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AGRICULTURAL JOURNAL, AND TRANSACTIONS

OF THE

Lower Canada Agricultural Society.

VOL. 5.

MONTREAL, NOVEMBER, 1850.

NO. 11.

How very desirable it would be that the rural population of Lower Canada should bestir themselves, and endeavour to realize the numerous advantages which their situation and circumstances have placed at their disposal. We have frequently attempted to enumerate these advantages, and the more we see of this and other countries, we become more firmly persuaded that we have never over estimated Lower Canada as compared with other countries. The rural population with us, we believe, are not so generally educated, as the farming classes of neighbouring countries, but this defect is in our own power to remedy. In introducing any changes of our systems of education for the rural population, it is to be hoped that due provision will be made to give this education an agricultural character that will be suitable for, and useful to the youth to whom it is imparted. Above all other considerations this is necessary, if we desire to attach the educated sons of farmers to the profession of their fathers. If this is not attended to, the children of farmers that obtain education according to the present system of schools, are very likely to fancy any profession rather than that of an agriculturist. Agriculture has never been done justice to in Canada by the systems of education that are got up for the children of agriculturists. Nothing can be more calculated to estrange the mind of a youth from the pursuit of agriculture than the teaching he receives at school. His reading and teaching, from beginning to end, is of every subject but agricul-

ture, although his parents, perhaps, intended him for a farmer. He naturally concludes that farming cannot be a suitable employment for a man of education, or it would require some education to fit him for such an occupation, he is, therefore, disposed on leaving school to despise the occupation of his father, and to apply himself to some other business. Farmers perceiving this propensity in their children, are not so anxious to have them properly educated and we condemn farmers for their disinclination, we humbly conceive, very unjustly. We object not to a good education for the children of the rural population, on the contrary, let it be as good as possible, but let the science and art of agriculture be a part of the education. If youth will, after such instruction, go to other professions, and prefer them, there can be no sound objection offered, however such a choice may be regretted. The sons of farmers would thus have a fair chance of practising their profession with advantage and being duly educated for it would not have any disinclination to it, or disrespect for it. It is time we should come to some just conclusion on this matter, and provide for the agricultural classes, the same advantages of instruction in their profession, that are provided for other classes in their several professions.

Large minds, like large pictures, are seen best at a distance. This is the reason, to say nothing of envious motives, why we generally undervalue our contemporaries, and over-rate the ancients.

We in a former number stated, that we were not disposed to admit but that Lower-Canada could show examples of good husbandry, equal to any on this continent, and that we were in a condition to lead in the art of good husbandry, and the manufacture of good implements, instead of following any other country in North America. We are more confirmed in this opinion every day and although we write this article before the Industrial Exhibition takes place at Montreal, we feel confident that the result of that exhibition will fully sustain our pretensions. We shall be much disappointed indeed, if we do not show products of Agriculture, Horticulture, and implements of husbandry equal to any that have been exhibited, and we hope, that will surpass all other. Our ploughing match also, we have not the slightest doubt, will show work executed by our implements that cannot be excelled. It is in this way we expect to prove that our pretensions are not idle words, and that we are in reality entitled to lead instead of following in the art, and practice of agriculture and in the manufacture of agricultural implements. The necessary implements of agriculture are not so numerous, and we should greatly prefer, a few, well selected and suitable implements, that would be necessary to carry on our business properly, to a large number that were not of the best quality, and which might not be required for use. It is only a waste of capital to be collecting every implement that may be offered for sale whether necessary or not. It is certainly well to have all necessary implements, but it is absurd to purchase every thing offered and recommended unless a farmer wishes to open a hardware store, or one of agricultural implements. Well made implements of good materials, light, and at the same time of sufficient strength to execute the work they are intended for, are the grand requisites, and we have seen very many implements exhibited, very deficient in these qualities, and only fit for the show room. Farmers should be cautious in purchasing im-

plements until they have been proved at work in the field by parties who can be depended upon. We hope the Industrial Exhibition will show farmers where they can best supply themselves with agricultural implements.

To the Editor of the Agricultural Journal.

St. FOY, COUNTY OF QUEBEC,

15th October, 1850.

Sir,—I take the liberty of enquiring, through the columns of your valuable Journal.—Whether it be proper and necessary, at Ploughing Matches, that the depth and width of the Furrow Slice should be given?—And, likewise, the time for finishing the work?

By answering the above in your forthcoming number, you will greatly oblige

Your obedient servant,

A YOUNG PLOUGHMAN.

In reply to a "Young Ploughman," we never witnessed a Ploughing Match in the old country that there was not a scale given to plough by, so that the furrow slice should be of the due proportion in depth and width. The usual scale was 5 inches in depth by 8 inches wide, or 6 inches in depth, by 9 or 9½ inches in width, and if the proportion was not kept, the ploughman was disqualified. We have seen the same scale given at Montreal. Some parties may imagine that establishing a certain scale is not necessary. We think otherwise. Land ploughed by the above scales will be better ploughed than by any other scale and give a better seed-bed for the crop. In the smaller scale, if properly executed, each furrow slice covers the one turned before it 3 inches, thus leaving an angle of the furrow slice for the harrow, of 5 inches each way, to cover the seed. In the larger scale, an angle of 6 inches each way is left. There cannot be any better mode of executing ordinary ploughing than this. When due proportions are not observed, the ploughed soil will lie too flat, and cannot be harrowed properly to cover the seed. In summer fallowing, or for green crops, it is not so necessary to adopt any particular scale, so that all the land is turned, but in all cases, if a minute division of the soil is desired, the smaller the furrow slice the better. There was, and should be, a time given to complete the work,

and any ploughman who did not finish within the time was disqualified. The usual time allowed to plough half an acre was three to four hours according as the soil was easy or difficult to plough.

ST. FOY, COUNTY OF QUEBEC,
14th October, 1850.

Sir,—I take the liberty to forward you a small quantity of a peculiar quality of oats, which I find to answer this climate extremely well, and to be profitable as to the quality and quantity of meal it yields; its flavour is peculiarly agreeable, —I got a small quantity of these oats last year, which I sowed the 20th May last, in light soil which, the previous year, had been under potatoes, and reaped them on the 20th August. The straw was of good length, and not too rank, and therefore not subject to lodge.

I hope the sample I send you, when tried, will induce farmers in the Province to prefer it to other oats, as more profitable, yielding as good, and a more certain crop

I have the honor to be,

Your most obedient humble servant,
MATHEW DAVIDSON.

Wm. Evans, Esq.,
Montreal.

It appears from the following extract, from the Bankers' Circular of September 20th, that the wheat crop in England is far from being a very heavy crop. We have also seen Reports from several English counties and from Ireland, that state the damage to the wheat crop, by the wheat-fly and other causes, is very extensive indeed, it is said that the crop has not been more deficient for twenty years past in England. We have no particular Reports of the state of the wheat crop in Scotland, but it appears that in the latter country, the season has been very dry this year, and that was favourable to wheat:—

“There has not been in England a season for twenty years, in which the diseases in the wheat crop were so various so extensive, or so general. The midge, the smut, the red-gum, and the mildew, have appeared more or less in moist countries of England. The two first may be passed over as being of partial range, and comparative-

ly unimportant in effect. The red gum, or, as it is termed in some counties, the red robin, may be found in all seasons, but in no former year for a long period of years has it ever been so general or so destructive as in the year 1850. Many farmers will tell you that it has destroyed one-half of their wheat crop. Such extreme cases, however must be rare. There can be no doubt of the extent and of the destructive nature of the disease upon the wheat crop of 1850; I have discovered it in all the midland, western, and eastern counties of England; also in Durham and Northumberland. As far as my observation enables me to determine, it was most first in Berkshire, Wiltshire, Oxfordshire, and Gloucestershire, and the counties lying between them and the coast counties of the eastern shore. Careless persons are apt to treat the red gum with indifference because it prevails more or less every season; but they will find that in this year it spread to an extent that will make a serious inroad on our annual supply of wheat of domestic growth. I believe it has struck out a quantity greater than that which has been lost by mildew, because it spread much more extensively, and affected nearly all districts—some to a lamentable degree.

“The mildew prevailed in Northamptonshire, Rutlandshire, Leicestershire, Derbyshire, and Nottinghamshire, partially; in the low lands of Cambridge, Lincoln, and East Yorkshire, very extensively. On two lines of railroad through Lincolnshire you could scarcely find a single field of full-cropped wheat without mildew; some of those crops were almost wholly destroyed by this destructive disease. All the way from New Holland, through Grimsby and Boston, to near Peterborough, it was quite melancholy to look over large fields of wheat beaten down flat, of a dark dingy green colour, showing that the corn would never ripen, and would never assume any other hue. The same from Retford, through Lincoln, to near Peterborough. When you reached within about five miles of that city, the wheat crops presented a healthy harvest colour, and one could observe very little of this disease all the way from that point to London; some in Huntingdonshire, while Bedfordshire and Hertfordshire were comparatively free from it. The mildew also prevailed extensively throughout the low marsh lands of the East Riding of Yorkshire; neither were the wolds entirely free from it. The *Times* newspaper still talks about an average crop of wheat; but in its report of the corn trade in Mark-lane on Tuesday last, there is this significant passage: ‘The samples on sale from Cambridgeshire and Lincolnshire for delivery by railway, presented a striking contrast to the Essex and Kent, as—although a few were fine and bold—the principal part were shrivelled and light.’ To be sure they were, as the writer might have known they must be, if

he had examined those counties a month ago. The worst samples from the midland districts will never be sent to the London market for sale.

"These are, consequently, the main facts of the case, so far as the wheat crop of England is concerned: 1. General deficiency arising from blight, and the inability of the injured plant to feed a numerous family of grains. More widespread disease of a great variety than has been known in England for more than twenty years.

WOOL.

The wool of the different races, families, and breeds of domesticated sheep differs so widely in comparative length of staple as to have occasioned them to be classified into short-woolled, middle-woolled, and long-woolled—and differs also so widely in comparative softness and tenacity as to have caused them to be classified into coarse-woolled, medium-woolled, and fine-woolled. But the wool of any one breed differs both in length and in fineness, as well as in other properties, according to the circumstances of climate and pasture and treatment in which the breed is reared and maintained; and the wool of each individual of every breed, in all circumstance, has somewhat widely different properties in different parts of the body. The wool of the most steady climate, the most congenial pastures and the most judicious management, is always bulkier and finer than that of inclement districts, irregular feeding, and bad store husbandry; the wool of light arenaceous or calcareous sheep-walks has always a cleaner texture and a purer colour than that of such soils as those of some parts of Gloucestershire, which impart to it an orange tinge, or that of such soil as those of some parts of Hertfordshire and Warwickshire, which give it a brownish hue, or that of such districts as the fens of Lincolnshire and Cambridgeshire, which give it a dark blue tint; and the wool of the shoulders, back, and sides, of any individual sheep, is finer than that of the upper part of the thighs, the upper part of the legs, and the parts extending thence toward nearly the haunch and the tail—and the wool of these parts, again, is finer than that of the upper part of the neck, the throat, the breast, the belly, and the lower part of the legs. The separating and assorting of the different qualities whether from one fleece or from a collection of fleeces, is a nice process of art, and is performed sometimes under the direction of the manufacturers who have purchased and are about to use the wool, but more commonly by a class of persons called the wool-staplers, who have qualified for their employment by a regular apprenticeship, and who purchase the raw material from the grower, and sell it in an assorted state to the manufacturer. The operator unrolls the fleece on the table, spreads it out under a clear

light, and, under the joint guidance of his sight and his touch, cuts out successive locks of uniform fineness of filament, and deposits them in a basket; and he assort the whole into six or ten or, in some cases, a greater number of kinds, and has beside him a separate basket for each kind, and goes through the whole process with a promptitude, accuracy, and celerity, which quite astonish the uninitiated. "In sorting wools," says M^r Culloch, "there are frequently eight or ten different species, in a single fleece; and if the best wool of one fleece be not equal to the finest sort, it is thrown to a second, third, or fourth, or to a still lower sort, of an equal degree of fineness with it. The best English short native fleeces, such as the fine Norfolk and Southdown, are generally divided by the wool-sorter into the following sorts, all varying in fineness from each other, viz., first, prime; second, choice; third, super; fourth, head; fifth, downrights; sixth, seconds; seventh, fine abb; eighth, course abb; ninth, livery; and tenth, short-course or brack wool." But either these divisions, or any others to a lesser or greater amount, would be far better designated by simple numerical names; and all vary in their relative market value, according to the demand for respectively coarse, middle, and fine cloths. The long wools, in an aggregate view, have a staple of seven inches and upwards—the middle wools, of from four to seven inches—and the short wools, of from two to four inches.

The comparative properties of wool are very vaguely expressed by the epithets coarse and fine or by any other two or three general words; and they have been somewhat better designated as follows, by Arthur Young, in the order in which they are esteemed and preferred by the manufacturer:—"First, fineness with close ground, that is, thick-matted ground; second, fineness; third, straight-haired, when broken by drawing; fourth, elasticity, rising after compression in the hand; fifth, staple, not too long; sixth, colour; seventh, what coarse is in it to be very coarse; eighth, tenacity; ninth, not much pitch mark, but this is no other disadvantage than the loss of weight in scouring. The bad or disagreeable properties are—thin, grounded, topky, curly-haired, and, if in a sorted state, little that is very fine, a tender staple, no elasticity, many dead-white hairs, very yolky. These who buy wool for combing and other light goods that do not want milling, wish to find length of staple, fineness of hair, many pitch-marks." Another clearer, and shorter classification of properties may be made into soundness, length, cleanness colour, softness and feltability. Soundness arises from the healthy condition and proper feeding of the animal, and comprises uniformly, flexibility, and kindness of the pile, but perfectly comports with the wide diversity of the other properties correspondent to the different families

and breeds of sheep. Length or shortness or any medium between the two must be variously suitable according to the different purposes of the manufacturer, but ought always to be uniform in the same specimen, or at least as nearly so as will comport with a due regard to the assortment of the other properties. Cleanness, though mainly desirable for preventing expense and the loss in the process of scouring, is desirable also for its appreciable conservation of soundness and softness; and it requires that no dirty or discolouring ingredient be employed in salving, that as little as possible of any ochreous substance should ever get into the shepherd's or store-master's possession, and that the living flock, as well as the separated fleece, should be kept aloof from whatever might pollute them. Colour is important because wool excels cotton and linen and even silk in taking on bright and beautiful hues in the process of dyeing—and because white wool receives the colouring matter more readily than black, and clear white wool more readily than creamy-coloured or brownish or dingy—and because any mixture of black filaments with the white, mars the harmony of the dye, and renders the whole specimen unsuitable for the reception of the brighter and more delicate hues. Softness has been raised to paramount importance by the demands of fashion; and depends partly on the minuteness of the fibres, partly on the combination of soundness and feltability, and partly on the abundance and tenuity of the lubricating yolk; and it more or less comprises or includes the two properties which Arthur Young and many other popular nomenclators call fineness and elasticity. What we have designed feltability is the most curious of all the properties; and is identical to a certain extent with what is popularly called fineness, but still more with a peculiar and very beautiful structure of the filaments quite recently discovered; and may be well understood from the following account of it by Mr. Spooner:—"The felting property and other qualities of different wools have long been known by practical experience; but we are indebted to Mr. Youatt for the discovery, that the felting property depended in a great measure on the number of serrations on its surface. This gentleman, after several laborious attempts, at length succeeded, with the assistance of a powerful achromatic microscope and its scientific maker, in developing the singular structure of wool and the different qualities. Each fibre was found to consist of a number of leaves attached to a central stem or band, and extending in one direction, viz., from the root to the point. This was the result of examining a filament on an opaque object; but when viewed as a transparent object, the edges of the leaves were more visibly apparent, appearing like so many teeth pointing in one direction, and thence properly termed the serrated

edge. The fibre of wool thus magnified appears somewhat like a common fir-tree. On examining different wools, Mr. Youatt found that the number of serrations corresponded to the felting qualities of the wool, being in the Saxon no less than 2,720 in the inch, in the Southdown 2,080, and in Leicester 1,860 alone. Thus fine wool differs from coarse in having a greater number of serrations and growing in a more spiral form, which, of course, increases the number of curves; but to this we must add the fact of its being actually finer or smaller in its fibres; so that while a fibre of the coarsest wool is 1-450th, the finest is 1-1500th of an inch in diameter. It can easily be conceived how the curious structure of the wool, particularly its serrated edge, must conduce to its felting property. As long as the filaments are kept in the same direction, these serrations are comparatively inoperative; but torn to pieces by the card and mixed in every direction, the serrated edges must tend to hook and entwine together; and this must be pretty much in proportion to the number of serrations in a given space, particularly when this is added to the fact that the wool is more curved as the serrations are numerous."—*Rural Cyclopædia*.

A DAIRY STOCK.

I recommend the following mode of managing a milk stock, the principles of which are followed by the best milk-selling farmers. Curry and wisp the cattle once a day, give water twice a day when in the stall, and an hour's airing in the yard. Let the food be given to them at exactly the same hour every day, and likewise the water. When food is given, and any cow does not take to it readily, take it from her, and let her be without any until next feeding time (this is the way man should do to remain in health.) Never pamper immediately after calving. At milking time the master or mistress should assist, or be present, in order to see that the milkers milk briskly, and without talking. A great deal depends on these two points. A milker may sing or whistle, but not talk, but then it must be tuneable. There is an old saying, that the last drop is the richest, and should be drawn. This is wrong, for the last drop from a good milker never does come. I have seen milkers pulling at the udder for the "last drop," while a weakly constituted cow has been nearly sick. A mother who has suckled children can understand this, and yet I have known thoughtless mothers to forget it when milking cows. In stripping a cow, a milker finishes with his right hand, by taking the teats in rotation, and getting what he can out; and when he gets hold of a teat, if he can get milk twice, he must try that teat again after he has gone them round; but if he can only get milk

once, he should give up, for the last drop which ought to be taken is then come: and if more after this is got, it is a pull upon the milk veins and is no richer than milk taken at the first, or rather, it is of an average quality. If a milk farmer intends to follow his business to the best advantage, either he or his wife must themselves milk, or be present during the time of milking. One of the best managers I am acquainted with, always did the stripping himself, and left the others to do the regular milking.

The proper temperature for a dairy, where butter is made, will be from 50 to 60 degrees, according to the temperature of the weather. There should be plenty of air circulating through it. If it be too warm where the cream stands, it will lift in the cream mug, and the butter will be rancid; and if it be too cold, the cream will not get sufficiently acid for churning in proper time; in this case the butter will have what we call a bingey taste. Bad dairymen, to insure good butter, will churn the cream before it is acid, but this is a waste of labour, inasmuch as the cream, in this case, must be churned until it is acid, before the butter will separate from the milk. When churning commences the cream should be at from 62 to 68 degrees, according to the temperature of the weather, or of the room. No water should ever be used about butter in making up, as water left in butter is just as bad as milk, and it will soon make the butter bad. Nothing but labour, by working the butter, will produce real solid sweet butter, and make it keep sweet. The following is a statement for eight years, previous to 1849, of the stock, produce, &c., of a dairy farm in the neighbourhood of Rochdale:—The farm is on the mixed system of dairying, that is, part of the milk is sold in the new, part skimmed, the cream being churned, and the skim milk and butter-milk sold as well as the butter.

Year.	No of Cows kept		Quantity of Butter produced.	Quantity of New Milk sold.	Value of Butter sold.		Value of Milk sold.		Total value of Produce.		Average produce of each Cow.	
	lbs.	Qrts.			£	s. d.	£	s. d.	£	s. d.	£	s. d.
1833	28	6608	5334	359	16 2	345	8 5	705	4	725	3 8	8
1834	28	6695	6890	3 4	10 5	347	13 9	712	4	225	8 9	8
1835	27	6733	7735	366	11 7	328	5 11	694	17	625	14 7	7
1836	25	6112	9389	357	15 8	353	2 0	710	17	828	8 8	8
1837	25	6010	11390	376	5 0	334	19 10	711	4	1024	8 11	11
1838	24	5929	9391	347	2 2	340	4 10	687	7	028	11 11	11
1839	25	5618	4743	328	19 4	313	13 1	642	12	525	14 1	11
1840	23	5530	2444	346	0 0	317	5 11	717	10	1131	3 11	11

In addition to the above there were about 150 lbs. of butter, and 1,000 quarts of milk annually consumed in the house; value about £15. The cows were kept on pasture in the summer, with about one quarter bushel of grains each daily;

in the winter on hay, potatoes, turnips, and grains, with bean flour or oatmeal. On an average 11 cows were changed (bought and sold) every year, at about £6 loss for each cow changed. The farm was an entire grass farm, consequently all the provender had to be purchased, and cost, on an average, £150 per year, —*Rutwell's Agriculture of Lancashire.*

[The report on the agriculture of Lancashire, from which the above extract is taken, was intended for competition for the prize offered by the Royal Agricultural Society of England, but, arriving too late, could not be received. It contains much of sensible remark, and will well repay perusal.—Ed]

STEAM MACHINE FOR MAKING BREAD.—On Tuesday last we attended an exhibition of the process of making bread and biscuits by steam, a patent being taken out for apparatus by Messrs. Lee and Robinson, of Wapping. The two important points in this process which struck our attention were, first, the preparing the dough almost immediately, without being set in sponge five or six hours, as is the common practice at present; and secondly, the appropriating the waste steam to the purposes of baking—that being the power which converts the dough into bread in the oven. The following is as concise a description, as we can give of this most surprising invention. The flour falls into a hopper in an even and regular manner, at the same time a regular supply of carbonated or soda-water is likewise supplied; these, intermingling in even proportions, are conducted to a tub, where machinery like that in a pug-mill mixes, and, at the same time macerates the mixture, until it is converted into dough: then it is expelled through a square opening, where, by a simple contrivance, as it protrudes, it is cut by a sliding door into any weight, from that of a quarter loaf to a biscuit. As each piece of dough is cut, it falls into a cloth attached to endless chain, whereby the operation of "moulding" is performed: a small boy then places the loaves on a baking-table furnished with wheels, the whole batch being thereby set in or withdrawn from the oven at the same moment. The same free current of steam which keeps the machinery in motion is the power which heats the oven: it passes openly and directly upon the bread, thus avoiding the dangerous pressure where heating by steam in strong pipes is used. That steam is the power used in baking is shown by the patentee, who opened the door of the oven, introduced an iron shovel, and withdrew it with the steam condensed on it into water; while at the same time the bread in the oven was collecting a strong brown crust from the same agency. The machinery is very simple, and can be easily attached to any steam-mill; and, by having the flour directly conveyed into the hop-

per of this invention, to be mixed as above described, the same steam power which now produces flour can, with the same ease and facility, produce in the same establishment, *br a l.* On the score of economy, as well as that of cleanliness, the above process deserves every encouragement. The apparatus is in daily use at 278, Wapping, and the inspection of it will well repay a visit.

DRAINING.

The following remarks on Draining are from the *Penny Cyclopædia*, and by the Editor:—

As a certain quantity of moisture is essential to vegetation, so is an excess of it highly detrimental. In the removal of this excess consists the art of draining. Water may render land unproductive by covering it entirely or partially, forming lakes or bogs; or there may be an excess of moisture diffused through the soil and stagnating in it, by which the fibres of the roots of all plants which are not aquatic, are injured, if not destroyed.

From these different causes of infertility arise three different branches of the art of draining, which require to be separately noticed.

1. To drain land which is flooded, or rendered marshy by water coming over it from a higher level, and having no adequate outlet below.
2. To drain land where springs rise to the surface, and where there are no natural channels for the water to run off.
3. To drain land which is wet from its impervious nature, and where the evaporation is not sufficient to carry off all the water supplied by snow or rain,

The first branch includes all those extensive operations where large tracts of land are reclaimed by means of embankments, canals, sluices, and mills to raise the water; or where deep cuts or tunnels are made through hills which formed a natural dam or barrier to the water. Such works are generally undertaken by associations under the sanction of the Government, or by the Government itself; few individuals being possessed of sufficient capital, or having the power to oblige all those, whose interests are affected by the draining of the land, to give their consent and afford assistance. In Britain there is no difficulty in obtaining the sanction of the Legislature to any undertaking which appears likely to be of public benefit. In every session of Parliament acts are passed, giving certain powers and privileges to companies and individuals, in order to enable them to put into execution extensive plans of draining. That extensive draining in the counties of Northampton, Huntingdon, Cambridge, Lincoln, Norfolk, and Suffolk, which is known by the name of the **BEDFORD LEVEL**, was confided to the management of a chartered corporation, with considerable powers, as early

as the middle of the seventeenth century; and by this means an immense extent of land has been rendered highly productive, which before was nothing but one continued marsh or fen.

In the valleys of the Jura, in the canton of Neuchâtel in Switzerland, which are noted for their industry and prosperity, extensive lakes and marshes have been completely laid dry, by making a tunnel through the solid rock, and forming an outlet for the waters. The greater part of the Netherlands, and Holland, have been reclaimed from the sea, and from rivers which flowed over them; and they are now as productive lands as any on earth.

In Canada, draining is very difficult; and in consequence some of the best situated lands are allowed to remain waste, that would not require a large expenditure to drain them perfectly. The principal obstacle is, the want of power to oblige all those whose interests would be affected by the draining of the land, to give their consent, and afford assistance. In some particular cases, were a proper application to be made now to the Government, perhaps the necessary powers might be obtained. It is only where outlets require to be cut, that would drain large tracts of land; or where small rivers require to be straightened and deepened, that the interference of the Government could be applied for. But in such cases, were the Government to grant the necessary powers, it would greatly promote improvement, and prove highly advantageous to the industrious agriculturists.

In hilly countries it sometimes happens that the waters, which run down the slopes of the hills, collect in the bottoms where the soil is impervious. In that case it may sometimes be laid dry by cutting a sufficient channel all round, to intercept the waters as they flow down, and to carry them over or through the lowest part of the surrounding barrier. If there are no very abundant springs in the bottom, a few ditches and ponds will suffice to dry the the soil by evaporation from the surface. This principle might be applied with great advantage, in many cases, where the water could not be drained out of considerable hollows, if it were allowed to run into them.

When there are different levels at which the water is pent up, the draining should always be begun at the highest; because it may happen that when this is laid dry, the lower may not have a great excess of water.

In draining a great extent of land, it is often necessary to widen, straighten, and deepen rivers, and alter their course; and not unfrequently the water cannot be let off without being carried, by means of tunnels, under the bed of some river or canal, the level of which is above that of the land. In more confined operations, cast-iron pipes are often a cheap and easy means of effecting this. They may be bent in

a curve, so as not to impede the course of the river, or the navigation of a canal.

The draining of land, which is rendered wet by springs arising from under the soil, is a branch of more general application. The principles on which the operations are carried on, apply as well to a small field as to the greatest extent of land. The object is to find the readiest channels by which the superfluous water may be carried off; and for this purpose an accurate knowledge of the strata through which the springs run is indispensable. It would be useless labour merely to let the water run into drains after it had sprung through the soil and appears at the surface, as ignorant men frequently attempt to do, and thus carry it off after it has already soaked the soil. But the origin of the spring must, if possible, be detected; and one single drain or ditch, judiciously disposed, may lay a great extent of land dry if it cut off the springs before they run into the soil. Abundant springs, which flow continually, generally proceed from the out-breaking of some porous stratum in which the waters were confined, or through natural crevices in rocks, or impervious earth. A knowledge of the geology of the country will greatly assist in tracing this, and the springs may be cut off with greater certainty. But it is not these main springs which give the greatest trouble to an experienced drainer; it is the various land springs, which are sometimes the branches of the former, and often original and independent springs, arising from sudden variation in the soil and subsoil.

In England, it is found that in one situation boring will bring water, and in another it will take it off. This principle being well understood will greatly facilitate all draining of springs. Wherever water springs there must be a pervious and impervious stratum to cause it, and the water either runs over the impervious surface, or rises through the crevices in it. When the line of the springs is found, the obvious remedy is to cut a channel with a sufficient declivity to take off the water in a direction across this line, and sink through the porous soil at the surface into the lower impervious earth. The place for this channel is where the porous soil is the shallowest above the breaking out, so as to require the least depth of drain; but the solid stratum must be reached, or the draining will be imperfect. It was by attending to all these circumstances that Elkington acquired his celebrity in draining, and that he has been considered as the father of the system. It is, however, of much earlier invention, and is too obvious not to have struck any one who seriously considered the subject. In the practical application of the principle, great ingenuity and skill may be displayed, and the desired effect may be produced more or less completely.

When the drains cannot be carried to a sufficient depth to take the water out of the porous

stratum saturated with it, it is often useful to bore numerous holes with an auger in the bottom of the drain through the stiffer soil, and, according to the principle explained, the water will either rise through these bores into the drains and be carried off, and the natural springs will be dried up, or it will sink down through them if it is above.

If the surface of peat mosses be properly dried, dressed with lime, and consolidated with earth and gravel, they will soon become productive. If the soil, whatever be its nature, can be drained to a certain depth, it is of no consequence what water may be lodged below it. It is only when it rises so as to stagnate about the roots of plants that it is hurtful. Land may be drained, so much as to be deteriorated in some cases.

When a single large and deep drain will produce the desired effect, it is much better than when there are several smaller, as large drains are more easily kept open, and last longer than smaller; but this is only the case in tapping main springs, for if the water is diffuse through the surrounding soil, numerous small drains are more effective; but as soon as there is a sufficient body of water collected, the smaller drains should run into larger, and these into main drains, which should all, as far as practicable, unite in one principal outlet, by which means there will be less chance of their being choked up. When the water comes in by the side of the drains, loose stones might be laid in them to a little above the line where the water comes in, and they may then be covered with sods cut off the surface and with earth.

The third branch in the art of draining is the removal of water from impervious soils which lie flat, or in hollows, where the water from rain, snow, or dews, which cannot sink into the soil on account of its impervious nature, and which cannot be carried off by evaporation, runs along the surface and stagnates in every depression. It requires much skill and practice to lay out the drains, so as to procure the greatest effect at the least expense. There is often a layer of light earth immediately over a substratum of clay, and after continued rains this soil becomes filled with water like a sponge, and no healthful vegetation can take place. Open drains should be made in the most suitable situations, and if the land is ploughed into well formed ridges, the fur rows between the ridges may answer all the purposes of under drains, and convey the surface water into the main drains.

Though much of the lands of Canada are very level, yet in the most level field, there is generally an inclination in some direction. It is necessary to ascertain in what direction the greatest fall may be had, and to cut the drains so as to obtain the full benefit of the fall. Drains cannot always be in a straight line, unless the ground be perfectly even. They should, however, never

have sudden turns, but be bent gradually where the direction is changed. The outlets of all drains should be carefully kept clear, for wherever water remains in a drain, it will soon derange or choke it. Cross drains should be so arranged or turned, that the outlet shall meet the main drain at an obtuse angle towards the lower part where the water runs to. A drain brought at right angles into a ditch must necessarily soon be choked by the deposition of sand and earth at its mouth.

The following is an article on the same subject from the *Quarterly Journal of Agriculture*:— At the conclusion of our last thoughts on draining (vol. vii. p. 533.) is expressed a sentiment which cannot be too emphatically impressed on the minds both of landlords and tenant, that draining is the first step towards the improvement of the soil, which, if neglected, and the soil permitted to remain, not only in its natural, but in a half cultivated state, all other means of fertilizing it will only prove comparatively abortive in their application. Were draining thoroughly effected, all the present undrained but improveable soil of the country would be rendered capable of receiving all the benefits derivable from numerous indirect modes of fertilizing it. These various modes of fertilizing soil, were enumerated to be ploughing, dung, lime, and bone-dust, and these subjects were recommended as interesting topics of enquiry for another paper. It is our purpose now to prosecute that enquiry.

1st, *Ploughing*.—In ploughing undrained land, particularly land resting on a wet subsoil, the attention of the ploughman is constantly exercised, otherwise the plough may be thrown out at one place, and dip deeper at another, without any apparent cause for the diversity of its action. There is, however, a paramount cause for it. The texture of soil, however homogeneous it may appear at the surface, greatly varies where the soil rests on a wet subsoil, in being consolidated at one place, and loose at another; and of course in being hard and soft at different places. The hard portions become dry by the expulsion of water, by the compression of the soil, and the porous portions remain constant receptacles of superfluous water. Small stones become firmly imbedded in the hard portions of the soil, and are loose, and apt to be pushed before the plough in the soft portions. The plough, through these alternate changes of hard and soft, wet and dry portions of the soil, requires the utmost attention in its guidance: the hand and the eye of the ploughman being constantly in requisition, during the operation, to prevent the plough being thrown out or burying itself. But even with attention, such ploughing is unequally executed, and therefore unsatisfactory: whilst the disagreeable nature of the work tends to fatigue the body, and irritate the mind of the ploughman, and the unsteady draught occasioned

by the unequal state of the soil, jades the horses more severely than the extent of the work performed. Great discomfort, both to men and horses, attends ploughing soil in such a state, at any season, and it is only less irksome than the danger which both run of injuring their health. Ague and consumption affect the men, whilst chole and inflammation of the bowels not unfrequently cut short the existence of the horse. That this is no exaggerated result can be attested by all farmers of wet land. But the evils of wet land are not confined to the annoyance of men and horses, they obviously affect the state of the cultivated soil, the nature of work, and the condition of crops. With regard to wetness affecting the state of cultivated soil, whatever labour and manure may be bestowed upon it, it always seems poor, hungry, weeping, and is apt to become foul with the strong ramifications of semi-aquatic plants, threading themselves in all directions through it. Being inelastic, its surface permanently imprinted with the hoofs of animals, and consequently, easily poached. Of the nature of the work on soil in that condition, the furrow-slice in breaking up lea, is not easily laid over with the ear of the mouldboard, its under edge adhering tenaciously to the subsoil, the vegetable matter in the soil becoming, in fact, a kind of incipient peat. When the furrow slice cannot be easily laid over, the slices never clap close together. The harrows rather make scratches over the furrows slices than cut them in pieces and blend them together, and the roller compresses such land so as to deprive the sown crops of the power of spreading their roots in it. As to the effects of wet land on crops, they consist of stunted growth of straw, or should a flush of vegetation be at any time encouraged by the state of the weather the grain in both cases is lean, thick-skinned, and light. The grass too, is short, wiry, and inclined to acidity, instead of being mucilaginous and saccharine in quality and taste, or rather the finer grasses disappear and coarse semi-aquatic kinds occupy their places.

Thoroughly drained land, on the other hand, can be easily worked with all the common implements. Being all alike dry, its texture becomes uniform; and being so, the plough passes through it with a uniform freedom; and where ordinary-sized stones obstruct its course, the plough can easily dislodge them. The plough by its own gravity tends to raise a deep furrow, and the furrow on its part, though heavy, crumbles down and yields to the pressure of the mouldboard, forming a friable, mellow, rich-looking mould, not unlike the granular texture of raw sugar. The harrows, instead of being held back and starting forward, swim smoothly along, raking the soil into a smooth uniform surface, entirely obliterating the prints of foot-marks. The roller compresses the surface of

the soil, and leaves what is below it in a soft state for the expansion of the roots of plants. All implements are much easier drawn, and held or driven on drained land; and hence all the operations on it can be executed less laboriously, and, of course, more economically and satisfactorily than on undrained. Much has of late been said of deep-ploughing in connexion with drained land. Deep ploughing we conceive to be a safe practice under every circumstance. It acts as draining to wet land, which of course must be very temporary in its effects. Its efficacy can only be fully developed on land that has been drained. There it forms the indispensable supplement to draining. It opens an easy access for light and air to the roots of plants, and facilitates their combined beneficial influence on the ingredients in the soil which go to support vegetation. These are all natural consequences of deep ploughing in the ordinary state of land; but these consequences will only be permanently observed and felt on thoroughly drained land. It matters not in what manner the soil is deeply stirred, the benefits of it will be derived in any case. The common plough with four horses, or a plough made a little stronger for the purpose, will stir the soil that is thoroughly drained, deep enough for the rumination of the roots of all plants raised in agriculture. Such a plough is equally efficient as any subsoil plough. A soil thus stirred one foot in depth will afford sufficient scope for the roots of most cultivated plants, and even fusiform roots will penetrate beyond that depth in a subsoil that has been thoroughly drained. It matters little, we conceive, whether a drained subsoil is brought up by the plough or no. We are sure it can do no harm when brought up, for it can be made the medium of conveying nourishment to plants as well as the upper soil. Both may be blended together for the common object, and, in a short time, neither can be distinguished from the other. By this property of drained land, we anticipate a general and increased improvement in soil, such an expansion, in short, of capabilities as to yield more abundant crops with the ordinary quantum of labour and manure.

2. *Dung*.—The baneful effects of undrained land on farm-yard and other matter commonly called manure, are most obvious. The perceptible dampness in undrained soil, dissolves the soluble portion of farm-yard manure, which, by gravity, descends beyond the reach of the rootlets of young plants; whilst the strawy portion remains undecomposed for a length of time. This statement may account for the invariable languid vegetation of plants while young in undrained land. After the straw has been decomposed, and vegetation been forced by the advancement of the seasons, the plants derive nourishment not only from the decomposed straw, but probably also from the soluble matter which had

previously descended through the damp soil. Vegetation is thus promoted in summer, but it is generally too late for that season to foster the plants to full maturity. The lateness and immaturity of crops on wet land may thus be explained. The fact is, wet land cannot be put in heart with manure to a sufficient degree to force vegetation without the assistance of the season. These effects on manure will be similar, whether the manure has been applied broadcast or in drills; but as the drill system deposits manure in larger masses on the same extent of ground, the effects will always be found to be comparatively less prejudicial to drilled than to broadcast crops. As an instance in point, potatoes cannot be successfully raised on wet land, when the manure is spread broadcast on the ground in Autumn or early in Spring. Before such a practice can succeed, the land must be in heart. But even in drills, on wet land, the manure will be decomposed in different degrees and at different times. The driest portion of the soil will first and most effectually decompose the manure, the hardest next in degree and time, and the wettest will retain it in a state of maceration, as long as the water is unevaporated by drought. Besides manure remaining inert in wet land, it also remains inert in such land rendered dry by drought. In that predicament the manure is undecomposed, and easily separated from the soil, which becomes, like a sterile powder; and remains so until the return of rain. Were the man to fall in moderate quantities, the decomposition of the manure would be rapidly hastened in the warm soil, but if in inordinate quantities, its decomposition would be retarded as effectually as by the drought, although in this case it would be dissipated before decomposition. Nothing can so convincingly prove the benefits of draining in immediately securing the fertility of manure to the soil, than in contemplating the baneful effects of too much drought or moisture. And to render the proof the stronger, we have only to contrast these effects with the effect of drained land on manure. The moment that manure is deposited in a proper state, that is in a state of humidity in drained land, its juices are absorbed by the dry soil, and retained there as in a wet sponge half-squeezed. The strawy portion being thus deprived of moisture by absorption, and still surrounded with comparatively dry soil which retains heat within itself, and readily absorbs more from the air, it is readily decomposed, and soon becomes intimately blended with the soil. Food in a semi-moist state is thus placed near and ready prepared for the tender spongioles of plants to exist upon; and supposing the weather no hotter but only equal to that we have supposed in the case of manure deposited in undrained land, the progress of vegetation will completely outstrip that in the latter.

3. *Lime*.—Many farmers consider lime a man-

ure, and talk of it as such, but it cannot be a manure, that is food for plants, in the caustic state in which it is desired to be applied to land, however it may be changed in its nature by admixture with the soil or exposure to the air. Caustic lime would soon destroy vegetable life. Instead of itself being a manure, it rather converts other substances into manure which would otherwise have remained in an inert state. It acts on vegetable matter on all soils, and, by decomposition, renders that matter fit food for plants. This is its chemical mode of action. It also acts mechanically, by separating the particles of adhesive soil by desiccation; but it is not probable that it acts chemically on the earthly portions of any soil. Confounding these properties of the action of lime, when applied to soil, with one another, might lead us to form erroneous conclusions regarding them. When, for instance, we observe lime to act with effect on vegetable matter lying inert in soils, we might conclude that it would be applied with best effect to wet land, in which vegetable matter is most abundantly found to be inert. When lime is found to pulverize and to dry clay soil become hard and cloddy with moisture, we might conclude that wet clays would derive most benefit from lime. Both these conclusions would be decidedly erroneous. Because, although lime readily decomposes vegetable matter in soil, it only decomposes it advantageously in dry soil, or rendered dry by draining, the moisture in wet land rendering the lime effete before it has time to act chemically on the vegetable matter in the soil; and lime only acts beneficially on drained soil, that contains excess of vegetable matter. Many dry soils, and particularly wet soils when drained, contain excess of vegetable matter, which matter although encouraging a flush of vegetation, is deficient of silica to harden the straw and fill the grain. Caustic lime converts a portion of this soft vegetable matter into silica, whilst it converts another portion of it into a pabulum, by which vegetation is powerfully supported. In like manner, the application of lime to wet clays would be to convert them into mortar, which would harden the soil in drought that was intended to be pulverized. Even in the case of top-dressing grass with lime, which is an excellent practice when performed aright, pasture in a constantly swampy state can derive no benefit from it. Before the application of lime therefore, in any circumstances, land should be thoroughly drained.

4. *Bone-Dust*.—The extraordinary power of crushed bones, when mixed with the soil, to promote vegetation, has not yet been satisfactorily explained. The finer the bone-dust, and the more intimately it is mixed with the soil, the more active is the vegetation. That the bone is chemically decomposed in its union with the soil is obvious. Lift up a handful of earth

in which bone-dust has been mixed for some days, and it will be found to be saturated with a rich oily substance, which makes the earth adhere together into a ball when squeezed in the hand; and this effect will be observed although the bones should have been boiled previously to being crushed into dust. It is hardly conceivable, *a priori*, that so small a quantity of any substance, as of the bone-dust when used, should be able to procure so sensible a change on the soil immediately in contact with it. We cannot positively assert which of the ingredients of the bone-dust it is that constitutes the food of plants, for although the circumstance of boiled, crushed bones being as good manure as those in a raw state, would support the belief that it is not the oily matter in bone which constitutes the manure, yet the fact that boiled, crushed bones render the soil apparently as rich with oil as raw, forbids us from asserting that the phosphate of lime alone constitutes the food of plants in bones. But whatever the chemical action of bone-dust on soil may be, we can assert with confidence, that bone-dust will impart no richness to any kind of soil, unless the soil is either naturally dry, or has been drained; and when soil does require draining, the more thoroughly it is drained, the greater effect will bone-dust have upon it as a manure.

We thus see, that unless land be thoroughly drained, all the adventitious substances which are employed to render it fertile, cannot impart their fullest benefits to it. Since this is the case, it is lamentable to think what vast quantities of manure, which take much time to collect, and much money to purchase, are yearly wasted on undrained land! How much more produce might not these quantities of manure annually raise, were they applied to land rendered fit to receive them by thorough draining.—*Quarterly Agricultural Magazine*.

SPRING TARES OR VETCHES.

In Dorsetshire, farmers have a practice which deserves notice, it is the following:—After the clover is fed off early by sheep, the land is then ploughed about the end of May, or beginning of June, and sown with rape and spring tares, which give an abundant produce in Autumn, on which the sheep are folded, and the land is thus well prepared for wheat. A bushel of tares or vetches, and two quarts rape-seed is sown on the acre. The crop is fed off by the beginning of October.

In Canada, land that is ploughed in the Fall, intended for the summer fallow the next year, might, in Spring, be sown with tares and rape-seed that would afford in July, August and September, a considerable quantity of provender for stock, when the pastures may be very poor. The land might be cleaned off in the latter end

of September, manured if necessary, and ploughed and prepared for a Spring crop. The tares and rape would not impoverish the soil much, and if they covered the ground well they would effectually prevent the growth of weeds.

This practice might be introduced without any difficulty, and we have no doubt that farmers would find it profitable, provided the tares and rape were sown in time, and fed off judiciously by stock, so as to allow the land to be ploughed and prepared in the Fall for the succeeding Spring sowing. If tares were sown alone without rape, they might be cut when green, and dried and preserved for Winter food for stock. In good weather they might be sufficiently and readily dried to keep perfectly safe. We might thus add very considerably to our stock of Winter and Summer food for cattle, and at the same time keep our land cleaner, and in higher fertility than we do now, and without any greatly increased expenditure. Such experiments as this will be safe for the farmer, though yet untried in Canada.

AGRICULTURAL MUSEUM, ROYAL DUBLIN SOCIETY.

The Agricultural Museum of the Royal Dublin Society is now well worth the attention of the agriculturists, landed proprietors, and all others engaged in the cultivation and improvement of land.

In preparation for the late triennial exhibition, many models of implements and implements themselves of great value and interest were of necessity put aside, stored up, and huddled away in corners for want of space. Since the close of that great and interesting national exhibition, the whole of the apartments devoted to the Agricultural Museum have undergone a thorough cleansing, repairing, and renovation. The models and implements have been cleaned and painted, and to the former numerous collection of first-rate prize implements have been added all those that have been most approved of at the different shows and exhibitions which took place during the past season, including the prize implements. Here is to be seen the most extensive assortment to be found in any establishment in her Majesty's dominions of ploughs, harrows, straw-cutters, oil cake, pulse, and corn bruisers, drilling machines, manure distributors, liquid manure carts, and portable pumps, hand thrashing machines, rollers, clod-crushers, pipe-tile machines, &c., &c., in endless variety and by the first manufacturers in England, Scotland, and Ireland. The whole arranged in the most convenient manner for inspection and comparison, each being ticketed, named and priced in such a manner as to enable the agriculturist to select that which is most suitable to his wants and means. Every information can be obtained on

the spot from the curator, Mr. Corrigan, who has, with great taste, exertion, labour, and perseverance conducted the re-arrangement and classification of this most valuable national museum, so immediately connected with our national wants and prosperity.

COOKING AND DIGESTION.—A mixed diet of bread, meat, and vegetables, is better than any of the three alone; meat satisfies the appetite more completely and for a longer time than either of the other two; and, if a choice must be made between bread and vegetables, the bread should be chosen. Most kinds of game are easy of digestion. Roast beef and mutton are the most easy of digestion of all butcher meats. It is a fact worth remembering, that roasting and broiling are the modes of cooking meat which best suit the stomach: this is proved by a comparison of the time required for the digestion of different sorts of food. Thus, beef or mutton roasted or boiled, rather underdone, are digested in three hours—

	Hours.		Hours.
Pork, broiled.....	3½	Veal, broiled.....	4
Salt pork, broiled.....	4½	" fried.....	4½
Pork, roasted.....	5½	Heart, fried.....	4
Salt beef, cold, boiled..	4	Rice.....	1
Soft eggs.....	1 to 3	Milk, boiled.....	2
Hard-boiled, or fried eggs	3½	Bread.....	3½
Venison, broiled.....	1½		

Fruit and vegetables require from two to four hours, according to quality and mode of cooking. Potatoes roasted and baked, and raw cabbage, are digested in two hours and a-half; but boiled potatoes need another hour, and boiled cabbage, with vinegar, four hours and a-half. Here we see why some things disagree with the stomach when eaten; those which stay the longest are the most troublesome. Vegetables, in general, afford the least nutriment, and they are mostly passed on from the stomach, without being fully digested. This has been proved in several instances which have occurred of patients with openings leading out of their bowels just below the stomach; when they had eaten meat it could not be distinguished as meat by the time it reached the opening, but spinach, carrots, and other vegetables were but little altered. M. Londe, the medical attendant, says, "In my patients, salads, prunes, apples, and spinach, always appeared at the end of an hour, while the animal food never reached in less than three hours. It seems as if the digestive canal, anxious to get rid of the vegetables, from which it could extract nothing, and always contracting to drive them away, took the opportunity which the accidental hole afforded of expelling them altogether while it retained, by a sort of a predilection or elective attraction, the animal matter which could repay the expense of its labor." Soup is not wholesome or digestible unless eaten with a good portion of solid food;

where children are fed largely on soup, their health suffers in some way. In several work-houses and Poor Law Unions, the use of pea-soup has been discontinued, as it was found to render children liable to disease of the mesentery. Fish, in general, is easy of digestion, and is good for those to whom meat would be too stimulating. Bacon, also may be eaten, as rashers, toasted in front of the fire, or broiled; but, as a rule, boiled salt meats are best avoided. Veal, pork, hot butter, and pastry, are more or less indigestible, and, consequently, to be eaten with caution. The mischief of pie-crust consists in the fat with which it is prepared. Some persons make it with flour and water only, as a cover to the fruit; it is then harmless. The chief good of a pie, however, is in the refreshing qualities of the cooked fruit.—*Famly Economist*.

IS LIME INDISPENSABLE TO THE FERTILITY OF A SOIL?

The practical farmer in nearly all countries has been accustomed to add lime to the soil; but can lime not be dispensed with? Is there no improved mode of culture by which the use of lime may be superseded? There are several considerations from which an answer may be drawn to this question.

1. Extensive and prolonged experience has shown that the fertility of many soils is increased by the regular addition of lime—that the surface of whole districts even is sometimes double or tripled in value by the addition of lime alone—and that, if it be for a series of years withheld, such soils become incapable of producing luxuriant crops.

2. All naturally fertile soils are found upon analysis to contain a notable proportion of lime; while in many of those which are naturally unproductive, the proportion of lime is comparatively small,

3. A naturally productive soil, even though regularly manured, is often found, after long cropping to become incapable of growing particular crops in an abundant or healthy manner. On analysis these soils are not unfrequently found to contain only a very small proportion of lime. After an addition of lime to such soils, the diseased or failing crops often grow again healthy and in abundance.

4. Lime added to one part of a farm sometimes produces no visible effect, while upon another it greatly increases the produce. In such cases, a chemical analysis not unfrequently shows, that those soils or fields on which it produces no effect already contain a sufficient supply of lime, and in the state most favourable to fertility.

Thus barren, sandy soils often admit of profitable cultivation after lime has been added; and clay soils, in which little or no lime can be de-

tected, are often entirely changed by the addition of lime. So, also, it may usually be laid with profit upon soils formed from decaying granite, while its action is frequently less sensible when applied to soils of decayed trap. This is chiefly because the granite contains little lime naturally, while the trap-rocks for the most part abound with it.

These practical considerations, all lead to the conclusion, that *lime is really indispensable to the fertility of the soil*.

5. This conclusion, drawn from experience, is rendered certain by the fact, that all the crops we raise, contain lime, which they derive solely from the soil. To this fact I shall hereafter more particularly advert, when treating of the purposes served by lime in the soil,—*Professor Johnston on Lime*.

ON THE NUTRITIVE VALUE OF OAT HAY.

On Oat Hay, and the relative value of oats cut green and cut fully ripe," by Dr A. Voelcker, Professor of Chemistry in the Royal Agricultural College at Cirencester.

In the present case, Dr. Voelcker seems to have happily united science with sound practical views, and we constantly have intelligible and reliable statements from him.

The first point to which attention was directed, regarded the proportion of water contained in the straw and grain of the ripe and unripe oat respectively; both samples being of the same variety and taken from the same field. As might have been expected, the green oats contained most water; this is shown by the following table:

OATS FULLY RIPE.

Per centage of Water.	Proportion of Straw to Grain.
Straw Grain.	Dry Straw. Grain.
38 48	20 65
	37 56 40 44

OATS CUT GREEN.

5 33	28 66	65 43	34 56
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I have taken the mean of the various results, given, as some discrepancy appears in the single determinations. By this table several general conclusions are indicated—

1. That the proportion of water in the unripe plant is greatest.

2. That the proportion of the dry straw in the unripe plant is greatest.

3. That when the plant is dry, the grain bears a larger proportion to the straw than would have been imagined; being even, in the green plant, more than one-third of the whole weight, and in the dry plant nearly one half.

The next step taken by Dr. Voelcker, was to determine the nutritive value of his several samples. In this case regard was had only to the amount of nitrogen contained in them, that being considered the most important ingredient in estimating any particular variety of nutritious

food. He calls the body in oats which contains nitrogen, by the general name of protein; this name applying to a class of bodies that contains about as much nitrogen, and that are about as nutritious, as lean meat when it is dry.

The proportions, or percentages of protein obtained by Dr. Voelcker were as follows:—

I. OATS FULLY RIPE.—MEAN RESULTS

Grain, 15 30 per cent. of protein compounds.
Straw, 8 46 " " "

II. OATS CUT GREEN.

Grain, 17 87 per cent. of protein compounds.
Straw, 21 01 " " "

No. II. was cut when the stalk and leaf were yet quite green, and the grain milky, but fully formed. They were cut at the same time, the green oats having been sown about one month later than the others.

The conclusions to be drawn from the above results are not only extremely interesting in a scientific point of view, but are of much practical importance.

I. We see, in comparing the numbers in the ripe and unripe straw, that the latter contain $3\frac{1}{2}$ per cent. more nitrogen than the former.

2. That the unripe grain also contains more nitrogen, this may seem a very strange result but may be explained when we consider the fact, that the unripe oats, although they had not attained their full bulk had received most of their nitrogenous compounds, and that the after increase, while ripening, must have consisted mainly in an accumulation of starch, and other non-nitrogenous bodies.

In addition to the facts established by these analyses, it is borne in mind, that the unripe straw is also much richer in starch, gum, sugar and other compounds of the same nature, all of them both nutritious and easily digestible, but which are for the most part, in ripening, gradually converted into woody fibre.

Here too, the larger quantity of water which has been already shown to exist in the unripe straw, is to be brought into account. This water helps to render the food more soluble, and more easily digestible by the animal. We find then that an equal weight of the unripe straw and grain contains more nitrogen, more sugar and gum, and also more water; so that while it is more nutritious, it is also at the same time more easily assimilated and digested by the animal. This last is a point of more importance than is usually imagined. Of two kinds of food containing equal quantities of nitrogen, one may be vastly superior in its effects when fed, and this simply because it can be readily digested; a large portion of the other may even pass through the body unaltered.

Dr. Voelcker gives, in addition to his theoretical results two letters from farmers who have seen oat hay tried. One of them says, "that

when cut fine, oat hay goes one-fourth farther than if the oats and straw had been allowed to ripen."

In many parts of the country, it is very difficult to produce good grass for cutting, but easy to grow quite tolerable oats, at least so far as bulk of straw and appearance of head is concerned. The grain was not filled out as well as if allowed to stand, but still would serve a good purpose as fodder when cut green and made into hay. There is no loss of the grain by shelling when cut in this way and the hay would be highly relished by stock.

NUTRITIVE VALUE OF THE DIFFERENT CROPS.

—CABBAGE.—The cabbage has lately been chemically examined, in consequence of the failure of the potato, with a view of its substitution for that root. It is found to be richer in "muscle-forming matter" than any other crop we grow. It contains more "fibrin" or "gluten," of which substance the muscles are made, and hence is richer in the material essential to the health, growth, and strength of an animal; wheat contains about 12 per cent. of it; beans, 25 per cent.; but dried cabbage contains from 20 to 60 per cent. of this all-important material, of which the principal mass of the animal structure is built.

An acre of good land will produce 40 tons of cabbage. But—

1 acre of 20 tons of drum-head cabbage will yield	1500	of gluten
1 do. of 37 tons of swede turnips	"	1000 do.
1 do. of 25 bushels of beans	"	300 do.
1 do. of 25 bushels of wheat	"	200 do.
1 do. of 12 tons of potatoes	"	550 do.

Such is the variation in our general crops, as to the amount of this "gluten," this special kind of 'nourishment', this "muscle-sustaining principle," which accounts for the preference given by experienced farmers to the cabbage as food for stock and milch cows, although the crop impoverishes their land, which requires much manure to restore it to its former fertility.

OATS.—The grain of the oat plant is found on analysis to be richer in this gluten, this "muscle-forming material," than the grain of wheat, and oatmeal a better form of nourishment than flour. Hence the superior strength of the Caledonians.

BRAN is found to be richer than the interior part of the grain in "gluten," in "muscle-forming material"—which proves that our antiquated country dames indulge not in mere conceit when they persist in preferring good wholesome wholemeal-bread to the white loaf.

BUTTER AND CURD OF MILK.—A voice from the laboratory tells us that the butter and curd of milk correspond to the fat and muscle of the animal, "hence the reason why good milkers are generally poor, and why the milk decreases when they begin to fatten." Oily substances, given as food, in the animal economy become

clarified into butter, or spread over the bones as fat. If we want butter, we must give linseed or linseed-cake. If we want to fatten, we must do the same, or give other fatty substances, rich in oil, with their ordinary food. But if curd or cheese is wanted, then we must give beans or cabbage, or other food rich in "gluten"—*that always-to-be-remembered muscle-forming material!*—(applause.)

BARLEY AND MALT.—Late experiments have settled the question as to the inferiority of malt to barley in feeding cattle. Barley in the process of malting loses about seven per cent. of highly nutritive substances, and thus is its nutritive power diminished. But in malt there is a peculiar substance found, generated in the malting process, and of high solvent power, which greatly aids the digestion of other food, even when such malt is given in small quantities. One-tenth part of the barley devoted to feed stock may be used in the shape of malt. A small portion may be given, as a digestive, with dry food. A smaller portion still with moist food, like potatoes, may be given: the digestion will thus be improved, and the health of the animal ensured; while even in man the mastication of a little malt after meals would contribute to the digestive process.

SWINE.—The same remarks apply to the food of the hog. If we wish to promote proper development of the muscular parts, and of the bone, we must give food rich in the "muscle-forming material," and not deficient in the "phosphates"—cabbage, swedes with their leaves; and afterwards feed the animal with substances containing much charcoal, so that fat in moderation may be spontaneously formed: such articles are beans, oatmeal, barley, grains, &c. If we wish to transfer fatty matter already formed—to make the animal into a "kind of oil butt"—we must give, with other food, greasy substances—"tallow-crap," linseed meal, anything in short which contains the unclean fat we wish to be clarified and manufactured, by this most useful creature, into good wholesome lard (cheers.)

PASTURE LAND.—Every milk cow robs the land annually of as much phosphate of lime (bone-forming material) as is contained in 80lbs. of bone-dust. From this cause the Cheshire pastures became greatly deteriorated, but were restored to their former fertility by being well boned. Land continually repastured must be fed regularly with phosphates—by the application of bones, nightsoil, &c. Some description of lime contains phosphates in sufficient quantity, but not all. When the mountain limestone of Derbyshire, formed almost entirely of a conglomeration of fossil shells, and hence rich in phosphates, becomes accessible by railway, it will probably be found of great value to pastured land (applause.)

THE HIGHLAND & AGRICULTURAL SOCIETY.—The show of the Highland and Agricultural Society of Scotland, took place at Glasgow on Wednesday, Thursday and Friday. The place of exhibition was the King's park, or the upper part of the green—a spot admirably adapted for the purpose, alike for convenience and effect. The fine tall trees which skirted the sides of the enclosure, and separated in the midst, the implement and cattle departments, gave a pleasing appearance to the whole, while the dark luxuriant grass proved most agreeable to the numerous visitors. The weather was very auspicious—the first two days not a drop of rain fell, while the slight shower of the morning of Friday, only made the succeeding brightness more pleasant. The arrangements of the Directors were excellent; and the Show itself may be considered perhaps, the most successful which the Highland Society has had in its long and useful course. The only objections we heard were from some of our keen agricultural friends, who, embracing the earliest opportunity of entrance on Thursday, had not proceeded over half of the exhibition, before the crowds, entering at the reduced rates, prevented any thing approaching to a careful and minute inspection of the animals.

TO MAKE WHITEWASH.—As this is the time for cleaning up door yards, and whitewashing buildings and fences, we give receipt for making whitewash, which is said (in the *Horticulturist*) to be one of the best and most durable character. Take a barrel, and slake one bushel of freshly-burned lime with boiling water. After it is slaked, add cold water enough to bring it to the consistency of good whitewash. Then dissolve in water; and add a pound of white vitriol (sulphate of zinc) and one quart of fine salt. To give this wash a cream colour, add half a pound of yellow ochre in powder. To give it a fawn colour, add a pound of yellow ochre, and one-fourth pound of Indian red. To make the wash a handsome gray stone colour, add one-half pound of French blue, and one-fourth pound of Indian red. A drab will be made by adding one-half pound sienna, and one-fourth pound of Venetian red.

PRESENT TO HER MAJESTY.—Queen Victoria, is soon to receive a curious present from the Province of Posen, in Poland, as a token of gratitude for the protection granted by her to the Polish refugees. It is the fleece of a ram of very singular beauty, bred on the property of Count Ignatious Lipski, who is celebrated for his breed of sheep. This costly fleece is enclosed in a box with a glass lid, and on which is inscribed the genealogy of the ram in four languages.

Soul-cheering is it to live in an age when a thought is stronger than a sword, public opinion more powerful than a standing army, the people's mouth more potent than the cannon.

Agricultural Journal

AND
TRANSACTIONS

OF THE

LOWER CANADA AGRICULTURAL SOCIETY.

MONTREAL, NOVEMBER, 1850.

THE CANADIAN INDUSTRIAL EXHIBITION—

Has at last been brought to a conclusion and we believe realized fully the public expectations. As it was not an Agricultural Exhibition, or rather we should say, one where Agriculturists were directly expected to exhibit their products, we should not perhaps, take upon us to make any particular report on the subject, except as a visitor like any other party who has seen the Exhibition. Indeed we feel that it would be an intrusion, were we to do more than simply to state that we conceive the Exhibition altogether, was very creditable to the Province, and to the parties exhibiting. We are quite incompetent to describe the numerous and excellent articles exhibited, as the greater portion of them had no direct connection with agriculture. The various samples of grain, wheat, oats, peas, and indian-corn were all of excellent quality. Several samples of cheese and butter were also very good. We did not pay such particular attention to the comparative excellence of the samples as to authorize us to mention the names of any exhibitor, nor should we consider ourselves justified in doing so, as the judges have decided who produced the best samples. The Montreal Press have already given such a full report of the Proceedings at the Exhibition, and all that was to be seen there, that it would be quite ridiculous of us, at this late period, to repeat all that has been written on the subject as we could not give it any new or better colouring than it has already received from our confrères of the Press. The Exhibition, we were rejoiced to perceive, was numerously attended by Canadians and strangers

who appeared greatly interested, and we have no doubt that the business portion of the Montreal citizens have every reason to be satisfied with their participation in the benefits of the Exhibition.

The County of Montreal Ploughing Match, took place on Mrs. Mills' farm, Côte St. Pierre, near the Lachine road, on Monday the 21st. October last. We believe there were 27 ploughs, of which, perhaps, about a third were French Canadian ploughmen, who ploughed in a separate field. All the ploughs were of iron, and what are known as the Scotch swing plough. The land was of the very best description for a ploughing match, and in good order, particularly the field for English ploughmen. The field for Canadians was stiffer clay, and not so easy to plough. The ploughing was exceedingly well executed by all, without exception. There was not an ill ploughed ridge in the whole of what was ploughed. The land ploughed is very accessible to any party who may be disposed to see it, and it is worth the trouble of going some distance to see it. The only objection, we conceive, that was to the mode of deciding the premiums, was that it did not appear there was any regard to the time occupied in ploughing the land assigned to each plough. It is a very material object to a farmer what quantity of land can be well ploughed in a day. In the old country, the land assigned to each plough was exactly measured and each plough had the same quantity. There was a certain time given to finish the work, and any party who did not finish within that time was disqualified, however well he ploughed, and the prizes were awarded to the party who executed the work in the best manner and shortest space of time, within the time given. This should be the rule at all Ploughing Matches, and four hours should be the longest time allowed to plough well half an arpent. Peculiar circumstances might occasionally justify a departure from this rule, but otherwise it should be general, on

land not very difficult to plough. We do not offer these suggestions to favour one party more than another as they would of course apply to all competitions. The visitors to the ploughing match were treated to a very excellent lunch, with abundance of beer, wine and brandy, for all who had not taken the temperance pledge. The whole affair was very creditable to the managers and to the ploughmen. The horses, harness and implements were excellent. We have never, in America, seen better ploughing, generally, executed at a Ploughing Match, and the unsuccessful ploughmen had very little less merit than those who were so fortunate as to be awarded premiums. We wish them all, life and health to come forward next year in a similar honorable competition.

At the late county of Montreal cattle show, we were sorry to observe that there was not one of the stallions exhibited for prizes that appeared to be of pure Canadian breed. This breed is so unmistakable in certain points, that the slightest cross with other breeds may be detected. A horse of pure Canadian breed has invariably, characteristic marks of that breed that can never be mistaken for any other. We conceive it to be serious matter of regret, that decided encouragement should not be given by Agricultural Societies for the pure Canadian breeds of both stallions and brood-mares. We do not object to prizes being offered for mixed breeds, but let there be always a separate class of prizes for pure breeds. Mixed and pure breeds should not be exhibited in the same classes. There is another objection which we have often urged, that is, to the manner in which animals are kept upon the place of exhibition. The animals entered in the same class are not kept together, but all classes, ages, and sizes are mixed together, and the judges who have to decide which are the best animals in each class, have to do so in the best manner they can from this mixture. We do not know how judges of cattle manage to decide correctly

under such circumstances, but we do know that we could not pretend to do anything of the kind. In the British Isles all animals entered in the same class are placed together to enable the judges to compare the merits of each accurately and properly. It may be difficult to induce exhibitors to conform to the regulations of Agricultural Societies, but no animals should be allowed to compete for prizes, but such as would be led to the shows, and could there be secured in their proper class that they were entered in. Cattle-shows should be so conducted that there would be an opportunity offered judges of animals to make a correct decision and award. It is not the opinion of judges of cattle that will make one animal superior to another, if it is not so in reality, and therefore if judges are prevented from making a correct award, there are other parties who will discover this error, and it has a tendency to do much harm. If it is worth parties while to take animals to cattle shows, they should not have any objection to conform to necessary regulations.

We attended at the District of Montreal Cattle show, held at St. John's, on Wednesday the 9th. October last, and were glad to perceive that a large number of domestic animals of every species, were exhibited, and many of them of excellent quality. The show of horses were numerous, but of very mixed quality. The horses entered in the class for "Best French bred Draught Stallions" were, as far as we could judge, all of mixed breed and we did not observe one that had the decided marks of the pure Canadian breed of horses. The show of what was termed "English bred Draught Stallions" was very superior, although we doubt that several of them should have been entered in this class. We counted 20 horses in the ring together in this class, for the judges award, and every one of them were fine looking animals. We never before, in America, saw so many fine stallions

(we cannot say whether they were all the most suitable for draught or not) exhibited together. They were very much superior, as a class in appearance, to the class of French bred draught stallions, and this is altogether our farmers' fault in not preserving the breed of the Canadian horse in its purity. There were many brood mares, but of very mixed quality, and mixed breeds. We observed one brood mare of pure Canadian breed, and we should never desire to see a better specimen of brood mares for agricultural purposes. She was in every respect what we would consider the most perfect shape and size, for a powerful and enduring working horse, and undoubtedly possessed more *good points*, according to our estimation, than any brood mare we saw at the exhibition, although there were some others very good. The most objectionable mode of allowing all animals to be mixed up without keeping them together in the class in which they are entered, prevents the possibility of making any just estimate of the relative merits of animals entered for competition in separate classes. The horses, however, were brought before the judges in their separate classes, but we did not see that distinct breeds were separated. There were many fine bulls, cows, and heifers of different breeds; scattered over the ground, and all varieties and ages mixed. This sort of confusion renders it impossible to form a correct estimate of the relative quality of the various breeds and crosses. With sheep it is the same case. There was the Leicester, South-down, Merino, and numerous mixtures of all these breeds, and, we believe, all allowed to compete in one class for premiums. We cannot even conjecture, how judges could award prizes correctly, under such circumstances. Leicester sheep may be very good as a separate variety competing in a separate class, and so may any other variety of sheep competing in separate classes. But why should we compare the Leicester with the South-down, Merino, or mixed breeds? What would be a perfection in one breed, would not

be a perfection in the other. Many farmers may choose to have different varieties of sheep but not for competition of the several varieties in one class at a cattle show. One variety of sheep may be more suitable and profitable in certain situations than another, but this circumstance should not determine to which variety the prize should be awarded at a cattle show. If there is only one general class of premiums for sheep, let the breed be determined that will be allowed to compete, and do not allow the different varieties to compete together in the same class. As well might goats and sheep be allowed to compete together! It is not acting with fairness towards parties who import South-down or Merino sheep, not to give them an opportunity of competing in separate classes for these breeds. If these varieties of sheep are pronounced by any Agricultural Society to be unworthy of encouragement they may be excluded from competition but under other circumstances, they are entitled to a fair chance of competition in separate classes for each variety. There may be very good South-down and Merino sheep, that would have no chance in competition with Leicester sheep, although they might be better of their kind than the Leicester. It is the same case with horses and cattle of different breeds, their owners can only be done justice to by having the various breeds competing in separate classes for each. The Ayrshire breed of neat cattle are not fit to compete with the Durham, nor are the Canadian breed fit to compete with either of these in the same class. There should be a separate class for each of the first two breeds, and always a separate class for Canadian or mixed breed to compete together, in order to show the effects of crossing, compared with the pure breed, that farmers may be able to determine the best course to pursue in regard to the breeding of neat cattle. We submit these remarks and suggestions for consideration, without any design to give the slightest offence to any party. We conceive it to be our duty to act in this way

while conducting this Journal. Our ideas may not be correct on these subjects, but we only offer them with a view that agricultural exhibitions may be conducted so as to produce the greatest possible amount of good to farmers, and that every exhibitor shall have a fair chance of obtaining the credit he may be entitled to. Any party who has had an opportunity of seeing a great Agricultural Exhibition in the British Isles, will understand how much better our Exhibition would appear if the animals were kept more orderly, and the different varieties and ages kept separate in the classes in which they were to compete. Our animals of every description would appear to much greater advantage, and our shows be worth looking at.

There is another observation we would offer on this subject. The true mode of determining the relative excellence of animals, is by endeavouring to ascertain the number of established, or generally admitted *good points*, and also the number of the objectionable or *bad points*, that each possess, and by comparing these marks of excellence and defects, a right conclusion may be arrived at by judges. This is a simple rule to act by, but we should be glad to be informed whether judges are able to adopt this rule generally at cattle-shows, or whether they have time or opportunity to do so, while the stock exhibited are mixed up in such confusion as they usually are, and scattered over a large space of ground. If animals were kept together in their regular varieties, ages and classes, one half the stock brought to show might at once be removed, as their owners would perceive that they had no chance of obtaining premiums, and this would relieve judges from considerable trouble, and difficulty in selecting the best animals. We conceive it to be a duty that all Agricultural Societies owe to the public that this matter should receive due consideration, and any remedies that may be necessary, introduced with as little delay as possible. While there is any attempt to class animals, there should be separate classes for each dis-

ting variety, and the distinction should be strictly observed, or justice cannot be done to parties exhibiting stock.

We should be delighted to see an honorable competition entered into between the farmers of Lower and Upper Canada, as to which would succeed in raising the largest and most valuable produce from their lands. We conceive that this competition might be entered upon on equal terms, neither party requiring any advantage over the other. There may be some sections of Lower Canada rather too far north to be able to join in this competition, but with this exception we should have no fears for the capabilities of Lower Canada, to enter into competition in agriculture with any part of North America. This will be considered no doubt, a groundless presumption on our part, but we are prepared to sustain it. We do not pretend that we can dispose of the produce of an acre for as much money as can be had for the produce of an acre in many parts of the United States; we only state that we can raise, acre for acre, as much of the products of husbandry here, as in any part of North America, so far as regards the common crops raised upon a farm including wheat (perhaps) barley, oats, rye, buck-wheat, Indian corn, peas, beans, hops, hay, pasture, potatoes, turnips, carrots, parsnips, mangel-wurtzel, beets, every description and variety of garden vegetables—most of the varieties of fruits—dairy produce—beef, mutton, lamb, veal, pork, wool, honey, flax, hemp, horses, &c.

This is a numerous list to be thankful for, and we might add many more valuable natural products, such as, wood of every useful variety, sugar produced from a variety of this wood, fish and fowl in great abundance and excellence. Surely a country that produces all these good things and in full proportion to the care and skilful attention we bestow upon it, is one to be proud of. Who can dispute the list we have given above of our products? We

have seen good crops, and good products, of every thing we have enumerated, produced in Lower Canada. Let our farmers only exert themselves, and we can assure them that there is not one of these articles we have set down in the above list, that they cannot produce in as much perfection, as in any part of North America that we have seen, with the exception, perhaps, of wheat.

We hope it will not be supposed we desire to undervalue other countries, and over estimate Lower Canada because we happen to reside there. It is not so with us, we feel firmly persuaded in the opinion we have expressed, although it is possible we may be in error in some items. We would give up as hopeless, the improvement of agriculture in Lower Canada, if our farmers were of opinion that the climate and soil were unfavourable for improved agriculture, and that it would not be profitable to introduce improvement. It is doing the greatest injustice to the country, to give the climate or soil a character that is unfavourable to agriculture, as compared with Upper Canada or the neighbouring States. It is an old saying that, "hills look green when far away," but were we to go to these hills, we might not find them so green or so pleasing as they appeared in the distance. It is so in respect to other countries than our own, we may hear great things, and most favourable accounts of them, but were we to leave our own country to seek these promised advantages that are at a distance, we might have reason to regret the change when too late to retrace our steps, or recover the advantages we had foolishly cast away from us.

If parties have succeeded elsewhere in realizing, or accumulating property, we are not without numerous examples in Lower Canada also, of parties having succeeded in acquiring considerable property, from scarcely any capital to begin with, and we know several of these parties that had not a dollar. We freely admit that a greater number of emigrants may have succeeded in acquiring property in Upper than

in Lower Canada, but the cause was, that generally the most skilful and enterprising emigrants settled in the Upper Province. We know very many instances of French Canadian farmers succeeding admirably—indeed, we have not known one of this class who has adopted an improved system of husbandry that did not succeed. These parties have been generally prudent, and taken good care of their profits, and the consequence is they are wealthy. When some parties, of all origins, can thus succeed under ordinary circumstances, there cannot be any fault to the soil or climate. What can be done by one party, can be done by another, under similar circumstances, if they adopt the same means of doing it. There is nothing connected with Lower Canada that should give it an inferior character, unless her population resolve to stand still when the order of the day in most other countries is to go ahead at all events.

A series of letters has been published lately in the *North British Agriculturalist*, upon English farming as compared with that of Scotland, by a Scotch farmer who has visited various farming establishments in England. These letters are very interesting, and give a high character of English farming, and candidly admit, that the English practice is equal, if not superior in many respects to that of Scotland. We know there are many parties in Canada who will be slow to believe this statement, but all who may doubt it, we refer to the *North British Agriculturalist and Journal of Horticulture*, an excellent paper, published in Dalkeith, Scotland, which may be seen at the office of the Lower Canada Agricultural Society. The writer of these letters describes the English farming, and points out in what respects he thinks it superior to Scotch farming. This is the fair way of giving an opinion by stating the grounds upon which it is founded. We believe there is no part of the world where farming in every department, is carried on in

greater perfection than upon an extensive English farm. We include everything, farmhouse, farm-buildings, the tillage, meadows, *pasturage*, horses, neat-cattle, sheep, swine, and rearing and feeding of stock; dairy implements, fences, and trees, the whole establishment is superior to any thing to be found elsewhere. We conceive that a fine old pasture stocked with beautiful animals, is one of the greatest ornaments of the farm. There is nothing artificial about it. Animals enjoy themselves delightfully on a fine old pasture that becomes covered with a great variety of the best of grasses. No matter how well land is cultivated and manured, new pastures of one or two years growth or standing, are never so good for cattle as old pastures; if the land is of good quality. The constant tillage of land without rest, in grass for more than a year or two, under, however good management, will ultimately injure the soil, break the staple of the land, so that it will not produce healthy and full crops of grain. This is said to be the case with much of the lands in Scotland at this moment, that they have been too long and constantly cropped, and lime applied to them, to make them give out every thing that is in them. We have seen the effect of this constant cropping, and we are certain it has a most deteriorating effect upon the soil, however well manured. Previous to potatoes becoming diseased, we raised a large quantity annually, and our practice invariably was to plough in the Fall as early as possible, after meadow or pasture, and give the land, again in the Spring, a cross ploughing, and if this did not break it sufficiently, give it a second ploughing, and then plant it in potatoes with manure. The following year, this land was laid down with wheat or barley, thus only taking one green, and one white crop, and once manuring. The land was consequently laid down in good condition. If kept in meadow, it was top dressed every second year, pastured occasionally, and not ploughed again for seven or eight years.

There was more labour by this method in preparing for the potato crop, but we found that the potatoes had not much weeds, were always good in new sod land, the crop of grain, good, and the land laid down in good heart. In any system of rotation that would be established here, we think it would be desirable that for every two or three years that land would be kept in tillage, it should be left for six or seven years in grass. The roots of the grass would then, when ploughed up, be a considerable assistance to manure the soil. If farmers would, the first year that grass land was broken up, sow it with peas and oats; the second year, manuring all they could of this land for green crops, such as potatoes, beans, mangel-wurtzel, turnips, carrots, parsnips, indian corn, &c., and Summer following the remainder; the third year the same land might be seeded down for grass, with wheat or barley, and not ploughed again for seven years. This is a simple rotation that any farmer might adopt, and we do not know a better or more suitable for Canada. Of course, if the farm is too small to allow the land to remain so long under grass, the tillage should be increased and the period under grass diminished to three, four or five years, as the case may be.

This Fall has been very favorable for ploughing and draining, as there were not many days wasted by bad weather. It was also a good time for top-dressing-land, as the soil was not over saturated with moisture, and would not be cut up with cart wheels. We have frequently recommended the mixing of soil as one of the most certain and lasting improvements. The sloping of drains, and the banks that are so often formed on the edges of the drains, are well adapted for compost heaps, to be mixed with other substances, and might be carted to convenient situations, without much trouble, to be made use of as opportunity serves. There may be parts of the farm where the sloping, &c., might be carted at once to mix

with different soils, such as sand with clay or moss, or clay with moss or with sand. Where marl of good quality can be had conveniently, it is a good mixture with sandy or clay soils, but it requires a considerable quantity to produce any useful effect.

Experiments are frequently made in all these matters, and when they do not succeed, the plans suggested are condemned as mischievous expenditure, without any useful result. The fault, however, is very generally to be attributed to the imperfect, and insufficient manner in which experiments are executed. It would not be expected that any great effect would be produced by a slight dressing of different soil, because the application of a small quantity does not sufficiently change the nature and texture of a soil to produce much improvement in it. There must be a considerable dressing to make any permanent improvement, if it is the nature of the soil that has to be changed. Where this improvement is attempted the soils should be well mixed up by frequent ploughings, or by Summer fallow which is the best of all to bring mixed soils into a state of production. Lime would also be an excellent addition when dressing one soil with another. Sufficient draining of land that was previously wet, has the effect of changing the nature and quality of its productions and making it altogether of much more value.

We have constantly advocated the advantage of preserving a proportion of the native forest trees on every farm, and when they have already been destroyed, that more trees should be planted in suitable situations. This country is so very favourable for fruit trees, and of other trees the maple might be planted principally, which would in a short time yield valuable products to the farmers. There is not a farm in Canada that would not yield fruit, were the trees planted properly. Where the soil might be unfavourable in its natural state, it would be possible to make it suitable by draining and mixing the

soil, placing stones under the roots of the trees, or planting the trees upon the surface of the soil, and raising mounds about the roots, so that the roots shall be altogether over the surface of the soil. We offer these suggestions to induce farmers to make the experiments of planting fruit trees, even where they might conceive the soil not to be favourable. The climate we know to be favourable for the production of fruit, and we believe the soil is in the power of the farmer to be so improved by artificial means, as to be made suitable for the healthy growth of fruit trees, indeed, we have no doubt of this. There is every inducement to us to plant trees where they are wanted for shade, for use, or for ornament. There are many cases that it is very difficult to preserve the natural forest, or any part of it, but it is always in our power to plant young trees, that will soon become of good size, with the rapid growth of this country. Hedges might also be cultivated for fences, and we have the means here to plant them at once by taking young plants from the forest of suitable species, or by growing the native white thorn from the seed or haws, which should be gathered and sown in the field in seed beds, from which they can be removed when two or three years old. The haws should be sown now in drills, about a foot apart, to admit of the soil and young plants being kept clean, until transplanted to where they are to form the hedge. There are several varieties of nut trees that might be planted, that would yield an annual produce, and are suitable for shade and ornament. The butter-nut is a very handsome tree, and is useful for its wood and its fruit. We shall in a future number give the names of various nut and other trees that might be planted. There is very little doubt that it is most injurious to the country that has been naturally covered with a forest of beautiful trees, to have them all cut down and destroyed, without being replaced to a certain extent by other trees. It is said that in other countries the lands have been rendered sterile, and

almost useless, by destroying all the trees upon them. From whatever cause or by whatever means, it is certain that a reasonable proportion of trees improves the climate of warm countries, makes them more fertile, and more suitable, and healthful for man and for domestic animals. We wish there was a law to compel the planting of trees where there are no trees upon the farm. It appears to be a degree of vandalism for us to come into a country, covered with majestic forests of every variety of trees, and cut them all down, burn and destroy them wherever we settle. We have only to compare a country that is sufficiently wooded, with one that has scarcely a tree upon it, and the difference is most striking. The first is a paradise, the latter is only a desert. Farmers may object to the waste occasioned by trees, but we are convinced that a good farmer might very well spare the land occupied by the trees, necessary for a farm, if he was to cultivate, and occupy properly all the other parts of his farm. We cannot admit there is any valid excuse under any circumstances, for the total destruction of our trees without planting other trees in their place.

WHEEL AND SWING PLOUGHS.

There is a very considerable difference of opinion exists respecting the merits of the wheel and swing ploughs, and we believe their respective merits have not yet been tested in Canada, by fair competition in the field. From having had a trial of both ploughs upon our own farm, we can state from experience, that each plough has its fair proportion of merit. In land that was in good order for ploughing, free from stones, or other impediments, we would prefer the wheel plough as more easy to manage, and more sure to cut and turn over, perfectly, the furrow slice. The swing plough would answer best in land that was not free from stones or roots, and in fact is an excellent implement on any lands, in the hands of a man, who knows how to use it properly. We im-

ported the best description of wheel plough from England with the object of introducing some necessary improvement in the Canadian wheel plough. We have ever considered it more judicious to endeavour to improve the implements we find in general use in a country, if susceptible of improvement, than to attempt a total change at once. We have frequently seen excellent ploughing by the Canadian wheel plough, much better ploughing, than we have seen executed by some swing ploughs of high pretensions. We have no hesitation in stating that the Canadian wheel plough might be improved so as to be an excellent and suitable implement for the strong clay lands of Canada, and we should be very far from recommending Canadian farmers, generally, to put away their wheel ploughs for swing ploughs, until they find out by their experience where it would be prudent for them to do so. The greatest objection to the wheel plough is the great width they give to the furrow slice, compared to the depth, but this might be corrected by the ploughman, as it is by no means a necessary consequence of the wheels, that they should make a disproportioned furrow slice. We have seen wood swing ploughs turn as broad and as shallow a furrow slice as a wheel plough, and at a ploughing match too. Crooked ridges and furrows are not a necessary consequence of using a wheel plough any more than if a swing plough was made use of. If the farmers generally made use of the swing plough, we would not be the first, to recommend them to adopt the wheel plough in stead of it. But we shall never admit that the Canadian wheel plough retards the improvement of our agriculture, and we think it very injudicious at ploughing matches, not to have a class of prizes offered to them for competition. If the ploughs are bad, this would be the proper way to convince their owners that they were bad, and if otherwise, they should have the merit they deserve. We confess we would be inclined to question the

judgment and good sense of any party who would condemn an implement before its merits were fairly tested, particularly any one that had been long in use. The wheel plough we imported from England which was of the same make as the wheel ploughs that was awarded the first prize at the *g. c. t.* annual Exhibition of the Royal English Agricultural Society for several years where ploughs of every make were in competition, has been condemned in our presence as worthless, by parties who have never seen such a plough at work. One would say it was too heavy, when we know it is lighter of draught than any iron swing plough; another would observe that the wheels would sink in the soil. This last objection is absurd, because the soil when unfit to bear the wheels would be unfit to be ploughed, and if too soft for the wheels, it would certainly be too soft for the horses' weight, that would be much heavier than the wheels. Caution in adopting a new implement, never before in use, is very proper, but for us, in Canada, to reject, without testing, a plough that is in general use in England, (that is *unquestionably*, the first agricultural country on earth,) because it is not the sort of plough we make use of, is, to say the least of it, a great absurdity. A good ploughman will be able to cut a furrow slice of proper proportion with a swing plough, but with a wheel plough, a man who would not be so experienced might turn as good a furrow slice, and would not be so likely to leave any of the slice uncut. We have never seen a plough cut a cleaner furrow than the wheel plough we imported. A well ploughed ridge, should, if all the turned surface was removed, be perfectly level and without the slightest inequality appearing. This is necessary in order to allow the water to escape from the ploughed soil into the furrow. They must be good ploughmen, who with a swing plough, will have a perfectly smooth surface under the furrow slices. There are great objections made to the Canadian Wheel Plough, but they are, in many instances, groundless.

In our humble endeavours as Editor of this Journal, it has constantly been our most anxious desire to conduct it so as to make it useful to Agriculturists, and promote, if possible, the profitable improvement of Canadian husbandry. We have carefully excluded all political and party discussions, and every subject that might give offence. Our views on Agricultural subjects may not be in all cases correct, but we should have been most happy to give insertion to any communication that would have differed from our views, and be thankful for any instructions offered. Although we have spent a long life employed in Agriculture, we see there is much to learn every day, and we are as willing to be instructed now as when a boy. During the many years we have employed ourselves occasionally in writing on Agricultural subjects, we have been favoured by the approbation of many whose approval we set the highest value upon, but we regret to have to say that we have also met with many discouragements, and from parties who we might reasonably expect would countenance and support us, in our humble exertions to promote the improvement of Canadian Agriculture, *where it most requires improvement*. It is for the Lower Canada Agricultural Society this Journal has been published, but while acting as Editor for them, we feel any neglect or want of support to the Journal, as if we were the only party interested. We offer our most sincere acknowledgements to all the kind friends who have ever supported or encouraged our humble services, and only regret that they were not more worthy of their favour. We can, with truth, assure them that paid or unpaid, our best services have ever been rendered to Agriculturists, and what we conceived was best calculated to promote the common good of our beloved country. Countenance and support to the Journal we might reasonably expect from the educated and the wealthy, and this consciousness of favour, would, we believe, inspire us with much more happy and useful

ideas, than it is possible for us to feel under discouragement, neglect or want of support.

There is said to be a new mode of preparing flax without steeping, adopted in England, noticed in the following paragraph:—

PREPARATION OF FLAX WITHOUT STEEPING.—This simple and economical mode of preparing the fibre for the spinner is attracting important attention at this moment. The machinery employed is singularly facile and inexpensive. The flax may immediately be taken from the field, dried, and prepared; and the yield is one-third more, and the strength one-third greater, than when treated in the ordinary way. Not being tanned by steeping, it is bleached as easily as cotton; as the essential oil remaining in the fibre imparts a lustre to the flax, and preserves that "nature" which will enable the spinner to rival the finest hand-spinning, both in quality and brightness. So economical is this process, that the woody portions broken away, retaining much of the richness of the plant, are admirably adapted for feeding cattle; and thus not one single atom of this valuable produce of our soil need be lost. There is, moreover, a peculiar idiosyncrasy in flax so prepared to unite kindly with woollen or silken fabrics, imparting great strength and beauty, and considerably lessening their cost.

As far back as 1816 we recollect to have seen flax prepared without steeping, and of beautiful quality. The mode now recommended, may be different, and it would be a great advantage in the management of flax if it could be dressed without steeping in water, as it is frequently injured by this process if allowed to be too long in steep, and the length of time it should be in steep is not generally well understood. We hope to be able to give some further information on this subject soon, that may be encouragement to the cultivation of flax in Canada, which we conceive would be very desirable.

We have received, through the kindness of Sir James Ed. Alexander, from Professor Robb, President of the "New Brunswick Society for the Encouragement of Agriculture, Home Manufactures and Commerce" the first number of their Journal, with the New Brunswick Almanac for 1851, prepared under the

superintendance of the Fredericton Athenæum. We beg to return thanks to Professor Robb for these interesting works, and request he will accept the exchange of the Journal of the Lower Canada Agricultural Society from their commencement, which we hope Sir Jas. Ed. Alexander will be so good as to forward to Fredericton. We are authorized to state that the Lower Canada Agricultural Society will be most happy to correspond with the New Brunswick Society on any subject connected with the subject which both Societies have been organized to advance. In our next number we shall refer to these books, and copy some extracts.

AGRICULTURAL REPORT FOR OCTOBER.

This month finishes the harvest of the farmer. The crop of the year will now have been collected, and he will have some idea of the total amount of his produce, although he may not, of its actual value in our future markets. As we before observed, the result of the year, we believe, will be favourable, as regards the general produce of the crops. We do not pretend that the acreable produce will be very large of any grain, but we have no doubt it will be equal to our cultivation of the soil for the various crops. Farmers in Canada have not much idea of the great expense incurred in England in the cultivation of ordinary farms, and the amount of capital employed. The latter is generally from £6 to £10, per acre, and frequently over this last amount. The expenses per acre annually, exclusive of rent and taxes, is from £2 to £5—all sterling. We have lately seen a Report of a farm of 740 acres, situated near Brighton, England. The annual expenses, including rent, taxes, &c., are £4500—and the annual returns for the last three years, are about £9 per acre, leaving a profit for the farmer of over £2000, for interest of capital and superintendance. This is not kept as a farm to supply garden vegetables, as there is 350 acres of grain grown annually—

140 acres of peas and green crops, and the remainder of the farm is in meadow, clover, tares and pasture. The stock kept upon this farm is, 28 horses for work,—21 Milch cows—12 Heifers—about 500 South Down sheep, and some pigs. The amount paid for manure annually, is about £700, and will it be believed? the farmer has 12 ploughs, all of wood, and having two wheels each, and very much resembling the Canadian wheel plough. Such are the only ploughs in use on the farm, with only one exception—that some of them are lighter than the others. This farmer, Mr. Rigden, has two drill machines, which cost £36 each, for sowing his grain, and although he finds it advantageous to use none but wheel ploughs, he has all other implements of the very best description. He has an Iron Roller that cost £70, and will roll over 20 acres in a day, and is drawn by 6 horses. Here is a farmer with wooden wheel ploughs, whose average of wheat is 36 bushels per acre, barley 40 bushels, oats from 60 to 80 bushels, mangel wurtzel 30 tons, and potatoes, from 150 to 300 bushels per acre. We introduce an extract from the Report of this farm, that we hope may not be without its usefulness, although it may be imagined as out of place in a Canadian Agricultural Report. We would be glad to see a Report of a larger general return from a farm where only swing ploughs would be used. There is not anything better calculated for instruction than reading reports of well managed farms in the British Isles, and the report we have now referred to is made by a Scotchman (now in England,) to a Farmers' Club in Berwickshire, Scotland. We are very anxious to see the necessary improvements introduced in our system of husbandry, but we do not wish, nor is it necessary to destroy all that belongs to the present system of Agriculture in Canada to effect this improvement. The Fall, so far, has been very mild, with scarcely any frost up to this time, allowing a good opportunity to take up potatoes and other root crops, in good

condition. Potatoes are partially diseased, but we hope there has not yet been any great loss by rot. The crop is generally light, and from this circumstance, they will be more likely to escape disease. We would strongly recommend any farmer who has the means, to manure for potatoes, carrots, and parsnips now, instead of in the Spring, and for grain crops also if possible. This is a very favourable season for ploughing. It is much preferable that the land should be rather dry than over wet when ploughing. Soil ploughed in too wet a state is very much injured, and it is difficult to restore it to a proper state. Land intended for summer fallow should be ploughed this Fall. This process we shall never cease to recommend to Canadian farmers as a necessary and easy means of improving their land. During the period that the land is fallow, it would often be necessary to change the direction of the ridges, and this is the only time to do so. If the situation of the land and drainage would admit, we should always prefer to have the ridges run North and South, or as near to it as possible. We believe that land, ridged in this way, will produce more of whatever crop, than if the ridges were to run in any other direction. The furrows and drains in ploughed land should be carefully cleaned out this Fall. Every farmer will understand how much better, land can be ploughed and drained, when the ridges are straight, than when crooked, and how much better the appearance of the field. The pastures continue green and afford a full supply of food for stock. The markets are well supplied with butchers' meat and all other descriptions of Agricultural products, and the prices for all are moderate. There is a considerable quantity of Canadian made cheese of good quality in the market this Fall, and we rejoice at it. Strangers who would visit the Montreal Market of a market-day would find it a very fine Exhibition of Agricultural products, and fruit, and vegetables, not to be excelled in North America. This is the

farmer's Exhibition and one he may be proud of, notwithstanding that the general state of our Agriculture is not so advanced in improvement as it might be, or as it is desirable it should be. A well supplied market, of excellent products, will be the best and most profitable Exhibition farmers can ever have, and good prices at the market will be the best prizes they can ever obtain, and we fervently hope they will do all that is in their power to make this Exhibition better every day and every year, and we wish them God Speed with all our heart.

October 25th. 1850.

NOTICE.—The Directors of the Lower Canada Agricultural Society are requested to meet, at their Rooms, in this City, on Saturday, the 16th day of November instant, at 11 o'clock, A. M.

By order,

WM. EVANS,

Sec. L. C. A. S.

EXPERIMENTAL AGRICULTURE.

By Professor Johnston.

Purposes for which experiments are made. Object of the suggestions contained in the present work.

The ultimate aims of applied science, in its relations to agriculture, will be the more fully and speedily attained in proportion as it succeeds in converting the practical farmer into a skillful, reasoning, and cautious experimenter, and every agricultural holding into a progressing and profit-giving experimental farm.

Experiments in chemical science are made with the view either of illustrating what is known, of testing what is asserted, or of discovering what is unknown.

In the *first* case they are intended either—

1°. To exhibit the known properties and mutual relations of bodies, and their influence upon animal and vegetable life; or,

2°. To demonstrate received theoretical views in reference to these known properties and relations.

These are merely illustrative experiments, such as the chemical lecturer makes before the audience he is instructing.

In the *second* case, they are intended to try alleged facts; to test hypotheses; to determine whether observations said to have been made have been made correctly; whether conjectures

thrown out have any foundation in truth; whether theories propounded are deserving of a place in our books, or ought to be banished altogether from their pages. These researches of the experimental critic are as valuable and important as any which can be made. To them we must be indebted for clearing away much rubbish which at present finds a place in our works upon scientific and practical agriculture.

In the *third* case, they are intended to discover new properties, relations, and useful applications of bodies; to determine more accurately and more fully the circumstances by which these relations and applications are modified; and thus to help us forward to the establishment of new or more general theoretical principles, and of new practical deductions.

To these last the term *research* most strictly applies, though with a view to both the second and the third of the objects specified above, experiments in the field and the feeding-house are fitted to render much service to the arts of rural life.

In suggesting the experiments proposed in the following pages, it has been my intention, among other things,—

First, To bring into view the numerous weak, or doubtful, or altogether dark points in our present knowledge of agricultural theory; and,

Second, Critically to consider the bases on which our opinions in reference to many practical points really rest. Weak points in theory, and uncertainties in practice, ought to be fairly stated and considered. Instead of being covered over and hidden by confident assertion, they ought to be made the subject of experiment in the field or in the feeding-house, and of analytical research in the laboratory. It is to the field and feeding experiments that I intend principally to confine the attention of my readers in what is to follow, though I shall not fail to indicate from time to time those experimental researches in the laboratory which appear most urgently to be required.

Such a procedure will benefit agriculture, not merely by suggesting to individual cultivators what may prove interesting and instructive additions to the ordinary labors of the farm, but also by putting into the hands of agricultural societies—now so often at a loss for subjects of intellectual interest to which the attention of their members may be drawn, or for which premiums may be offered—an almost boundless field of inquiries, upon which their labors may, year after year be beneficially expended; inquiries, each of which will tend to awaken thought and excite discussion, while they are of a kind, also, upon which the least cunning in agriculture will not venture to cast ridicule.

Some years ago, the Highland and Agricultural Society of Scotland began to offer premiums for experiments in the field, founded on the

suggestions contained in the appendix to the first edition of my published *Lectures*.* The Royal Agricultural Society of England also took up the same subject, though less warmly than the Highland Society, and still more limited exertions in the same walk have been made by many provincial societies. These premiums caused many persons to undertake such experimental inquiries, many competitors appeared for the prizes which were offered, and a large body of valuable results has from time to time been published, especially in the *Transactions* of the Scottish Society.

But, with the award of the premiums and the publication of the results, the labors of the Societies have ended. The experiments and their results have never been criticized, compared, or digested,—their merits or defects carefully and candidly pointed out,—the purposes for which they were made, weighed against the information they yielded,—the rubbish they presented, separated from the useful matter they contained,—and the steps distinctly pointed out which ought next to be taken, in order to secure a further advance.

These things it is my wish to do to extent in the present work. The suggestion of such a union between theoretical science and field experiment, with a view to the more secure and rapid progress of agriculture, originated very much with myself; and I feel bound, in so far as my knowledge and leisure permit, to show how much we have as yet attained, how our methods of experimental procedure may be improved and made more reliable, and what new inquiries may be entered upon, in the hope of solving the numerous agricultural problems which lie still unexplained before us.

The progress of scientific agriculture cannot fail to be greatly promoted by an extension of the habit of cautious experimenting, and the multiplication of results in which confidence can be placed. But many persons, capable of benefitting the art of culture in this way, are unaware of the points which chiefly require to be investigated, and in what way the investigation is to be commenced; while others are now groping in the dark, uncertain, and therefore unsuccessful, in their experiments. Many also who have hitherto felt no interest in such pursuits, require only to have their objects clearly set before them to become warmly and zealously devoted to them. These have served as additional inducements to me in preparing the following pages.

Habits and analogies of the species of plants on which experiments are made, and of their general varieties.

But a knowledge of the special habits and analogies of particular species of plants, and of their several varieties—the soils on which

they grow—the diseases to which they are subject—the enemies, animal and vegetable, by which they are liable to be attacked,—these things are not less important to the suggester of experiments than a knowledge of their general physiological and chemical functions.

Chemistry, from the mouths of some of its more hasty or more ardent cultivators, has promised to make any plant grow luxuriantly, and at will, upon any soil, provided only that it be suited to the prevailing climate. But such promises are mere idle boasting, and argue much ignorance on the part of those who venture to make them. Even chemistry, with all her power, must bend to the constitution and natural habits of a plant. Thus—

1°. *The oat* and red clover love a firm and stiff soil—a natural habit, which chemistry cannot hope to change. On some soils the Tartary oat yields heavy crops, while, on the same soil, the more valuable Potato oat refuses a remunerative return. Where other varieties of oats grow sound, the Hopeton oat is subject to a disease called sedge or tulip root, which is gradually driving it out of cultivation. I do not know whether these qualities of the Potato and Hopeton oats be within the dominion of mechanical or of chemical causes.

2°. *Wheat*.—Winter wheat fails in many places where Spring wheat is found to do well. Such a result has been observed in the island of Islay, where so many improvements have in late years been made by Mr. Campbell of Islay. Is chemistry or climate, or the special constitution of the variety of wheat, or the mechanical condition of the soil, to blame for this?—and which of these causes has most to do with the capability of this or that field to grow white or red wheat, or with the greater productiveness of this than that variety of seed on similar soils?

3°. *Barley* affects a lighter soil, but the quality of the grain varies with the natural dryness, the drainage, or the quality of the land; and the maltster, the feeder, or the pot-barley maker, buy it accordingly. Yet, in regard to the physical condition of the soil, different varieties have different tendencies. The Chevalier barley grows on clays on which the Annat—one of our best varieties—does not succeed; and this is probably one reason why the Chevalier barley has spread so widely, and yields good crops even on the Huntingdon clays. Some varieties show a great difference as to the physical nature or condition of the soil, while others are most choice in their selection of a suitable soil. Thus the Annat variety, already mentioned, not only dislikes a clay, but a gravelly soil also, and thrives best on a dark-coloured loam.

4°. *Rice* grows usually on low alluvial flooded tracts of land, and abundance of water at the earlier stages of its existence are in most cases

a necessary of life to this plant. But there are varieties of hill rice which grow healthily, and ripen on dry land. This difference, though a little more striking, is, in reality, not more remarkable or deserving of attention than the constitutional differences above mentioned in regard to barley.

5°. *The Turnip*.—The numerous varieties of turnip so generally known in this country, differ little less in habit, and tendency, and choice of soil, and power of resisting the effects of climate than varieties of grain do. It is essentially favoured by a cold and humid climate. Hence it is a less profitable culture in our southern countries, and yields less abundant crops along our eastern borders. The yellow and the white varieties differ greatly in nutritive value and in climatic habits. Of white turnips, again, varieties differ. Thus the *white stone* comes quicker to maturity than the *white globe*; so that what is fitted to nourish and bring forward the one will not promote the growth of the other in an equal degree, or cause it in the same month of the year to yield an equal crop. In different districts, also, and under different treatment, the same variety is differently nutritive—a circumstance of much importance in all experiments on feeding.

The turnip is also liable to special attacks from insects, and to special diseases—such as that called fingers-and-toes—accidents which are more or less completely beyond the calculations of pure or theoretical chemistry.

6°. As the cultivated carrot is the offspring of the wild carrot, (*daucus carota*), so the white beet (*beta vulgaris campestris alba*) are allied to the sea-side beet, (*beta maritima*), which, like them, has a fleshy root, and is good for food. This analogy indicates the probable wants of the beet tribe, the probable utility of saline applications to the plant while growing, and the especial expediency of making experiments upon it with that common salt for which the *Beta maritima* frequents the sea-shore.

The farmers of the Guildford Club, (Surrey,) in a recent discussion on the growth of beet, came to an unanimous resolution that, in their soils, experience had shown common salt to be a valuable promoter of the growth of this root, and that it was worthy of being recommended.

The analogy above stated throws light on this result of practical experience, and points out to the improving experimenter the special value to him of a familiarity with such analogies: they not only modify and restrain the conclusions to which pure chemistry might erroneously lead him, but they indicate new paths of inquiry on which his chemical knowledge may exercise itself to the manifest advantage of scientific agriculture.

7°. *The pea* exhibits, among its several varieties, similar liabilities to be attacked by insects

as the turnip does, and which, as in the case of the turnip, do not admit of easy or satisfactory explanation.

I lately saw on the home farm of Lord St. John, at Melshburne, in Huntingdon, a field of winter peas, sown in November 1848, which had been all treated and manured alike, but on one half of which the seed sown was the early maple—a common field pea; on the other half the Ringwood marrow dwarf—a white pea. The latter was attacked at Christmas by the slugs, and in great part devoured so as to require filling up with fresh seed, while the former—the gray pea—was untouched by them. There may have been some other reason besides the difference of variety for this limited attack of the slug; but it is obvious that circumstances or liabilities of this kind may materially modify the effect of chemical applications made to our crops, and may be the often unsuspected cause of important discordancies in our results.

I might give many other illustrations of the general habits and analogies of our commonly cultivated crops, and quote many special physiological facts, such as that dry weather makes roots like mangel-wurtzel run prematurely to seed, and that the seed so prematurely formed produces plants which, under any circumstance of weather, exhibit a similar tendency, (Stephens); that, to succeed equally, some seeds, like that of the parsnip, must be sown new or fresh, (Le Couteur,) while others will germinate readily and healthily though kept for years, and so on; but the examples already given are sufficient to show that much other knowledge besides what is purely chemical is necessary to the suggester of agricultural experiments even of a chemical nature. His skill in regard to the circumstances in which they are likely to succeed, and therefore ought to be tried, and, above all, his ability to account for failures and discordant results, will in a great measure depend upon the possession of this practical physiological knowledge.

8°. So in experiments upon trees, no less than upon field crops, practical knowledge of a similar kind is most necessary. That the clays of the gault and weald favour the oak; that the elm flourishes only on the soils of the intermediate more sandy strata; that our cider countries rest chiefly on the old red marls, those of France on the chalks of Normandy, and the tertiary or more recent drifts which overlie them; that, in Bermuda, the coffee-tree grows luxuriantly on the recent hard calcareous rock of that island: such facts as these, with which the practical man is usually most familiar, are all of much use to the experimental adviser, and are rich in suggestions as to the kind of experiments which are likely to succeed upon each species, as to the method of making them, and as to the kind of soils on which good results are to be expected.

RULES

OF

THE LEGISLATIVE ASSEMBLY,
RESPECTING PRIVATE BILLS.

ADOPTED on 3rd August, 1850, and substituted for the Rules (numbered 60 to 72) heretofore in force.

60. That hereafter no Petition for any Private or local Bill will be received by the House, after the first fifteen days of each Session, unless the Petitioners shall have first applied, after notice thereof, for leave to present such Petition, and obtained permission of the House to do so.

61. That hereafter this House will not receive any Private or local Bills, except within the first four weeks each Session.

62. That this House will not receive any Report of a Standing or Special Committee, upon any Private or local Bill, except within the first six weeks of each Session.

63. That the Clerk of this House shall, immediately after the issuing of the Proclamation convoking the Provincial Parliament for the despatch of business, announce, in the *Canada Gazette*, and other newspapers published in this Province, until the opening of Parliament, the day on which the time limited for receiving Petitions for Private Bills will expire, according to the Rules of this House; and the said Clerk shall also announce, by notice set up in the Special Committee Rooms, and in the Lobby of this House, by the first day of every Session, the days on which, according to the Rules of this House, the time for receiving Petitions for Private Bills, Reports on those Petitions, and Reports on the Bills upon those Petitions, are to expire.

64. That all applications for Private or local Bills, whether for the erection of a Bridge the making of a Rail Road, Turnpike Road, or Telegraph Line; the construction or improvement of a Harbour, Canal, Lock, Dam, or Slide, or other like work; the construction of works for supplying gas or water; or for the incorporation of any particular Profession or Trade, or of any Banking or other Commercial Company, or Cemetery Company; the incorporation of a Town or City; the levying of any local Assessment; the division of any County or Township; the regulation of a Common; the re-survey of any Township, Line, or Concession; or for granting to any individual or individuals any exclusive rights or privileges whatsoever, or for doing any matter or thing which in its operation would affect the rights or property of other parties; or for making any amendment of a like nature to any former Act, shall require the following notice to be published, viz.:

In *Upper Canada*—A notice inserted in one newspaper published in the County, or Union of Counties, affected.

In *Lower Canada*—A notice inserted in one newspaper in the English, and one newspaper in the French language, in the District affected (if any be published therein), and also affixed at the Church door of every Parish or Township that such application may affect, or in the most public place where there is no Church.

Such notices shall be continued in each case for a

period of at least two months, during the interval of time between the close of the next preceding Session, and the presentation of the Petition.

65. That before any Petition praying for leave to bring in a Private Bill for the erection of a Toll Bridge is presented to this House, the person or persons proposing to petition for such Bill shall, upon giving the notice prescribed by the 64th Rule, also, at the same time, and in the same manner, give a notice in writing, stating the rates which they intend to ask, the extent of the privilege, the height of the arches, the interval between the abutments or piers for the passage of rafts and vessels, and mentioning also whether they propose to erect a draw-bridge or not, and the dimensions of such draw-bridge.

66. That parties publishing notices of intended application for Private Bills under the 64th Rule, shall be required to send, addressed to "Private Bill Office, Legislative Assembly;" (as soon as may be after its publication) a copy of the local newspaper containing the first insertion of any such notice (or a certificate of the insertion thereof, by the proprietor of such paper); and also, after the presentation of the Petition, a copy of the paper containing the last insertion of the said notice (or a certificate thereof), together with proof of notices having been affixed (when required) at the Church doors.

67. That every Private Bill shall be prepared by the parties applying for the same, and printed by the contractor for the Seasonal Printing of the House, at the expense of the said parties, and one hundred and fifty copies thereof shall be deposited in the Private Bill Office, for the use of Members, before the second reading.

68. That Bills of a private nature shall be introduced on a Petition, to be presented by a Member, and seconded.

69. That when any Bill shall be brought into the House for confirming Letters Patent, a true copy of such Letters Patent shall be attached to the Bill.

70. That the expenses and costs attending on Private Bills giving any exclusive privilege or advantage, whether for the erection of a Bridge, or the construction of a Railroad, Turnpike Road, Telegraph Line, Harbour, Canal, Lock, Slide, Dam, or other like work; or for the incorporation of Banking or Commercial Companies, Cemetery Companies, or Companies for the construction of Gas or Water Works, or for any other objects or profit; or for amending, extending, or enlarging any former Acts in such manner as to confer additional powers, ought not to fall on the public, and that for the purpose of defraying the same, the parties seeking to obtain any such Bill shall be required to pay into the hands of the Clerk of this House the sum of fifteen pounds, before, in any case, the said Bill shall be further proceeded upon after being read a second time.

71. That every Private Bill, after having been read a second time, shall be referred to the Standing Committee on Private Bills, if any such shall have been appointed, or to some other Standing Committee of the same character.

72. That whenever any Petition or Bill presented to the House shall have been referred to a Committee to examine the matter thereof, and report the same as it shall appear to them, to the House, the House will not admit any Petitioners to be heard, by

themselves or Counsel, against such Petition or Bill, until the matter shall have been first reported to the House.

73. That all persons whose interest or property may be affected by any Private Bill shall, when required by the Committee, appear in person before them to give their consent, and if they cannot personally appear, they may send their consent in writing, which shall be proved before the Committee by one or more witnesses. And in every case the Committee upon any Bill for incorporating a Company, shall require proof that the persons whose names appear in the Bill as composing the said Company, are of full age, and that they are in a position to effect the objects contemplated by the Bill, and have personally consented to become so incorporated.

74. That no Committee on any Private Bill, based upon a Petition, notice of which is required by the 64th Rule, shall sit thereupon, without first causing a week's notice of the day of sitting to be set up in the Lobby.

75. That the Committee to whom any Private Bill shall have been referred, shall report the Bill to the House, whether such Committee shall or shall not have agreed to the Preamble, or gone through the several clauses, or any of them, and when any alteration shall have been made in the Preamble of the Bill, such alteration, together with the ground of making the same, shall be specially stated in the Report.

79. That when the Committee on any Private Bill shall report to the House that the Preamble of such Bill has not been proved to their satisfaction, they shall also state the grounds upon which they have arrived at such a decision.

77. That a filled up Bill containing the amendments proposed to be submitted to the Committee on the Bill, be deposited in the Private Bill Office, one clear day before the meeting of the Committee upon such Bill.

78. That the Chairman of the Committee shall sign, with his name at length, a printed copy of the Bill, on which the amendments are fairly written, and shall also sign with the initials of his name, the several amendments made and clauses added in Committee.

79. That no Private Bill be read a third time, until the party interested shall have delivered to the Clerk a certificate from the Queen's Printer, that the cost of printing one hundred and fifty copies of the Act for the Government, has been paid, or secured to him.

80. That (except in cases of urgent and pressing necessity,) no motion shall be made to dispense with any Sessional or Standing Order of the House, relative to Private Bills, without due notice thereof.

81. That a Book, to be called the "Private Bill Register," shall be kept in a room to be called the "Private Bill Office," in which Book shall be entered, by the Clerk appointed for the business of that Office, the name, description and place of residence, of the parties applying for the Bill, or their agent, and all the proceedings thereon, from the Petition to the passing of the Bill; such entry to specify briefly each proceeding in the House, or in any Committee to which the Bill or Petition may be referred, the day on which the Committee is appointed to sit, and the name of the Committee Clerk. Such Book to

be open to the public inspection daily, during Office hours.

81. That the Clerk of the Private Bill Office do prepare, daily, lists of all Private Bills, and Petitions for Private Bills, upon which any Committee is appointed to sit, specifying the time of meeting, and the room where the Committee shall sit; and the same shall be hung up in the Lobby.

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