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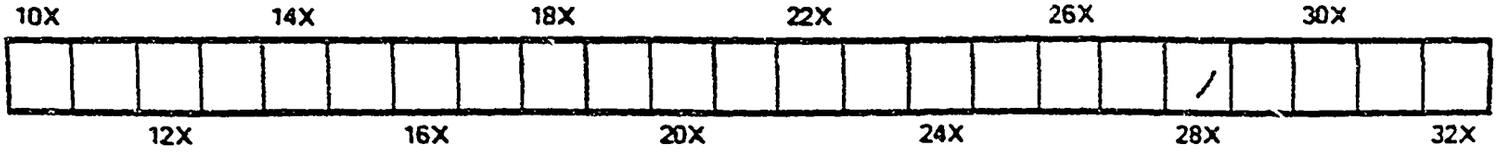

THE

NOVA SCOTIAN

JOURNAL OF AGRICULTURE

Published under direction of the Board of Agriculture of Nova Scotia.

Omnium rerum, ex quibus aliquid adquiritur, nihil est agriculturâ melius, nihil uberius, nihil homine libero dignius.—Cicero: de Officiis, lib. I, cap. 42.

VOL. IV. *HALIFAX, N. S., AUGUST, 1883.* *No. 36.*

THE YARMOUTH EXHIBITION.

The Annual Exhibition for the County of Yarmouth, N. S., will be held at Yarmouth on Thursday and Friday, 11th and 12th October, when cash prizes to the amount of $1,487 will be competed for. The Prize List and General Regulations may be obtained by application to Thos. B. Crosby, Secretary, Yarmouth. The Exhibition will be held in the Rink and grounds adjoining, corner of Parade and Pleasant Streets, under authority of the Provincial Parliament, and under the immediate direction of the Yarmouth County Agricultural Society. The Managing Committee consists of the Hon. L. E. Baker, President, Wm. Corning, V. P., Bowman Corning, Joseph R. Wyman, J. W. Moody, and Thomas B. Crosby, Secretary. Exhibitors pay an entrance fee of one dollar at the time of making entries. All entries must be made in writing, and handed in, on or before Wednesday preceding the day of Exhibition, to the Secretary, by whom a number will be supplied to each exhibitor.

We have very pleasant recollections of the Yarmouth Exhibition of last year. We know of no place where so much real interest is taken in the local exhibition by the people of the place as at Yarmouth, all classes entering heartily into the work, even truckmen refusing to take pay for carrying exhibits and luggage of strangers. In short the hospitality of Yarmouth is unbounded. We can thus, from personal experience, bespeak a good time for visitors to the Yarmouth Fair.

The Potato Beetle has caused some consternation in parts of Colchester, Kings, and Cumberland, but latterly we have heard nothing more of his depredations. We are desirous of obtaining as full and definite information as possible on the following points, and shall feel very much obliged to any of our readers who will take the trouble to supply us with the facts required :—

1. Locality where the Beetle appeared this season.
2. Date when first noticed.
3. Say whether it occurred in the same locality or neighbourhood in any previous season.
4. Whether any crop of grain near the infected potato field has been raised from seed imported from Ontario or the United States, or any Potato Beetle country.
5. Whether any recently imported Fruit Trees or Bushes are growing near the infected potato field.
6. How many broods of the Beetle were produced during the season.
7. What remedies were applied, and how far they were affective.

Replies to all or any of these questions, or any other information respecting the occurrence of the Beetle in this Province, will be thankfully received.

Truro, August 3rd, 1883.

"Troubadour" stands at New Glasgow this season. Should have answered yours sooner, but was waiting to hear from H. Townshend with regard to him.

Yours, C. P. Blanchard.

DOMINION EXHIBITION,

ST. JOHN.

SUPPLEMENTARY PRIZE LIST.

The Dominion and Centennial Exhibition Commission having determined to offer Medals and Diplomas in certain Classes of Manufactures, not heretofore provided for in the Prize List, the following are offered, in addition to any mentioned in the several Classes referred to, viz. :

Class 33—Page 30.

No.
475 Sugar, White and Yellow, 1st Prize Silver Medal. 2nd, Bronze Medal.
478 Syrup, Golden—Diploma.
479 " Fruit, assortment—Bronze Medal.
480 Fruit, Preserved, do do
481 " Canned, do do
482 " Essences, do Diploma.
483 Cocoa and Broma, do Bronze Medal.
484 Spices, ground and whole, assortment, do
485 Soap, Hard, Fancy, Toilet, assortment, 1st Prize, Bronze Medal. 2nd, Diploma.
486 Perfumery, Extracts, ass't—Diploma.
487 Candles, do do
488 Biscuits, Fancy, do Bronze Medal.
489 Confectionery, do do
490 Tobacco, manufactured and unmanufactured, ass't. do
491 Tobacco Pipes, do Diploma.
492 Blacking, Shoe, do do
493 Starch, Corn, Potato, and other kinds—Bronze Medal.
496 Baking Powders—Diploma.
498 Petroleum Products, assortment of—Silver Medal.
499 Glue and Gelatine—Diploma.
Ship Biscuit, separate from Fancy—Bronze Meda
Colors, in Powder—Bronze Medal.
" Ground in Oil, do
White Lead, do
Cordage and Oakum, assortment of—1st Prize, Silver Medal. 2nd, Bronze Medal.

Superphosphate, best exhibit, for quality and manufacture, exhibitor to furnish analysis of composition, certified by a professional chemist—Silver Medal.
Special Manures, for best collection—Bronze Medal.

Class 38.—Woolen Goods, Factory Made.
Page 36.

In this Class the Judges will be empowered to award 6 Silver Medals, 12 Bronze Medals and 10 Diplomas, if the Exhibits are considered worthy, and are to be appropriated by the Judges to the best of the articles exhibited in any of the sections.

Class 39.—Cotton Goods, Factory Made.
Page 37.

4 Silver Medals, 6 Bronze Medals and 6 Diplomas will be offered in this class—on the same terms as in class 38.

Class 40.—Miscellaneous Canadian Manufactures.

2 Silver Medals, 3 Bronze Medals and 3 Diplomas will be offered on the same conditions as in class 38.

Class 41.—Knitted Goods, by Manufacturers.

2 Silver Medals and 2 Bronze Medals will be offered on the same conditions as in class 38.

Class 42.—Furs, Canadian Manufacture.
Page 38.

No.		
744	Collection of Ladies' Furs —	Silver Medal.
745	do Gentlemen's do.	do
746	do Sleigh Robes,	do

Bronze Medals to be given, if there is sufficient competition, as second prizes.

Class 43.—Leather Goods.

4 Silver Medals, 10 Bronze Medals and 10 Diplomas. Silver Medals will be awarded, first, one for Leather, different kinds; second, Boots and Shoes; third, Harness; fourth, Trunks and Valises.

Class 44.—Paper and Manufactures thereof, Bookbinding, Printing, and Materials connected with same.

3 Silver Medals, 2 Bronze Medals and 5 Diplomas will be offered on same conditions as specified in class 38.

Class 47.—Manufactures, principally in Iron.

8 Silver Medals, 12 Bronze Medals and 15 Diplomas will be offered on same conditions as in class 38. The following additional Premiums are offered in this class:

For Collection of articles in Galvanized Iron—Silver Medal.
Specimens of ditto.—Bronze Medal.

Class 48.—Cabinet and other Manufactures, principally of Wood.

6 Silver Medals, 10 Bronze Medals and 10 Diplomas will be offered on same conditions as in class 38.

Class 49.—Carriages and Sleighs.

No.		
1042	Coach	Silver Medal.
1043	Landau	do
1044	Baroucho or Brett	do
1045	Rockaway, 4 or 6 seats	do
1046	Extension top Carryall, without perch	do
1047	Extension top Carryall, with perch	do
1048	Standing Top Carryall	do
1049	Coupe or Brougham	do
1050	Phaeton, single, open	do
1051	" double, open	do
1052	" single Top	do
1053	" double standing Top	do
1054	" Ladies', with rumble	do
1055	" Physician's, pannelled quarters	do
1056	Buggy, drop-front	do
1057	Wagon, Road, one man	do
1058	" Concord, single	do
1059	" " double	do
1060	" Top on side-bar	do
1061	" " on elliptic sp'gs	do
1062	" open on side bar	do
1063	" " on elliptic sp'gs	do
1064	" " on side-bar, 2 seats	do
1065	" side-bar, Extension Top	do
1066	" side-bar, Standing	do
1067	" side spring, Box	do
1068	" Beach, double	do
1069	" Buckboard	Bronze Medal.
1070	Sulky, Trotting	do
1071	" Road	do
1072	" 4-wheel Skeleton	do
1073	T. Cart	Silver Medal.
1074	Dog Cart, 2-wheel	do
1075	" 4-wheel	do
1076	Express Wagon, single	Bronze Medal.
1077	" " double	do
1078	Farm Wagon, single	do
1079	" " double	do
1080	" Cart, dump	do
1081	Farm Wagon, with manure attachment	do
1082	Baroucho Sleigh	Silver Medal.
1083	" " double	do
1084	Ladies' Sleigh, with rumble	Bronze Medal.
1085	" " single	do
1086	Trotting Sleigh	do
1087	Pung, shifting seat, painted	do
1088	Cutter, Berlin, single	do
1089	" " double	do
1090	Toboggan, or Ash Pung, single	do
1091	Toboggan, or Ash Pung, double	do
1092	Wheelbarrow, gardener's	do
1093	" for general work	do

Class 50.—Page 48.

Silver and Bronze Medals and Diplomas will be awarded in this Class, as the exhibit in improvements or extra efficiency of machines may warrant.

Class 51.—Musical Instruments.

4 Silver Medals, 4 Bronze Medals and 6 Diplomas will be offered in this class, on same conditions as in class 38.

JULIUS L. INCHES,
July 30, 1883. *Secretary.*

SUPPLEMENTARY PRIZES FOR STOCK.

The Dominion and Centennial Exhibition Commission have determined to offer the following prizes in the Stock Department, in addition to those published in the Prize List:

HORSES.

Class 2.—Trotting, Carriage, or Road purposes.

No.	
9 A.	Mare, with foal at her foot—1st Class, $20. 2nd, $15. 3rd, $10.

Class 3—Draft or Agricultural purposes.

No.	
19 A.	Mare, with foal at her foot—1st Class, $18. 2nd, $14. 3rd, $10.

Class 34.—Clydesdale and English Shire Horses.

No.	
23 A.	Stallion, 4 years old and upwards—1st Class, $35. 2nd, $27. 3rd, $20.
23 B.	Stallion, 3 years old and upwards—1st Class, $25. 2nd, $20. 3rd, $15.
23 C.	Stallion, 2 years old and upwards—1st Class, $15. 2nd, $12. 3rd, $9.
23 D.	Stallion, 1 year old and upwards—1st Class, $10. 2nd, $8. 3rd, $6.

CATTLE.

Class 161.—Short-Horn Grades.

No.	
113 A.	Cow, 5 years old and upwards—1st Class, $14. 2nd, $12. 3rd, $10.
113 B.	Cow, 3 years old and under 5 years—1st Class, $14. 2nd, $12. 3rd, $10.
113 C.	Heifer, 2 years old and under 3 years—1st Class, $12. 2nd, $9. 3rd, $7.
113 D.	Heifer, 1 year old and under 2 years—1st Class, $9. 2nd, $7. 3rd, $6.
113 E.	Heifer Calf—1st Class, $7. 2nd, $6. 3rd, $5.

JULIUS L. INCHES,
Aug. 7, 1883. *Secretary.*

In addition to Nova Scotian exhibits noticed in lists already published, notification has been received of the following. All intended exhibits will be examined as far as practicable and reported upon by the Members of the Board. The exhibitors will be thereupon notified whether the exhibits have been accepted, and any necessary instructions relating to arrangements for transit will be communicated to them by circular. The following are the Members of the Board for the several agricultural districts of the Province:—

District No. 1, including counties of Halifax and Lunenburg—C. N. Sprott, Middle Musquodoboit.

District No. 2, counties of Kings, Annapolis and Queens—Colonel W. E. Starratt, Paradise.

District No. 3, counties of Digby, Shelburne and Yarmouth—Charles E. Brown, Yarmouth.

District No. 4, counties of Hants, Colchester and Cumberland—Israel Longworth, Truro.

District No. 5, counties of Pictou, Antigonish and Guysborough—David Matheson, Pictou.

District No. 6, counties of Cape Breton, Inverness, Richmond and Victoria—John McKeen, Mabou.

Gates Organ and Piano Co., (limited), 120 Granville Street, Halifax and Truro—Two pianos and three organs, of different styles, manufactured at their factory, Truro.

Edward Blanchard, Truro,—Jersey cow and calf.

Brown & Webb, wholesale druggists, Halifax.

Rev. Frederick J. M. Axford, the Rectory, Cornwallis—a road sulky; also a case of drawings, framed.

Mrs. L. A. DesBrisay, 44 Hollis Street, Halifax—Engravings on wood and metal, by Albert E. DesBrisay.

Acadia Coal Co., Stellarton, (per H. S. Poole—Sample of coal.

Adam McKeen & Sons, Pictou—Sample of building stone (freestone).

V. A. Cameron, Stellarton—Samples of fire brick of native clay.

Byron Chesley, Clarence, Annapolis Co.—Roots, vegetables and fruits.

J. D. Ellis, Echo Farm, Lower Stewiacke—12 or 15 head of pure bred Shropshire sheep, 4 or 5 head of Oxford Downs.

Dunlap and McKeen, Wallace Bridge—Horse Tiger.

Rev. Prof. Wilson, King's College, Windsor—Jersey cow Ligna Debonnaire, No. 25. Jersey bull Lord Falmouth, No. 59. Jersey heifer calf Falmouth Hazel.

Albert Beckwith, Middleton—Six sheep.

F. R. Trotter, Antigonish—Short Horn Durham Bull Lord Randolph.

Herbert Harris, Halifax Nursery—Exhibits in class 30.

Wm. Mason, Sapper, Royal Engineers, Halifax—Several pictures, including a specimen of "modern illumination," and a pen and ink drawing of a view in the public gardens, Halifax.

Chas. A. McLennan, Photographer, Pictou and Truro, photograph collection.

Oxford Manufacturing Co., Oxford, Co. Cumberland—Tweeds, wool, and cotton wool, cassimeres, blankets, flannels, shirtings, ladies' dress goods, rugs, tufts, etoffe, yarn, etc.

C. P. Blanchard, Truro—heard of 1 bull, 4 cows, 2 heifers.

Lowrey P. McLennan, Pictou—Collection of insects.

Athol Agricultural Society, Co. Cumberland—Short Horn Bull Marquis of Lorne.

A. C. Bell, M. P. P., 4 Shropshire sheep, 1 male, 3 female; 3 lambs, 2 male, 1 female.

McKay, Graham and Fraser, New Glasgow—3 ploughs.

New Glasgow Agricultural Society—Ayrshire Bull Marquis of Lorne, Polled Angus Bull Jock o' Benton, Jersey Bulls Abdurrahman and Freebooter.

Mr. C. E. Brown writes that a number of very fine Jersey cattle will be sent from Yarmouth, if the animals can be sent direct by steamboat to St. John. This can be arranged.

J. Y. Crockett, Durham, Pictou County—Gelding for carriage purposes.

C. Fritze, Lunenburg, writes that several members of the Agricultural Society there intend exhibiting squashes and other vegetables.

Robert Marshall, Clarence, Co. Annapolis—Fruit, wheat, potatoes, etc., etc.

Eureka Woollen Mills Company, Pictou, per Isaac A. Grant, V. P.—Cloths, blankets, yarns.

Mr. J. Austin, 7 Maynard Street, Halifax—Paintings.

Jack & Bell, proprietors of the Chemical Fertilizer Works, Halifax—Exhibits of their manufactures, including ground bone, superphosphate, chemical fertilizer, etc.

Nova Scotia Glass Co., (limited), New Glasgow—Goods manufactured by the Company, viz.: lamps, lamp chimneys, lantern globes, table ware, such as tumblers, goblets, tea settes, bowls, comports, jellies, etc.

James Croskill & Son, Halifax—Space applied for for an exhibit of their goods.

S. H. Craig, Truro—Ploughs, fowls, vegetables.

Robert Bacon, Windsor—6 or 8 sheep.

William Sharp, Windsor—Stallion Prince Albert.

C. C. Gregory, Antigonish—2 yearling Short Horn Durham Bulls, and 1 two year old heifer of same breed.

John McDonald, Shubenacadie—15 sheep and lambs, thoroughbred Downs.

Shubenacadie Agricultural Society—1 Ayrshire Bull, 3 years old.

James McKenzie, Shubenacadie—1 trotting Stallion, 4 years and upwards, 1 Stallion colt for trotting purposes, 2 years old.

C. F. Eaton, Lower Canard—Short Horn Durham stock, viz.: 1 yearling bull, two bull calves, 1 heifer calf, 2 three year old cows, 1 two year old heifer, 1 grade cow.

Spurr H. Woodworth, Canning—Stallion, 4 years old.

Dartmouth Ropewalk Co., Halifax, manufacturers of the rope work—300 feet of floor space applied for.

The Radiating Flue Company (per Cathcart Thompson, 96 Upper Water St.)—one of the radiating flues.

Cathcart Thompson, Halifax—Fish meal, manufactured from dry fish.

The Acadia Coal Company (per H. S. Poole, agent)—A Howe patent culm grate, with rockers for cleaning fires without a poker. This grate has been adopted with success for burning the fine dust coal.

J. Lewis & Son, Truro—Assortment of lasts, shoe pegs and machine wood.

Puttner Brothers, 125 Hollis St., Halifax—Budd's cream emulsion of cod liver oil, and Puttner's syrup of hypophosphites.

A J. Rice, New Glasgow—Exhibit of photographs.

Blenkhorn & Sons, Canning—A pyramid of edge tools.

Colonel Laurie, Oakfield—Samples of wheat.

Mrs. James M. Johnson, Falmouth, N. S.—Knitting and fancy work.

J. Lewis Cox, Canning—A two years' old Stallion colt.

C. R. Dickie, Canning—A carriage horse.

Rev. Henry How, Newport—Thoroughbred mare Oakleaf, and colt.

A. Wright, Lower Stewiacke—Brood mare and colt.

Wm. Norris, West Branch, River John, Co. Pictou—Trotting Stallion Frank Allison, Jr.

C. R. Bill, Billtown—Two Stallions.

Professor Lawson, Lucyfield, Co. Halifax—A herd of Short Horn Durham cattle; also, 3 Short Horn bulls, several cows and heifers, poultry, &c.

Mrs. Spain, Pine Grove, Wilmot, Annapolis—5 head of thoroughbred cattle, 6 thoroughbred sheep, etc.

B. W. Chipman, Halifax—3 thoroughbred Polled Angus cattle, viz., Polled Angus Bull, 2 years old; Polled Angus Cow and Heifer Calf of same breed.

Fenwick W. Rand, Canning, King's Co.—One pair fat oxen, 4 years old or over.

James Kitchin, River John—One herd Short Horn Durham cattle, and one herd of Jerseys, 1 Durham Bull (2 years), 1 Ayrshire Bull (3 years), 2 Ayrshire Bull calves, 1 Durham Bull calf, 1 Jersey Heifer calf, 1 pair draft horses, etc.

W. Scott Fraser, New Glasgow—Cattle.

Jonathan Rand, Canning—A number of cattle and a few sheep; also, some fruit.

L. A. McEachan, Whycocomagh, Inverness Co.—Ayrshire Bull, Robin Hood.

Lower Stewiacke Agricultural Society—Ayrshire Bull, Von Moltke.

Col. W. E. Starratt, Paradise, Annapolis—Jersey Bull Victor Draffan and yearling Gazelle, of Maple Grove; Ayrshire Bull, Jumbo; also, the following high grades Jerseys, cow Laura and 2 year old heifer Blanche; high grade Ayrshire heifer, 2 years.

Henry Townsend, Rockside Farm, New Glasgow—Herd of Jersey cattle, 1 pair registered Berkshire pigs; also, Jersey Bull Romeo Debonnair, 3 Jersey heifers, calves and bull calf; also, Leicester sheep, a pair of Toulouse geese and a pair of Scotch collies. (His Percheron Horse Troubadour will be shown at Truro.)

Parker F. Reagh, Prince Albert, Wilmot, Co. Annapolis—Jersey Bull.

For the Journal of Agriculture.

APPLE TREES AND APPLES.

Mr. Editor,—I have somewhat to say upon this subject that may be of benefit or interest to a number of your readers. One of your correspondents states that the southern slope of the Cobequid Mountains is not a fruit district. I believe the only reason why this is so is because the farmers in that district do not make due effort to raise fruit. I cannot imagine there is anything in soil or climate against raising fruit—apples, at any rate—on either slope, or on any part of the Cobequid Mountains, or any other part of this Province. I once thought differently, in common with almost every other person in the Province. But then, thirty years ago, people merely planted trees in the ground, wherever the ground might happen to be, or whatever it might happen to consist of. Then, the most of our fruit came from Boston, and what few shakings we did produce the pigs would scarcely eat.

But in regard to the slopes of the Cobequid Mountains,—here we have a series of somewhat steep, rounded spurs, rather inaccessable for all farming purposes—rounded, sloping promonotories, which the Romans in military operations termed *colla*, from their resemblance rather to the necks of oxen than anything else. This south slope consists of a close grouping of rocks, that contain in astonishing abundance all, or nearly all, the elements of fertility. I cannot conceive that the world will last long enough for any impression to be made, in the ordinary course of farming, upon this boundless mass of manurial material, in fact I have been at different times struck with the belief that nowhere in Eastern America do we find such unlimited

material and healthy situation for not only apples but all other agricultural productions of which this climate is capable. The hindrances or drawbacks in this locality are, as I have stated, first, the comparatively inaccessible character of the land, and secondly, the present condition of the soil, in that it contains so many loose stones.

Let us consider, now, in the planting of an orchard, some things that require to be done before the trees are ever brought upon the ground to be planted. In the district of which we are speaking, the different parts are characterized by great and extreme variety in the consistency as well as elementary substances of the soil. Along the brow of the hill, the soil, where there is indeed any, consists mainly of ground up rocks, of a quality very much like the rocks immediately under feet, while within but a few hundred yards, it may be, away down from the hill, the soil, though still light, contains, however, an abundance of clay. Now the great object of the farmer, hereabouts, becomes not only to make extremes meet, but to thoroughly mix them up, and with all between.

In deciding whereabouts to plant an orchard, it were well, first, to dig a hole, here and there, three or four feet in depth, to ascertain the character of the ground, because it is not well to have a hard pan anywhere near the surface for apple trees —that is, within about two feet; we should have, if possible, a well mixed loam to at least that depth, because apple trees differ in this from a great many forest trees, that their roots must have a good depth of soil. Again, this soil must be dry, or must be dried, so that water would not remain even in a hole dug anywhere in an orchard. This deep-searching of the roots of fruit trees seems to have been one of the grand secrets in their cultivation, from the want of which our forefathers paid, not only in raising fruit, but in growing trees. Now, in the effort to be rid of standing water we must beware of over-doing it on the side of sand and stones. Apple trees cannot, any more than human beings, do well or thrive, either in a puddle hole or a desert. The soil must be retentive of water up to a certain degree, and, if naturally arid and stony, there must be enough of clay or clay soil brought to form a plant-bed, capable not only of retaining a certain amount of moisture through drouthy spells, but of receiving, and in some sense assimilating the annual additions of manure, without which we cannot ordinarily expect to receive any crop of fruit from our trees. Now, this soil-composition, apart from the manure proper, is something we must not by any means lose sight of, it forms not only a retentive but in some degree a neutralizing medium between the application of the manure and its reception by the tree roots, so that these may not suffer by any crude, harsh, or chemically unformed material that may be offered as manure at any time to the soil. It is necessary also that the soil everywhere lie well to the roots, this must be seen to in the planting, and the finer the earth the better the opportunity for the roots to gather nourishment. There are reasons wherefor the soil itself should be in some quantity changed occasionally, which may be done by paring off a few inches from the top once in a few years and replacing it by fresh new soil; not only is this likely to be more clean and healthy, but it is observable that the soil function itself suffers by high cultivation over extended periods; and in the case of soils originally made up, we should remember and regard the liability there is of it being washed away by the weather. It is said that in eastern countries much of the land has suffered from this very cause, and more particularly in the case of these hillside situations.

Just below the brow of the Cobequid Mountain, maybe quite continuous with its slope, and maybe within a short gunshot, and maybe a mile or more away, we come across rock formations that bear no relation with those of the mountain proper, except proximity. Chief among these, and in heavily bedded masses, is the soft shale of the carboniferous system. It is almost everywhere to be found in some quantity, often in low rolling ridges, in a course parallel rather with the course of the mountain, and as far as I have observed, continuous with the whole range of the mountain, though at very varying distances from it. In appearance it looks on the surface like a grey or dirty looking slate, if we cut into it with a sharp pick it shows a streak of a bluish white color. It is often taken to be a kind of bastard slate—which in fact it might be truly called, only for confusion of geological terms. It is from this substance that the clay in the soils along the base of the mountain is most derived. It is generally a rather thin soil, however, being often mixed with loose material, such as the debris from the broken sides of the . ain, and yet more with the gravel of the conglomerate, which in fact underlies it near the mountain; often times again, the soil is of very little depth, lying upon this shale, which forms a pan beneath. In this case the surface will be in many places very wet, when drains must be made about and throughout your proposed orchard, and, to have these permanent, will necessitate a depth of more than three feet, partly filled with loose stone, and packed over tight with more clay, which should be rammed down close and rounded over, to keep out the surface water. If your orchard is thus placed near a declivity, all the better, for then the drainage water can escape. As a proof that this is wisdom and sound philosophy, the reader may have observed that most of the healthy and productive orchards in Nova Scotia are situated about the cellar drain leading from the house, while the most of those placed anywhere else take sick and die. The exception is in the valley of King's and Annapolis Counties, where the soil doesn't appear to require much draining. There is neither much clay slate nor clay shale about there.

The site of the proposed orchard having been thoroughly drained, the soil should be worked, pulverized, dug and turned over to a depth of at least two feet. We are considering now the case of ground consisting of too much clay, in contradistinction to the case of too little. And here we take into view some process of rendering the soil permanently loose, in a sufficient degree for a healthy and vigorous growth, and to do this the best way I ever heard of is, if the right kind of stone can be got, to collect a quantity and burn them; of these an abundance will generally be found anywhere about the Cobequid Mountain. It may be necessary, however, to use some discrimination. The light-colored breccia, which is the ankerite of the iron lode, if burnt, will be found altogether too caustic and killing to be placed very near your trees. The conglomerate is very good, but the best rock of all, and in fact the prevalent rock of the Cobequid, is a brick-red felsite, containing certain minute specks of black mica. Then there are porphyries, and other quartzose boulders lying about; these all require very little fire—not half as much as lime-stone or gypsum. A great heap may be made of these, with layers of old fencing, stumps, brush, or the like, in sufficient proportion to the stones to make an actual burn, when they will all knock to pieces with an old axe pole or hammer. These should be broken very small and collected with all the dust and sand and piled to the depth of half a foot or so, and ten or twelve feet across and under where each tree is to go; this will not harm the roots of the tree, though placed in immediate contact with it, though containing a great deal of alkaline material, principally potash, this is in no concentrated state, but combined with silica; and it does well mixed up with the clay or composted earth, or whatever other manurial substance is added above to form the plant bed.

All the manurial substances going to the roots of orchard trees should be as thoroughly mixed, composted and chemically combined as possible before hand, otherwise you may cause a war of the

elements down below which will not be at all consistent with that quiet and repose necessary to a healthy and productive tree. For instance, in applying lime to your trees it should be in small quantities, otherwise in the sulphate form, and if barnyard manure, the same direction, as it may be with burnt gypsum; or, what is just as good, there is to be found along the base of the mountain a great many tarns, lakelets, mineral springs, bog holes—all containing sulphur in some degree, as may be discovered by stirring up with a stick, when they will be found to smell very bad. Now the mud from these places is good, not only to fix the ammonia of the barn dung; it is a capital thing when in some excess, to banish vermin—always a matter of much concern in an orchard.

The soil of an orchard should be on the whole, then, somewhat compact on the surface, so as to afford as little shelter as possible to any kind of vermin, from mice down in size to the microscopic orders of animalia, also for protection and nourishment to the roots; and indeed as a defence against extremes of heat, cold, and drouth. But by all means provide for the escape of water.

I find that my article has already grown sufficient in length; if I proceed much further your readers will be looking for a whole treatise on orchard trees, which I have no intention of offering here and now—and this for a very good reason indeed. I hope the readers will not suppose that I have been able to furnish all the material for this crude and ill-expressed article from my own unaided store of wisdom and knowledge; on the other hand, it pretty much all came out of books, as any of your readers can find, if they look in them.

CLOVERDALE.

MIDDLE RIVER, 19th July, 1883.

Dear Sir,—In answer to yours on the probable result of the crops in this district, I may say that, judging from present appearance the result will be a good average crop, every kind of grain makes a good appearance, the hay crop will exceed the yield of last year, and potatoes never looked better, particularly those sown on dry soils.

Respectfully yours,
JOHN MCLENNAN.

A prominent New York farmer, whose crops are proverbial for their abundance, uses no other fertilizer than land plaster and clover. His plan is to sow clover, plaster it so as to secure a rank growth and turn under for his other crops, wheat included. He has kept up this plan for over fifty years, and claims that his farm is growing more valuable each year.—*New York Herald.*

LIFE HISTORY OF THE LIVER-FLUKE PARASITE.

[Professor A. P. Thomas, writes on this subject in the columns of *Nature*.]

The winter of 1879-80 was marked by a widely-spread outbreak of the liver rot amongst our sheep. The losses during that winter were estimated at 3,000,000 sheep, or about one-tenth of the total number in the United Kingdom, and during the following winter the losses were equally severe. It had long been known that the disease was due to the presence in large numbers of a parasite called the liver-fluke (Fasciola hepatica) in the liver of the affected animals, and that the parasite invaded sheep or sometimes other animals allowed to feed on wet pastures, and especially on flooded ground. But notwithstanding that the question had been repeatedly investigated by numerous zoologists, including Professor Leuckart, so well known for his researches on parasites, the manner in which the disease was incurred remained a complete mystery. It was known indeed that the animals most nearly allied to the liver-fluke, the digenetic Trematodes, presented an alternation of generations, and that they possessed larval forms infesting various species of molluscs, These nurse-forms, as they are called, produce internally larvæ, usually tailed, known as cercariæ, which leave the nurse and encyst themselves in some other mollusc or in aquatic insect larvæ, &c., and remain there quiescent, only reaching maturity if swallowed together with the animal harbouring them by some suitable vertebrate host. Such is a typical instance of the development of a trematode with alternation of generations, but there is a great deal of variety in the life-histories of the different species. It was supposed that the liver fluke had a somewhat similar life-history, but all attempts to discover what mollusc served as intermediate host had been fruitless.

The Royal Agricultural Society of England was induced by the heavy losses of sheep in 1879-80, to offer a grant for the investigation of the natural history of this most destructive parasite. I undertook the research, and the result of my work during the summer and autumn of 1880 were published in the *Journal* of the Society for April, 1881. Certain slugs had been suggested as probable bearers of the larval form of the liver fluke, and I was able to show that these conjectures had little evidence to support them, and suggested that Limnæus truncatulus was really the intermediate host, or at least one of the intermediate hosts of the liver-fluke. For on the Earl of Abingdon's estate at Wytham, I examined thoroughly a clearly circumscribed area of infection situate on the side of a hill far above the reach of floods, and found that almost the only species of water-snail occurring on the ground was Limnæus truncatulus, found in a boggy spot. This contained an interesting form of cercaria, produced in a cylindrical redia, or nurse form provided with digestive tract.

The free cercaria had a body of oval form, about 0.3 mm. in length, but was of very changeable shape. The two suckers characteristic of the adult forms of the family of the Distomidæ were of nearly equal size, the oral sucker about terminal, and the ventral sucker near the middle of the ventral surface. The anterior part of the body was covered, at least in the most mature examples, with exceedingly minute spines. But the most striking character of the cercaria was due to lobed lateral masses extending the whole length of the body on each side of the middle line. These lobed masses were an opaque white from the multitude of granules composing them. The cercaria had a tail, which, when fully extended, was more than twice the length of the body. It was exceedingly active, but soon came to rest, showing a strong tendency to encyst itself on surrounding objects. It contracted so as to assume a rounded form, and exuded a mucous substance, containing numerous opaque granules derived from the lateral masses described, which were thus shown to be a special larval organ, producing the substance of which the cyst was composed. The tail continued to wag violently, and was at length pinched off as it were by the hardening wall of the cyst. The cysts were snowy white by reflected light, but on upturning them the included larva was found to be quite transparent. I had a few months previously seen a sheep which I had the best possible reason for knowing to be infected with flukes, wandering over the boggy spot from which the snail containing the cercaria came, and the presence of so highly developed an organ for the production of the substance of the cyst in a cercaria which encysted on any plants at hand seemed to indicate that there was the cercaria of the liver-fluke, and it has since been proved that such was the case. Moreover, I had collected evidence from independent sources, which rendered it probable that the parasite was taken up by the sheep while grazing from the damp roots of grass, most likely in the encysted condition.

Of this cercaria I wrote at the time as follows:—"The structure and habits of this cercaria render it possible that it may prove to be the larva of Fasciola hepatica, but want of material has prevented my testing the question by giving the cyst to rabbits. I intend, however, to pursue the case further."

Accordingly, during the summer of 1881, I endeavoured to procure L. truncatulus in order to put my strong suspicion to the test of experiment. But I was unfortunately unable to find any, even in the localities where I had found it during the previous year. In my search I had on many occasions the skilled assistance of my friend and colleague Mr. W. Hatchett Jackson, but we never found any other trace of this species than the empty shells. The localities for the snail mentioned by Whiteave in his paper on the mollusca inhabiting the neighbourhood of Oxford were searched, but without success. My friends at a distance were appealed to, but were unable to assist me. There can be little doubt but that the freedom of sheep near Oxford from the liver-rot during last winter was directly connected with the real scarcity of this snail. This year, however, there were floods on the Isis in July, and L. truncatulus was brought down by the water in vast quantities, probably from marshy ground far up the river. So numerous were they that I repeatedly obtained as many as 500 specimens at a single sweep of a small hand-net. The low-lying meadows near the river were covered with the flood waters, and when these subsided the snails were left scattered broadcast over the fields. The snail is almost the smallest species of Limnæus; the variety which I found so abundantly was only a a quarter of an inch long when fully grown. Although it is a water-snail, it lives much out of water. My observations have convinced me that the individuals left by floods on the fields continue to live out of water so long as the ground is moist. Their numbers are recruited by others, which crawl out of neighbouring ditches or streams. If a drought occurs they become dormant; but, unless too long continued, they revive with the first shower of rain.

On discovering these snails I immediately started infection experiments with them, and was at once successful. The adult fluke in the liver of the sheep or other mammalian host produces vast quantities of eggs. So prolific is it that I have estimated the number produced by each fluke to be at least several hundred thousand. The eggs pass with the bile into the intestines, and are distributed over the fields with the manure. If the eggs fall on too wet ground, or are washed into a ditch, development continues, and after a time, the length of which depends upon the temperature, embryos are hatched out of the eggs. For the purpose of my infection experiment, I obtained eggs from the livers of affected sheep, and kept them in water until the embryos were hatched, and then transferred them to vessels containing the snails to be experimented upon.

The embryo of the liver-fluke has the shape of an elongated cone with rounded apex; its average length is .125 mm., or about 2-200 of an inch; its breadth at the anterior end about one-fifth of this. The broader end or base of the cone is always directed forwards, and in the centre of this is a short retractile head papilla. The whole of the surface, with the exception of the head papilla, is covered with very long cilia, by means of which it swims, with head papilla drawn in, swiftly and restlessly through the water. It is exceedingly active; sometimes it goes rapidly forwards, and then rotates on its longitudinal axis, just turning a little from side to side as if searching for something. At other times, by curving its body, it sweeps round in circles, or, curving itself still more strongly, spins round and round without moving from the spot.

When the embryo, in moving through the water, comes in contact with any object, it pauses for a moment, and feels about, as if trying to discover its nature, and if not satisfied, darts off hastily again. But if the object be a Limnæus truncatulus it at once begins to bore. Under ordinary conditions, the head papilla of the embryo is short and blunt, but as soon as the animal begins to bore it becomes longer, conical and pointed. The embryo spins round on its axis, the cilia working vigorously, and pressing the embryo against the surface of the snail. This pressure is increased by the body of the embryo being alternately drawn up and then suddenly extented. As the papilla sinks further into the tissues of the snail it becomes longer and longer, and it reaches five times its original length, and the tissues of the snail are forced apart, as if by a wedge, leaving a gap through which the embryo squeezes its way into the snail.

The embryo will not bore into all snails alike; the only other species which I have found it bore into from without is Limnæus peregor, and even here the specimens have always been such as were still very small. I have found embryos enter certain other snails, such as Planoribus, but only from eggs which had been swallowed by the snail, and had been hatched in the digestive tract. This difference seems to be due to an instinctive choice on the part of the embryo, rather than to a greater softness of the tissues in Limnæus truncatulus. The tissus of Physa fontinalis, for instance, appear to be equally soft, but I have found that if these two species are placed in a small bulk of water with a very large number of embryos, the Limnæi will be found, on dissection, to contain fifty or more embryos, while the Physæ will be found entirely free from them.

But although the instinct of the embryo seemingly prompts it to enter the right snail, it does not teach it to discriminate between the different parts of the snail's body, for I have found as many as a dozen embryos within the substance of the foot of a single Limnæus truncatulus. Such a position, of course, is not favourable to further development of the embryos, which, thus gone astray, soon perish.

The natural place for the further development of the embryo appears to be the pulmonary chamber, but they may also be found in the body cavity. Once safely lodged in the suitable locality, the embryo undergoes a metamorphosis. It loses the external layer of ciliated cells, and changes from the conical to an elliptical shape. The eye-spots usually become detached, but they, as well as the head-papilla, persist, showing the identity of the young sporocyst—for so it must now be called—with the embryo of the liver fluke. The active embryo has degenerated into a mere brood sac, in which the next generation is produced. The sporocyst increases rapidly in size, the round, clear cells contained within it increase in number, partly perhaps owing to the division of the germinal cells of the embryo, but also owing to a multiplication and subsequent detachment of the cells lining the inside of the body-wall. As growth proceeds the contents of the sporocyst arrange themselves into round balls of cells, the germs of the second generation. These germs increase in size and assume first an oval and then an oblong shape, whilst a delicate cuticle is formed upon the surface. At one end a number of cells are arranged to form a spherical pharynx, which leads into a blind digestive sac. A little behind the pharynx the surface of the body is raised into a ridge, forming a ring surrounding the anterior end, whilst near the opposite end two short processes grow out. The germ has now become a redia, as the brood sac or nurse form provided with pharynx and intestine is called. The adult sporocyst is sac-shaped, and reaches the length of 0.6 mm.; it usually contains one or two rediæ nearly ready to leave, together with two or three larger and several smaller germs. There is another method of increase during the sporocyst stage, namely, by the division of a sporocyst into two others by a constriction separating the original one into two smaller ones. This method of multiplication, however, does not appear to be frequent in this species.

When the rediae is ready to come forth, it breaks through the wall of the sporocyst, and the wound caused by its forcible exit immediately closes up, and the remaining

germs continue to develop. The injury done by the parasites to the snails causes serious mortality amongst them, especially at the time the redie begin to leave the sporocyst, for the former are much more active than the almost inert sporocysts, and migrate from the pulmonary chamber into the other organs of the snail, and particularly into the liver, upon which they feed. The redie can be observed with the microscope, through the transparent shell, moving in the snail's liver. So great is the injury done, that in the laboratory, at any rate, very few snails survive three weeks from infection.

The redia increases in size, and may ultimately reach the length of 1.3 mm. or about one-twentieth of an inch. It resembles in every respect the redie I formerly described as found in the same snail at Wytham. Its contents of spherical cells arranged themselves into round germs as in the sporocyst, though I was able in this case to observe the formation of a gastrula. The germs at first were spherical, they then become oval, and afterwards they elongate still more, whilst one end becomes narrower than the other. The narrower end is partially constricted from the remainder, and becoming long and slender, forms the tail of the cercaria, whilst the rest of the germ becomes the body. A sucker appears at the anterior end, and another of nearly equal size at the middle of the ventral surface of the flattened body, whilst within a digestive tract appears. This digestive tract is simply forked, and presents no trace of the lateral branches so characteristic of the adult.

The adult redia contains about a score of germs. but these are in very different stages of development. There are generally two or three nearly mature, the others in various stages down to small spheres of cells. Close to the raised ring surrounding the body of the cercaria there is a small opening, as in all rediæ, by means of which the cercariæ are destined to be liberated one by one as they come to maturity.

But not all the redie produce cercariæ, for they sometimes produce other rediæ, and these daughter-rediæ then give rise to cercariæ. These latter, therefore, sometimes only appear as the fourth generation in the snail; and in one set of experiments I had reason to believe that no cercariæ appeared earlier. It will thus be seen that a single embryo may give rise to more than a thousand cercariæ.

On October 9 a paper, by Leuckart, appeared in the *Zoologischer Anzeiger*, a periodical which gives rapid publication to important papers. In this Leuckart extends his former results, and states that he too has reared the cercaria of the liver-fluke in L. truncatulus, and finds that it is the form with the lobed lateral organs which had already seen, and supposed to have no connection with the liver-fluke. It will be seen, therefore, that the cercaria of the liver-fluke is really the form found by me in Limnæus truncatulus at Wytham, and described in the Royal Agricultural Society's *Journal* for 1881. It is interesting to see this result confirmed, not only by my own experiments, but also by Leuckart's independent investigations.

For further details of the structure and natural history of the liver-fluke, as well as the discussion of preventive measures, I may refer to my reports in the *Journal* of the Royal Agricultural Society.

AN INVITING FIELD FOR THE AMATEUR.

It does not follow that, because a young man is the son of a farmer, and has grown up to manhood on the farm, he is competent to become a successful amateur breeder of the better classes of farm stock. Taste and percision in practice—and this latter qualification comes only to those possessing tact and judgment—are far more necessary than that it can be merely said of a young man that he has been raised on a farm, and has been accustomed to the routine of ordinary farm work. This routine, in part, fits the land for grass, thus forming the foundation for the breeder to commence upon. It also puts the grain in the bin and the hay in the stack as a commencement for the man who practices the higher art, namely: that of breeding improved farm animals.

A superficial view may lead a man to imagine that the field of raising purely bred stock is already fully occupied, and that for any other than an expert to enter this field is simply an act of presumption; that there is great liability of overdoing the business, and hence good reason for caution. Now, who ever knew of a lot of good farm stock of any sort, no matter how apparently hid away in an obscure neighbourhood, if of fair quality, and ready for market, for which there were not ready buyers. This is not the case in other lines of business, as we are constantly confronted with announcements of overstocking in various lines of manufacturing, and consequent failures, simply because there are not buyers.

Due weight is not usually given to the fact that improving a breed of domestic animals does not necessarily add to their fecundity, but rather, in certain hands, their tendency to increase is lessened, while an important item in the case of manufacturing rests in the increased facilities for turning off work. A moment's reflection will show another point of difference in the case of meat-produing animals. The coat worn may be made in a day, but it wears a year. The carriage used is made in a month or two, but may last a decade. A set of furniture made in a month, will last a lifetime, while the flesh of the meat-producing animal, which it has taken from one to three or four years to grow and prepare for market, and several months longer, if we count the time it was carried in the dam, is consumed in a day.

So, upon these reasons in part, the breeding of the higher types of domestic animals may be put forward as one of the best fields, if not the very best for capital, provided, always, that the investments and the management are guided by the highest order of taste, business tact, and energy. It is not an insurmountable barrier for a young man with means, and a taste that way, to say that he is not acquainted with the business, because all lines of business abound with experts, whose fountains of knowledge can be successfully drawn from. Perhaps there is no class of men who can so well be relied upon to give opinions and advice to beginners as breeders of improved stock, and this, too, without hope of pecuniary reward.

The beginner, if he wishes to master the business in all its aspects, should familiarize himself with the leading stock literature, that referring to the past as well as that relating to the present. The young man at the desk, or behind the counter, having means, and a taste for out-door pursuits, with an especial liking for the business referred to, may enter the field as safely as he that has been reared with his hand upon the handle of the plow. His means, under proper advice, can, as a rule, be far more safely placed than in manufacturing, or in any mercantile pursuit. If he secures the best, whether cattle, horses, sheep, or swine, he gets the advantage of other men's years of successful effort; whereas if he takes up with the culls, he pays good money for other men's mistakes and failures.—*National Live Stock Journal, Chicago, Ill.*

ENSILAGE.—Mr. Atkinson, of Boston recently sent a cask of maize fodder and a cask of rye to Professor Voelcker, the well known agricultural chemist of England, with the view of showing the sort of ensilage prepared in America. Having analyzed the samples the Professor reported the maize fodder to be perfectly sound and the rye very slightly mouldy; but both were wholesome food for cattle. A little cottonseed meal having been added to the fodder it was given to cows on an experimental farm. They took to the ensilage at once and evidently enjoyed it. With careful management Mr. Atkinson calculates that four cows can be maintained in good condition to one acre of ensilage.—*Scientific American.*

THE VETERINARIAN.

THE LIVER-FLUKE.

As it would seem that there are still some unacquainted with the teaching of science upon one pastoral enemy—*i. e.*, the rot fluke, coathe, or bane—perhaps you will allow me to state in a few lines what Mr. A. P. Thomas (Balliol College, Oxford) has, after a series of experiments lasting through more than two years, ascertained, and has published in the *Quarterly Journal of Microscopical Science* for January, 1883, and in the Royal Agricultural Society of England's *Journal*, June, 1880, and June, 1883. It is impossible to exaggerate the importance, to every one connected with sheep and sheep farms, of studying this brief story. It is as interesting as a fairy tale, and has more startling transformations than any Christmas pantomime.

Flukes have been known to be found in cattle, horses, pigs, rabbits, hares, kangaroos, camels, and even in man himself. In every case in which flukes find an entrance at all, they enter in one way. That animal (in man's case, probably by eating watercresses without washing in salt and water) has swallowed with its food certain small bags, which in certain seasons are found attached to the herbage, which are called cysts. These cysts are in some seasons frightfully common, and found over a wide tract, but in ordinary seasons they occur only in low, marshy spots. These cysts are somewhat similar to the pupæ or chrysalides in which some insects lie for a while dormant. But the fluke-cysts cannot emerge of their own action; they must perish in a few weeks unless some warm-blooded animal swallows them. If this occurs, a wonderful series of development begins. The tiny germ expands in the cyst as soon as it is swallowed, and becomes the loathsome fluke above an inch long, whose ugly features have become known to so many farmers of late years. It is not unlike a small sole, and is even more prolific of eggs. (It is estimated that one fluke *may* give rise to 500,000 eggs.) These eggs, produced in myriads, pass from the diseased animal with the dung. If this falls on dry ground and drought follows, the eggs perish. If it falls in a moist spot, and water is near, and the thermometer stands over 60°, the egg hatches into an embryo in a few days, which, invisible to the naked eye, may be seen under the microscope, darting to and fro in water with incredible rapidity. Its activity is not purposeless, for its whole object is to come into contact with a special kind of snail which seems to be predestined to become its nurse and victim. As soon as the embryo touches this snail it commences to bore through its shell, and, succeeding in this, penetrates the snail, and the second change takes place. The active embryo becomes a motionless sporocyst—a long word, which means bag of germs. This bag may either subdivide into two or more bags, each complete, and capable of reproduction; or it may at once, within the helpless snail, send forth redia. These redia (named after an Italian anatomist, Redi) are organisations capable of moving, which the sporocyst is not. Moving about within the snail, and supported by its juices, the redia give vent to tailed creatures called cercariæ, which resemble minute tadpoles. These wriggle out of the wretched snail's flesh either after it succumbs to their attacks, or whilst it still lives, and by help of the tail, move among the herbage, until they find a suitable stem to which the cercariæ attach themselves. Then the tail drops off, and each cercaria, forming a cover for itself, becomes a cyst and is ready for the next victim to swallow, and so to begin the round anew.

It will be seen, in this wonderful narrative, that the fluke egg gives birth to something quite unlike its parent, which never does become like it, nor lives where it lived. There has to be the intermediate host (the snail known as Limnæus truncatulus), and the final host (the warm-blooded animal) before this kind of flatworm (known as Fasciola hepatica) can run its career. A snail cannot take the infection directly from another snail, nor a sheep from another sheep; nor can snail and sheep suffice to spread the vermin without wet and warmth. Only in a small part of each year can the mischief be extended.

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