medium	Dark red berry of very good flavour, firm.	"
Alexander II	" 20	"	Large medium	Of good flavour, sweet and firm	"
Dayton	" 21	"	Medium	" "	"
Iowa Beauty	" 22	"	Large	Of very good quality, firm	"
Alpha	" 22	"	Large medium	Of fairly good quality, firm	"
Anna Kennedy	" 23	"	Medium	Of fair flavour, firm	Moderately productive.
Maxwell	" 23	"	"	Of good flavour, firm	Productive.
Arrow	" 23	"	"	Of fairly good flavour, not very firm.	Moderately productive.
Bissel	" 23	"	Large	Of good flavour, firm	Productive.
Windsor Chief	" 23	"	Large medium	Of good flavour a little acid, firm	"
Magoon	" 24	"	Large	Of good flavour, not very sweet, but firm.	Fairly productive.
Eleanor	" 24	Moderately vigorous.	Medium	Of fairly good flavour, not very sweet.	Moderately productive.
Imp. Jucunda	" 24	Vigorous	Large medium	Of good flavour, sweet, firm	Productive.
Eclipse	" 24	"	Medium to large.	Of good flavour fairly firm	"
Tennessee Prolific.	" 24	Moderately vigorous.	Large medium	Of fair flavour, a little flat	Moderately productive.
Empress Eugene	" 24	"	Medium	Of good flavour, firm	"
H. W. Beecher.	" 24	Vigorous	Large	" "	Productive.
Bonny Lass	" 24	Moderately vigorous.	Large medium	Sweet and of good flavour, firm.	Moderately productive.
Greenville	" 24	Vigorous	"	Of good flavour, firm, sweet, a very good berry.	Productive.
Weston	" 25	Moderately vigorous.	"	A dark red berry of good flavour, fairly firm.	Fairly productive.
Timbrell	" 26	"	"	Of good flavour, firm	Not productive.
Sir Jos. Paxton.	" 26	"	Medium	Quality fair, firm	"
Mary	" 27	Vigorous	Small to large.	Of fairly good flavour, firm	Moderately productive.
Dr. Hogg	" 27	"	Medium	Sweet and of good flavour	Not very productive
Brandywine	" 27	"	Large	Of good flavour, firm	Moderately productive.
Michigan	" 27	"	Very large	Only fair in flavour, ripens unevenly, often has a hard core.	Fairly productive.

ACKNOWLEDGMENTS.

Acknowledgments are tendered to the following gentlemen, who have kindly supplied trees or scions of new fruits or seeds for testing.

Professor Shinn, of Berkeley, California, scions of apples, pears, and plums.

Mr. R. Layritz, Victoria, B.C., apple and prune trees.

Mr. J. A. Skinner, Silverdale, B.C., scions of apple and plum.

Mr. E. Hutcherson, Ladner, B.C., scions of apple.

Mr. G. W. Hadwen, Duncan, B.C., scions of apple.

Mr. R. M. Palmer, Victoria, strawberry plants.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Degrees.	Date of Lowest Temperature.	Degrees.	Rainfall.	Snowfall.	Sunshine.
1898.		1898.		Inches.	Inches.	H. M.
December 18	47	December 31	22	4·39	4	56·42
1899.		1899.				
January 23	51	January 4	7	6·50	2	23 00
February 15	56	February 3 and 4	5	5·06	28	46 36
March 26	68	March 10	30	4·11	7	85 48
April 22	77	April 10	34	3·27	.....	86 18
May 21	80	May 1	32	6·62	.....	90 42
June 17	80	June 5	35	2·42	.....	139 00
July 26	96	July 6 and 13	44	1·76	.....	228 00
August 22	83	August 10	41	4·17	.....	95 42
September 15	90	September 30	40	3·07	.....	167 42
October 20	72	October 13	32	5 86	.....	65 18
November 8	67	November 16	32	11·44	.....	25 54
				58·17	41	1,110 42
Totals for 1898	.....	.....	.....	46·55	20	1,506 54
" 1897	.....	.....	.....	65·95	45½	1,474 00

The record of sunshine shows nearly one-quarter less than in 1897 or 1898.

I have the honour to be, sir,

Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS FOR THE YEAR ENDING JUNE 30, 1899.

CENTRAL EXPERIMENTAL FARM—EXPENDITURE, 1898-9.

Live stock	$	861 95
Feed for stock, including veterinary services		373 82
Seed grain, seeds, trees, &c		668 30
Implements, tools, hardware and supplies		1,114 71
Drainage and drain tiles		6 25
Manure and fertilizers		270 56
Travelling expenses		1,144 66
Exhibition expenses		356 91
Blacksmithing, harness supplies and repairs		465 08
Bee department		194 82
Salaries		1,860 00
Wages, farm work, including experimental work with grain and other farm crops; also, salaries of officers in charge		6,097 83
Wages, care of stock		2,498 75
Chemical department proportion chargeable to the Central Farm		864 73
Botanical and Entomological department proportion chargeable to the Central Farm		1,109 24
Horticultural department, including salary of officer in charge		3,745 48
Poultry department, including salary of officer in charge		1,600 44
Forestry department and care of grounds		643 56
Arboretum		564 35
Distribution of trees and tree seed		64 36
Office help, correspondence branch and messenger service		3,415 97
Printing and stationery		781 30
Seed testing and care of greenhouses		866 64
Dairy department		500 23
Museum		14 35
Contingencies, including services and expenses of L. V. Labelle delivering lectures and giving instruction on tobacco culture, $448.86; gravelling roads through farm, $532.97; cutting, drawing and packing ice, $66.95; sewers, $39.37		1,618 70
Books and newspapers		176 99
Telegrams and telephones		136 13
Steers purchased for feeding experiments		2,034 97
		34,051 08
LESS—Proceeds of sale of steers purchaesd for feeding experiments		2,831 07
	$	31,220 01

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1898-9.

Live stock	$	40 75
Feed for stock, including veterinary services		1,551 52
Seed grain, seeds, trees, &c		142 41
Implements, tools, hardware and supplies		272 21
Drainage and drain tiles		17 00
Manure and fertilizers		249 15
Travelling expenses		333 79
Exhibition expenses		233 47
Blacksmithing, harness supplies and repairs		96 70
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,485 00
Wages, farm work, including experimental work with farm crops		2,114 87
Wages, care of stock		1,156 90
Chemical department, proportion chargeable to each branch farm		504 42
Botanical and Entomological department, proportion chargeable to each branch farm		442 75
Poultry department		87 98
Horticultural department, including salary of officer in charge		982 48
Bee supplies		28 22
Forestry department, including care of grounds		120 15
Seed grain distribution		194 06
Contingencies, including postage, $31.15; mail delivery, $32.50		103 09
Printing and stationery		11 36
Books and newspapers		42 79
Telegrams		38 37
Steers purchased for feeding experiments		1,043 64
		12,293 08
LESS—Proceeds of sale of steers purchased for feeding experiments		1,392 27
	$	10,900 81

EXPERIMENTAL FARM, BRANDON, MANITOBA—EXPENDITURE, 1898-9.

Live stock	$	141 00
Feed for stock, including veterinary services		93 60
Seed grain, seeds, trees, &c		203 17
Implements, tools, hardware and supplies		339 86
Travelling expenses		98 70
Exhibition expenses		250 20
Blacksmithing, harness supplies and repairs		265 05
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,485 00
Wages, farm work, including experimental work, with farm crops, &c		3,125 76
Wages, care of stock		600 00
Chemical department, proportion chargeable to each branch farm		504 42
Botanical and Entomological department, proportion chargeable to each branch farm		442 75
Horticultural department		178 35
Forestry department, including care of grounds		297 30
Poultry department		46 40
Office help, including delivery of mail, $129		324 22
Seed grain distribution		625 15
Tree distribution		213 59
Contingencies, including postage, $113.50		171 42
Printing and stationery		64 51
Books and newspapers		26 00
Telegrams and telephones		21 41
Steers purchased for feeding experiments		330 00
		10,847 86
LESS—Proceeds of sale of steers purchased for feeding experiments		591 03
	$	10,256 83

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE, 1898-9.

Live stock	$	265 26
Feed for stock, including veterinary services		45 75
Seed grain, seeds, trees, &c		205 73
Implements, tools, hardware and supplies		417 31
Travelling expenses		108 41
Exhibition expenses		254 53
Blacksmithing, harness supplies and repairs		97 90
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,485 00
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c		2,806 43
Wages, care of stock		1,180 50
Chemical department, proportion chargeable to each branch farm		504 43
Botanical and Entomological department, proportion chargeable to each branch farm		442 75
Poultry department		97 10
Forestry department, including care of grounds		183 25
Office help		533 00
Seed grain distribution		333 12
Tree distribution		163 11
Contingencies, including postage, $113.86		227 50
Printing and stationery		47 64
Telegrams		1 91
Books and newspapers		4 00
Bee supplies		15 54
		10,420 17
LESS—Proceeds of sale of steers		428 16
	$	9,992 01

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EXPERIMENTAL FARM, AGASSIZ, B.C.—EXPENDITURE, 1898–9.

Live stock	$	21 05
Feed for stock, including veterinary services		1 75
Seed grain, seeds, trees, &c		136 65
Implements, tools, hardware and supplies		99 73
Manure and fertilizers		68 17
Travelling expenses		130 04
Exhibition expenses		155 94
Blacksmithing, harness supplies and repairs		48 35
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,485 00
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c		2,925 36
Wages, care of stock		391 75
Chemical department, proportion chargeable to each branch farm		504 43
Botanical and Entomological department, proportion chargeable to each branch farm		442 75
Poultry department		85 25
Forestry department		167 00
Office help		110 00
Seed grain distribution		82 77
Tree distribution		44 00
Clearing land		431 50
Contingencies, including postage, $51.35		93 60
Printing and stationery		35 96
Books and newspapers		27 00
Telegrams		5 20
	$	8,493 25

SUMMARY.

Central Experimental Farm		$	31,220 01
Nappan "			10,900 81
Brandon "			10,256 83
Indian Head "			9,992 01
Agassiz "			8,493 25
Seed grain distribution from Central Experimental Farm			4,137 09
Printing bulletins and distribution of bulletins and reports	$ 4,000 00		
Less special sum in estimates for this item	4,000 00		
		$	75,000 00

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &c., ON HAND DECEMBER 31, 1899.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

14	Horses	$ 1,005 00
2	Ayrshire cattle	250 00
1	Durham "	75 00
4	Guernsey "	425 00
27	Grade "	653 00
4	Yorkshire swine	70 00
3	Berkshire "	72 00
2	Tamworth "	40 00
3	Poland China swine	105 00
19	Grade swine	57 00
9	Shropshire sheep	255 00
8	Leicester "	190 00
16	Grade "	64 50
	Farm machinery and implements	2,527 50
	Vehicles, including farm wagons and sleighs	1,086 00
	Hand tools, hardware and sundries	1,090 00
	Harness	250 75
	Dairy department, machinery, &c.	614 00
	Horticultural and Forestry departments, implements, tools, &c.	590 15
	Botanical department, implements, tools, &c.	11 50
	Poultry " 253 fowls	240 00
	" " implements, furnishings, &c.	158 75
	Bees and apiarian supplies	503 95
	Chemical department, apparatus and chemicals	2,120 05
	Books in several departments	474 90
	Greenhouse plants, supplies, &c.	1,394 00
	Furniture at Director's house	1,072 00
	Office furniture and stationery	1,600 00
		$ 16,695 05

EXPERIMENTAL FARM, NAPPAN, N.S.

7	Horses	$ 735 00
4	Guernsey cattle	525 00
6	Holstein "	320 00
6	Ayrshire "	390 00
29	Grade "	1,078 00
2	Yorkshire swine	40 00
2	Berkshire "	35 00
3	Tamworth "	37 00
60	Grade "	250 00
38	Sheep	160 00
56	Fowls	32 75
	Bees and apiarian supplies	32 50
	Vehicles, including farm wagons and sleighs	335 00
	Farm machinery	520 00
	" implements	203 00
	Hand tools, hardware and sundries	332 15
	Harness	158 25
	Furniture for reception room and bedroom for visiting officials	166 25
	" supplies and books for office	92 00
		$ 5,441 90

EXPERIMENTAL FARM, BRANDON, MANITOBA.

13	Horses	$ 1,060 00
4	Ayrshire cattle	140 00
4	Durham "	520 00
1	Guernsey "	100 00
6	Holstein "	250 00
8	Grade "	160 00
1	Chester White swine	15 00
3	Tamworth "	40 00
5	Berkshire "	55 00
7	Grade "	14 00
59	Fowls	59 00
	Bees and apiarian supplies	75 70
	Vehicles, including farm wagons and sleighs	497 25
	Farm machinery	987 00
	" implements	630 00
	Hand tools, hardware and sundries	600 17
	Harness	217 50
	Furniture for reception room and bedroom for visiting officials	162 55
	" supplied and books for office	182 40
		$ 5,765 57

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

15	Horses	$ 1,350 00
1	Ayrshire cattle	75 00
9	Durham "	775 00
1	Holstein "	50 00
17	Grade "	435 00
1	Yorkshire swine	15 00
4	Berkshire "	70 00
4	Tamworth "	67 00
1	Chester White "	10 00
71	Fowls	38 00
	Bees and apiarian supplies	34 15
	Vehicles, incluging farm wagons and sleighs	475 00
	Farm machinery	1,259 00
	" implements	618 00
	Hand tools, hardware and sundries	446 10
	Harness	197 25
	Furniture for reception room and bedroom for visiting officials	168 50
	" supplies and books for office	220 65
		$ 6,303 65

EXPERIMENTAL FARM, AGASSIZ, B.C.

6	Horses	$ 600 00
3	Durham cattle	120 00
4	Ayrshire "	135 00
4	Holstein "	145 00
1	Grade "	30 00
10	Dorset horned sheep	71 00
2	Berkshire swine	45 00
8	Tamworth "	100 00
7	Grade "	24 50
54	Fowls	54 00
	Bees and apiarian supplies	35 95
	Vehicles, including farm wagons	210 00
	Farm machinery	586 00
	" implements	180 00
	Hand tools, hardware and sundries	155 15
	Harness	56 75
	Furniture for reception room and bedroom for visiting officials	205 50
	" supplies and books for office	120 45
		$ 2,874 30

W. H. HAY,

Accountant.

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ERRATUM.

On page 170, line 1. *Instead of* Reports, *read* No reports.