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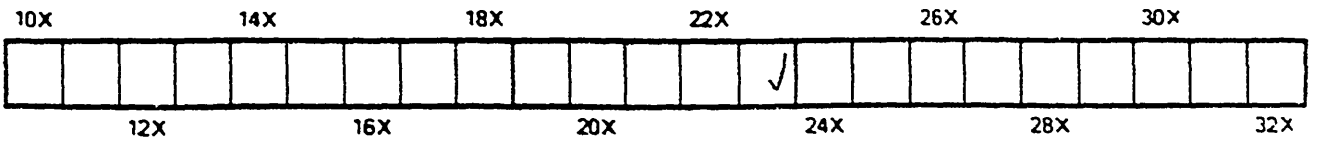

AGRICULTURAL JOURNAL,

AND

TRANSACTIONS

OF THE

Lower Canada Agricultural Society.

VOL. 2. MONTREAL, JUNE, 1850. NO. 6.

A meeting of the Directors of the Lower Canada Agricultural Society took place at their Rooms in this City, on Monday the 29th day of April, 1850, several members were present.

John Yule, Esq., the President of the Society, having taken the Chair, stated: that an application had been made to him on behalf of the Committee appointed to arrange the Industrial Fair to be held in this City this year, preparatory to the Grand Exhibition to take place in London, in, 1851, requesting to know what part the Lower Canada Agricultural Society would take in the matter; when the following Resolution was proposed, and adopted unanimously:—

Resolved,—That the Society, with a view of giving the assistance in their power, to the Committee appointed to arrange the Industrial Fair to be held in this City this year, preparatory to the Grand Exhibition in London, in 1851; hereby appoint J. Yule, Esq., President, Major Campbell, Evans and Langevin, as a Committee to act conjointly with them, and that the Directors regret the absence of means to contribute otherwise to the advancement of the objects in view.

The Secretary was instructed to address a letter to the Secretary of the Committee for arranging the Industrial Fair, apprising them of the foregoing Resolution. Other business of the Society was then discussed, and the following Resolutions unanimously adopted:—

1st. That the Lower Canada Agricultural Society petition the Provincial Legislature to amend the Act of Incorporation of this Society,—that in the 6th Section, the word "nine" shall be replaced by the word "five," and that 9th Section, the word "fifty" shall be replaced by the word "fifteen."

2d. That another Petition be presented to the Provincial Legislature, to ask for an investigation, in that manner which may appear best suited, to ascertain the present state of Agriculture generally, and the best means for advancing the improvement of that important interest.

3rd. That the Society see with regret, that the debts they have contracted for the publication of the Agricultural Journal in English and French, and the great difficulty of collecting the subscriptions, will prevent them from holding the Provincial Exhibition, which they at first proposed to hold this Fall, until the year 1851. That the Society, however, believe that they could not have applied the funds of the Society and the aid granted by the Legislature, to a better purpose, than in disseminating useful and practical instructions and suggestions by their Journals; and the Directors of the Society hope that the Legislature and the Agricultural public, will give their approbation to the plan they have been obliged to adopt.

4th. That a Petition be addressed to the Provincial Legislature, praying that a grant in aid, similar in amount to that made to this Society last Session, may be granted to them the present Session and annually.

5th. That the Report made by the Committee appointed to examine the accounts of Messrs. Lovell and Gibson, for printing the

Agricultural Journal, be received and approved. The Secretary submitted several letters and other documents connected with the business of the Society. The books containing the receipts and expenditure of the Society were also placed before the Directors.

The Secretary was instructed to prepare the Annual Report, to be submitted to the Annual General Meeting of the Society, which he was also directed to give notice for in the Agricultural Journals, to take place on Friday, the 17th day of May next. He was further instructed to prepare the Petitions to the Provincial Legislature resolved upon at this meeting. The Directors resolved that the Books and Periodicals in the Library of the Society, should be lent to Members, one at a time, and that a Book should be prepared and left upon the table of the Society's Rooms, where any Member taking a Book or Periodical, should enter the title of the same, with the date when taken, and also note the return of the same. The Directors expect that no Member shall keep a Book or Periodical more than two weeks at most. The Meeting then separated.

By order,

WM. EVANS,
Secretary, L. C. A. S.

Montreal, April 29, 1850.

The cows kept in Lombardy, where the famous Parmesan cheese is made, are generally of the Swiss breed, and very handsome. The bull chosen is generally of a rich, dark brown colour, small, straight backed, with slender limbs and a small head. Such is the description of a bull approved for breeding dairy stock, and is certainly not at all a buffalo shape, or anything approaching to it, or to that of many bulls we have seen that have been highly prized. Neither large or small sized cattle that are of coarse make or form, are fit for the dairy, or at least, are not the most profitable for it. The best dairy cows we have ever seen, were fine in the head, neck, and limbs, heavy and broad in the hind quarters, and light in the fore, and these are sure marks of a good dairy cow.

The Annual General Meeting of the Lower Canada Agricultural Society, took place at their Rooms in Montreal, on Friday, May the 17th, pursuant to advertisement in the Agricultural Journals published in English and French.

The President, John Yule, Esq., having taken the Chair, read the proceedings of the last meeting of Directors. The Secretary presented the Annual Report, which being read, it was proposed and seconded, that the Report be received and approved, which was carried unanimously. The meeting then proceeded to elect a Board of Directors for the ensuing year, in conformity to the original Rules and Regulations of the Society, confirmed by the Act of Incorporation by the Legislature, and the following gentlemen were chosen, viz.:— Hon. A. N. Morin, Speaker of the Legislative Assembly, Hon. B. De Boucherville, M. L. C., Hon. Adam Ferrie, M. L. C., Hon. G. R. S De Beaujeu, M. L. C., Major Campbell, John Yule, Esq., Rev. J. G. Desaulniers, Rev. F. Pilote, D. Finlayson, Esq., P. E. Leclerc, Esq., D. M. Armstrong, Esq., M. P. P., Dr. Bouillier, M. P. P., Jos. Cauchon, Esq., M. P. P., R. N. Watts, Esq., M. P. P., A. Jobins, Esq, M. P. P., L. Lacoste, Esq., M. P. P., Dr. Taché, M. P. P., A. Turgeon, A. Pinsonnault, J. N. Poulin, A. Morris, A. N. Archambault, F. Armand, Fils, J. E. D. Bellefeuille, John Gilmour, F. A. La Rocque, H. L. Langevin, L. A. H. Latour, A. Vaudaudaigue, Dr. Valois, Joseph Vincent, J. Gilbault, and Wm. Evans, Esquires.

Major Campbell, seconded by the Hon. Adam Ferrie, proposed a vote of thanks to the late President of the Society, John Yule, Esq., for his very efficient services as President of the Society for the past year, and for his very proper conduct in the chair, this day, which was unanimously adopted. The meeting then dissolved itself.

THE ANNUAL REPORT OF THE LOWER CANADA AGRICULTURAL SOCIETY.

The Society have now been in existence for a period of more than three years, and although they may not have effected all the good they were desirous to produce, it is satisfactory to know they have been instrumental in exciting a very considerable interest amongst the rural population, and others, for the improvement of Agriculture. If there was no other proof of this, the greatly increased demand this Spring for Agricultural seeds of every description, from all parts of Lower Canada, to the Seedsman of the Society, would clearly demonstrate that this interest has been created, and produced practical effects that will soon display themselves, and have a very beneficial influence upon the Agriculture of this section of the Province. The Society, instead of making a display by Cattle Shows and Exhibitions, have endeavoured to awaken a spirit of inquiry, and desire for improvement amongst Agriculturists in Lower Canada to its remotest bounds, and they have reason to suppose with considerable success. The primary object of the Society was to effect the improvement of Agriculture where it was most required; and this, they were convinced, could not be effectually accomplished in the commencement, by Cattle Shows and Exhibitions, the benefit of which are generally participated in *only* by our best farmers, men of capital, and perhaps having their farms in good order, while those who really required instruction and encouragement to improve their system of husbandry and stock of cattle, would feel themselves virtually excluded, at least, from any share in the premiums distributed. The efforts of the Society, therefore, have been directed to instruct and encourage those who would be so excluded in their present circumstances, and enable them to come forward as competitors at Cattle Shows and Exhibitions, on equal terms with those who are now in advance of them in Agricultural skill and other advantages, and who consequently, would take all the premiums to themselves at these Exhibitions. Under these circumstances, the Society have the satisfaction to believe, that the funds that were at their disposal have been employed as judiciously and advantageously for the improvement of Agriculture, *where most requiring it*, as they could be in any other way for the attainment of that object. Their action has had a general effect, and was not confined to one locality, nor was the distribution of their funds made to parties who were good farmers, or men of capital, requiring no payment or encouragement for doing or having what they knew was for their own advantage. The Society have published an Agricultural Journal, containing information and instruction in the science and practice of improved husbandry, and have circulated this Journal to the extent of about 3,000 copies (2,000 in French, and 1,000 in English) throughout every parish of Lower Canada, where improved systems of husbandry were little known or practiced; and the Society confidently hope, that the "seed" they have thus sown, and are sowing, will succeed and flourish, and yield an abundant produce of good to the rural population and to the country generally.

The Chartered Societies of the British Isles publish each a quarterly Journal, which they denominate their "Transactions," containing the most useful information on Agricultural subjects; together with recording the "Transactions" of the Societies, which, however, only form a small portion, comparatively, of the Journals. These Transactions are published at a considerable expense to the Societies, and distributed to the members. The Report of one of these Societies last year, gave this cost of publishing as over £1500 annually, and there were only receipts for copies sold to the amount of about £150, but the Report stated that the publication was highly estimated, and a principal means of obtaining members for the Society, and connecting the Society together.

The Lower Canada Agricultural Society, while they exist, will find it necessary to publish a Journal, to make their existence and usefulness known throughout the country. A monthly publication is better suited to a scattered population over an immense extent of country, and to the circumstances of the farmers, than a quarterly or annual Journal would be. An annual Cattle Show and Agricultural Exhibition, would be very desirable, but would not supersede the necessity of publishing an Agricultural Journal of some description, under the sanction of the Society. The Society's usefulness will altogether depend upon the amount of improvement they are instrumental in producing in the Agriculture of Canada.

If only one Canadian farmer in a parish, adopts an improved system of husbandry, and obtains favourable results from it, there is no doubt, others will follow the example. This Society possess the advantage of having the confidence of those whom they are desirous to benefit, and, therefore, their recommendations or those sanctioned by them, have, they are glad to say, that degree of influence that confidence is always sure to confer—This confidence is more generally inspired from the Society having hether to applide all their disposable means, to instruct farmers and encourage them, to adopt a better system of husbandry where manifestly requiring it.

From a considerable portion of the Roman Catholic Clergy, the Society have received the most useful support, particularly from his Grace the Archbishop of Quebec, and his Lordship the Bishop of Montreal. Their influence in the country will have the very best effect in promoting the object the Society are so anxious to accomplish—the improvement of Agriculture.

In the month of December last, the Society passed a Resolution to hold a Cattle Show and Agricultural Exhibition at Quebec next September. First, from a desire to satisfy parties who wish to have such Exhibitions, and secondly, to show the people of Lower Canada that this Society do not confine their attention to one portion or section of the country, but extend it to all parts. They regret, however, that the want of adequate funds and the difficulty (of collecting) the subscriptions due to them will prevent them holding this Exhibition this year unless the Legislature grant the means. The Society are rejoiced to find a greatly increased number of visitors to their Rooms at Montreal, from the most remote sections of Lower Canada, most of them coming to make enquiry on Agricultural subjects, and to purchase seeds from the Society's Seedsman, who has already disposed of nearly all the foreign Agricultural seeds imported last fall and this Spring.

There is another evidence of the progress of Agricultural improvement, in the greatly increased demand for Agricultural implements of the most approved construction this Spring, and many of them purchased by Canadian farmers.

The Society continue to augment their Library, and have now some of the best works on Agriculture, both in English and French. They also receive several valuable periodicals from the British Isles, including the Transactions of the Highland and Royal Irish Agricultural Improvement Societies, the Transactions of the New York State Agricultural Society, and the Canadian Agriculturist from Upper Canada.

By order,

WM. EVANS,
Acting Secretary.

Montreal, May 17, 1850.

At a subsequent meeting of the Board of Directors, elected at the Annual General Meeting, which took place on the 17th of May, instant. The following gentlemen being present:—John Yule, Esq, Major Campbell, Hon. Adam Ferrie, F. A. LaRocque, P. E. Leclere, A. Turgeon, H. L. Langevin, L. A. H. Latour, and Wm. Evans, Esquires. Mr. Yule, the late President, was called to the

Chair, when the following Resolutions were unanimously passed:—

That Alfred Pinsonnault, Esq. be elected President of the Society for the ensuing year. That William Evans, Esq. be elected Secretary. That the Hon. G. R. S. DeBeaujeu, Hon. Adam Ferrie, Rev. F. Pilote, Rev. G. Desaulniers, R. N. Watts, Esq., M. P. P., and P. E. Leclerc, Esq. be elected Vice-Presidents. That John Yule, Esq., Major Campbell, and the Hon. A. N. Morin, compose the Executive Committee.—That Major Campbell, Alexander Morris, and H. L. Langevin, Esquires, compose the Finance Committee.—That F. A. LaRocque, L. A. H. Latour, and Alexander Morris, Esquires, compose the Journal Committee.

The Secretary submitted copies of Petitions prepared for the Provincial Legislature, ordered at a former meeting of the Directors on the 29th April last, which were approved of. Instructions were given to the Secretary to prepare a statement of the Funds of the Society, to be transmitted to the Provincial Legislature, with the Annual Report, approved of at the Annual General Meeting of the Society.

The meeting then separated.

By order,

WM. EVANS,
Secretary, L. C. A. S.

Montreal, May, 1850.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

The following very valuable lecture was recently delivered before the Royal Agricultural Society of England. It is a most interesting and valuable statement, and will, we trust, lead to some important practical results:—

LECTURE ON SOILS AND MANURES.

Mr. Way stated that he had on that occasion to bring before the Society some facts and observations in regard to the action of soils upon the constituents of manure. These observations he believed to be perfectly new to the Agricultural public, and he hoped to show that they would throw much light on some of the operations of practical Agriculture. As, however, he was preparing a paper for the next Journal of the Society, in which he would go minutely into the subjects and give the results of the investigations which had been proceeding for the last eight or nine months in his laboratory, he should that day merely give an outline of those results, avoiding everything in the shape of detail. It had often been observed that the dark liquid from a manure-heap, if by chance placed upon a bed of soil through which it could filter, issued from the bottom almost or altogether deprived of colour. Again, the water of drainage, especially in heavy clay soils, was observed to be free from colour, and often beautifully clear and limpid. What was the nature of these actions? Were they the effect of mere mechanical filtration and the separation of the solid substances suspended in the water? Most persons would answer in the affirmative, and such had been the general impression hitherto, but it did not meet all the circumstances of the case.

On the table were glass filter-jars, containing a red soil from Mr. Pusey's estate in Berkshire. The soil, as the gentlemen present would see, occupied the jars to the depth of 5 or 6 inches. Upon one of these Mr. Way poured water obtained from one of the sewers of London. To another filtering-jar he added a quantity of the fetid liquid produced in the steeping of flax. Both of these liquids were turbid, highly coloured, and exceedingly offensive to the smell: but it would be seen that, so soon as having passed through the soil they began to drop from the jar, they were no longer the same. The resulting liquid had an earthy smell it was true—a smell always accompanying soils—but was no longer offensive to the nose. Now, to what ingredient of the soil was this metamorphosis due? Was it due to the sand acting as a filter? It was easily proved that such was not the cause; and that there might be no doubt on this subject, Mr. Way would pass through a filtering-jar, containing more than 9 inches depth of fine white sand, a quantity of cow's urine taken from a tank in the country. The liquid was so far altered by the filtration, that the turbidity was removed as it would be by filtration through paper; but the colour and disgusting smell remained in all their intensity. Sand, therefore, obviously was not the active ingredient in soils in respect to the power under discussion. The same must be said of the different forms of gravel, which were only coarse sand. The other great ingredient of soil was clay, and to this Mr. Way attributed the power in question. As an experiment comparative with the last, he would pass the same tank water through sand, mixed with one-fourth of its weight of white clay in powder, and they would observe the result was very striking. The liquid coming through was clear and free from smell; indeed, it was hardly to be distinguished by its external characteristics from ordinary water. There

could be no doubt, then, that the property of soils to remove colouring matters, and organic matters yielding smell from solution, was due to the clay contained in them. Filtration was only a method of exposing the liquid in the most perfect form to the action of the clay, but it was not necessary to the success of the process. In proof of which Mr. Way stirred up a quantity of soil with putrid human urine, the smell of which was entirely destroyed by the admixture, and upon the subsidence of the earth the liquid was left clear and colourless. It appeared, therefore, that the clay of soils had the property of separating certain animal and vegetable ingredients from solution; but was this property the only one exhibited? Mr. Way had found that soils had the power of stopping also the alkalies, ammonia, potash, soda, magnesia, &c. If a quantity of ammonia, highly pungent to the smell, was thrown upon a filter of clay or soil, made permeable by sand, the water first coming away was absolutely free from ammonia. Such was the case also with the caustic or carbonated alkalies, potash, or soda. This was a very wonderful property of soils, and appeared to him as an express provision of nature. A power, he remarked, is here found to reside in soils, by virtue of which, not only is rain unable to wash out of them those soluble ingredients forming a necessary condition of vegetation; but even those compounds, when introduced artificially by manure, are laid hold of and fixed in the soil, to the absolute preclusion of any loss either by rain or evaporation.

But Mr. Way had found that this property of clay did not apply only to the alkalies and their carbonates, but to all the salts of these bases, with whatever acid they were combined. Here again was a beautiful provision; sulphate of ammonia, when filtered through a soil, left its ammonia behind, but the sulphuric acid was found in the filtered liquid—not, however, in the free state, but combined with lime; thus sulphate of lime was produced, and brought away in the water. In the same way muriate of ammonia left its ammonia with the soil, its acid coming through in combination with lime, as muriate of that base. The same was true of all the salts of the different alkalies, so far as he had yet tried them. Thus lime in the economy of nature was destined to one other great office besides those which had already been found for it—it was the means by which the salts ministering to vegetation became localized and distributed through the soil, and retained there until they were required for vegetation. Mr. Way pointed out that, from what he had just shown, it must be obvious that there was no provision for the ordinary salts of lime themselves. It was necessary that when the alkali of a salt is laid hold of by a soil, some provision should exist for the neutralization of the acid with which it was combined; for all other salts lime performed this useful office, but it had nothing to fall back upon for its own salts. Sulphate, muriate, or nitrate of lime, when passed through a soil, would come through unchanged. This, however, did not extend to lime itself, or to its carbonate, when dissolved in carbonic acid, as it is found in most waters. Quicklime, when dissolved in water, is removed by passing the water through clay, or through moist soils containing clay; and carbonate of lime in solution is so effectually removed, that hard water may be softened by the same process.

With regard to the extent to which these actions were capable of being carried, it was not to be supposed, that we could go on filtering indefinitely with the separation of the salts contained in the liquid; on the contrary, the limit was soon reached; but although small in per centage quantity, the power was, in reference to the bulk of the soil, enormously great. He had found that a pure clay would absorb, perhaps, two-tenths per cent. of its weight of ammonia—that is to say, 1000 grains would separate two grains of ammonia; and from reasons which need not then be noticed, a loam, or a well cultivated clay soil, would absorb nearly twice as much. Now every inch in depth of soil over an acre of ground weighed about 100 tons; consequently, 10 inches of depth of such soil would weigh 1000 tons, and would be adequate to combine with, and retain, 2 tons of ammonia, a quantity which would be furnished by about 12 tons of guano. Now, one-sixtieth of this power would suffice for the preservation of the ammonia of an outside dose of guano; consequently, he was justified in saying that the property was practically of immense activity. Mr. Way stated that he had ascertained the extent of the power in different soils, and for the different alkalies. The property was decidedly a chemical one; and although he intended only to state the facts, without entering upon their explanation, he might say that he had every reason to believe that he should be able to develop that satisfactorily at the proper time.

Having thus endeavoured to call their attention to this highly interesting subject, the lecturer went on to point out very shortly the different operations of practical Agriculture, upon which it was likely to throw light.

First, as to manuring: Obviously if there was a provision in the soil for the retention of the salts of manure, and for the ammonia and other products of the decomposition of animal and vegetable matter, the soil was the proper place for those decompositions to go on, and no matter how remote the period when the crop would be taken, it would be perfectly safe to get the manure into the land as soon as practicable after its production. Again, the equitable distribution was a point also which seemed of consider-

able importance; for, it was an absolute necessity that a new class of compounds was formed in the soil immediately the manure reached it, and it seemed to follow that those compounds furnished the elements of nutrition to plants; consequently we should seek to produce them by every means in our power. Liquid manuring, wherever practicable, was an effectual way of securing this distribution. In the case of artificial manures—that is to say, manures composed of chemical salts—much simplicity was introduced by the new discovery. Henceforth we must regard the different salts (those of ammonia, for instance) as of value in relation to the price of the ammonia, or other base contained in them, since they are all alike when incorporated with the soil.

In liquid manuring it had been usual to think that the application must be made to grass, or to land bearing some crop; but now it was known that the land, not the plant, retains the manure, no theoretical difficulty could arise in the use of liquid manure for arable land.

In irrigation the principle now illustrated must certainly be of great importance, if, as there is but little doubt the chemical characters of the water are of consequence, and that the soil is the means by which the salts and organic matters are separated for vegetation; then it will be obvious that the water should be made to flow *through* rather than *over* the soil. This reasoning is consistent with the observation, that to produce the full effect irrigated land should be well drained.

The application of water to land not at the time bearing a crop, would be clearly admissible under this view, and is indeed practised extensively in Germany and some parts of Italy. Mr. Way also pointed out that the proper depth for drainage must be materially influenced by this property of soils to absorb manure. Without asserting that this or that depth was the most advisable, he thought it would be admitted that the water of drainage should pass through a depth of soil regulated, amongst other circumstances, by its particular power of detaining the manures placed upon it.

To the question of the application of sewer refuse from towns these experiments brought much light, and they clearly proved that the sewer water might be applied in an unintermittent way, provided that a due relation were maintained between the capacities of retention of the soil, the quantity of manure applied, and the amount of crop taken in a given period. The great obstacle to the use of sewer manure, based upon the belief that it must be applied to the plant in actual growth, or it would otherwise escape in the drains, is thus removed. Lastly, after adverting to the probability that the power of soils to remove carbonate of lime, and thus soften water, might be turned to account for the supply of towns with pure water; Mr. Way said that he had great hope that with the clue he now possessed, some material progress might be made in the elucidation of the action of lime itself upon soils, which he had reason to believe was closely connected with the phenomenon which he had that day had the pleasure of explaining.

On the motion of Mr. Fisher Hobbs, seconded by Mr. Paine, the best thanks of the meeting were voted to Professor Way, for his kindness in delivering another lecture before the members, and for the newly discovered and important agencies of the soil, in reference to manure, which he had so ably explained to them on that occasion.

THE MAKING OF COMPOSTS.

I have come to the method by which I increase my stock of manure—partly from experiments of my own, partly through the reading of Agricultural journals, and partly through the suggestions of some friends. At any rate I have found that method highly successful; and I am most willing to give a full account of the way I proceed, hoping that other farmers may benefit by it, as I have done.

First of all, I have tanks, tubs, &c., in which I collect all the urines, the liquid manure, and the rain-water—the more the better, as long practice has taught me that nothing is better; and to the farmer it is a real treasure, which increases in value the longer it is kept. This liquid manure is required for the making of solid manure. However, should it be difficult to collect liquid manure, a mixture may be made which might replace it. In that case, rain water should be collected in tanks, the surface of which should be large, whilst their depth is small, so that the sun and air may act the sooner upon it, and hasten its corruption. In this water I throw weeds, useless roots, green plants, rubbish of all kinds. I would especially recommend for that purpose euphorbia, tamarisks, and all lactiferous plants. In winter, when such plants cannot be procured, I replace them with the leaves of evergreens, such as pine, fir-tree, box, ivy, moss, etc. To the mixture thus prepared I add quick-lime and sal-ammoniac, in the proportion of 10 lb. of quick-lime and 5 ounces of sal-ammoniac, to about 200 gallons of liquid. Although I mention these proportions as those I have made use of, yet what I say must not be taken as an absolute or general rule: each man must act according to his own resources, and his own wants. What I wish to show is merely the principles for the application I have made of it may often; be far from being the best. I will further remark that the tanks should not be too deep—about four feet is quite enough; and the several reservoirs constructed should be placed a little elevated

above the adjoining one, so that the contents of the first may be easily emptied into the second, and so on.

We are now in possession of one of the necessary elements in the manufacturing of my manure; and I will suppose that we have either liquid manure or corrupted water, prepared as above stated, in sufficient quantity.

Suppose, then, that we wish to make about two tons of manure: for that purpose I begin by taking 200 gallons of liquid manure, or of corrupted water; and to this I add—

200	lb.	of human excrement, or urine.
50	—	chimney-soot.
400	—	dry lime.
60	—	limestone.
20	—	wood-ashes.
2	—	sea-salt.
1	—	salpetre. (In all, 783 lb.)

To this mixture add 50 lb. of the ferment kept from the preceding operation: but, in case this is the first time that you have thus prepared manure, you must increase by one-fourth the quantity of each of the solid substances mentioned above, making the entire mass 916 lb. If the soil be light and sandy, I have often found it expedient to add some clay, in order to give greater consistency to the liquid mixture, and more firmness to the manure.

I will tell you how to do, if you cannot procure some of the matters I have mentioned. Instead of 200 lb. of human excrements, you may put 40 lb. of fermented barley or buckwheat, or 100 lb. of sheep-droppings, or 200 lb. of pig or cow dung: 100 lb. of burnt soil will replace the 50 lb. of soot, and 2 lb. of potash will do instead of the 20 lb. of wood-ashes. It is better to put rather more than less of these different elements; and I need scarcely say that it is well to add to the mixture the poultry-yard manure, pigeons' dung, rape-seed cake, and such other beneficial substances as can be procured with ease, and without great expense.

The place in which to mix these ingredients must be chosen near the tanks, and it should be paved, in order to lose as little as possible of the liquid; and it is important that it should be on such a slope, as that the liquid running from the watered manure may fall into a cask or tub placed at the lowest part of the slope. Part of this liquid may be kept, to be used as a ferment in the ensuing year. I must not forget to mention that the liquid manure should be often thoroughly mixed by means of a curved spade. Monsieur Jauffret, a French agriculturist of note, from whom I have borrowed part of this process, used to build up his manure on a wood grating, through which the liquid escapes more easily, and the action of the air is increased. The same result will be obtained by employing small bundles of branches and wood, upon which the manure may be constructed. To make the manure, all kinds of young shrubs, leaves, reeds, &c., can be used, together with straw. A bed of common grass will be often required to increase the fermentation. If you have sufficient time, I advise you to cut the straw; and as for the ligneous matters, such as whins, small roots, &c., their length must not exceed 8 or 9 inches.

Everything being ready, you may build your manure-heap about 21 feet long, 8 in breadth, and 7 in height. This is merely an average size, and it is quite evident that it will be of no consequence if the heap should be a little larger or smaller. Next put a bed of straw, reeds, &c.—over the branches, &c., which are laid upon the ground—about one foot thick; then water it thoroughly with the liquid: if possible, it is better to soak the dry elements of the compost in the tanks, and, as you take them out, build them upon the heap. Then lay a second bed, another foot thick, and water it as before, and so on, until the heap has attained a sufficient height, when you may have it well trampled down. Each bed having been separately trampled, then spread on the top the mud that is found at the bottom of the tank, after which you cover the whole with a bed of soil or chaff a few inches thick.

On the fifth day after these operations have been completed, the manure will be pretty well drained, and you may then turn it over, so that the top of the old heap be the bottom as the new. This being done, you have the heap watered as thoroughly as possible, and then immediately covered, as before, with a bed of soil or chaff.

On the seventh or eighth day the compost will begin to smoke, especially in the morning, and a strong smell of manure will be felt. You then bore holes in it with an iron auger an inch and a half in diameter, and about 5 feet and a half in length—the holes must be 3 feet deep, and 6 or 7 inches distant from each other—and you then water the heap with liquid manure through these holes, and immediately afterwards close them, merely by the pressing of the foot, when you lay a new bed of soil or chaff over the whole compost.

On the ninth or tenth day you bore new holes, deeper than the first, and, as much as possible, in different places; you then water the heap by these new holes, and have them closed in the same way, and lay a new bed on the top formerly. It is to be remarked, that all these new beds are themselves soon converted into manure by the watering, and the fermentation of the compost. If the compost is merely made of straw, you had better stop the fermentation at 134 degs., and that, by means of an abundant watering; but if there be any woody matter amongst it, let the fermentation go on to 183 degs. In this manner the compost is prepared, and ready to be used at the end of a fortnight in summer, and of three weeks in winter. Although, by

being often watered, the manure will keep for any length of time, it is better to make use of it as soon as it is ready.

I have sometimes made use of the liquid contained in tanks in another way, which I have found to be very beneficial. I had a heap of loose earth, which was watered from time to time, and thoroughly mixed by means of a mason's shovel, handled by one man, whilst another with a spade cut the edges, and threw them into the heap. When once the mixture was well prepared, I put it in a heap, and had this new kind of mortar spread in very small quantity over some natural meadows, in the month of November. Although it became very dry by being long kept, it was broken into small bits with the greatest ease, and thus spread upon the land.

Instead of waiting a long time for a compost, as I am obliged to do by the ordinary process of preparing it, I have made, in the space of twelve days, a very good compost in the following manner:—I spread a bed, one foot thick, of my manufactured manure, then a bed six inches of over seven or eight feet in height. Immediately over it a bed of loose earth, over which a bed, one foot thick, of farm-yard dung, six inches of loose earth, and so on, until watered by means of holes bored in it in the way I have before described; and having repeated the waterings three or four times, I obtain a compost, of the very best description, in the course of about a fortnight.—*Quarterly Journal of Agriculture.*

JERSEY CATTLE.

Colonel Le Couteur, Aide-de-Camp to the Queen, and Viscount of the Island of Jersey, presented to the Council a lithographic impression, from two beautiful drawings, made by himself, of a bull and a cow of the Jersey breed, on which were marked the "scale of points," approved by the Royal Agricultural Society of Jersey at their general annual meeting in January last, as constituting perfection in their peculiar and well-known breed of dairy cattle, and as furnishing to their judges a simple and definite process for arriving at satisfactory conclusions in making their awards. Col. Le Couteur entered into a detailed and very interesting statement of the character of animals, in which any one or more points specified in this scale were more than usually developed. The drawings then laid before the Council were not portraits of any particular bull or cow of the Jersey breed, but represented an ideal assemblage of individual excellencies occurring in different animals, and selected from the finest cattle on the island, collected together at Col. Le Couteur's farm for the express purpose in view, and carefully submitted to the inspection and comparison of the gentlemen who formed the special committee appointed by the Jersey Society to revise the "points" of their stock. Col. Le Couteur, in detailing the points thus agreed to by the committee, called the particular attention of the Council to some of those points found to be most intimately connected with the natural excellence of the animals, and the characteristic peculiarities of the Jersey breed, of which the island, in Col. Le Couteur's opinion, at that time contained some of as perfect specimens as could well be conceived. He remarked that the cows which had the inside of the ear tinged with a deep yellow colour were invariably found to yield butter of a rich orange colour, while those with ears of a lighter tint furnished butter of a correspondingly inferior quality, and of a paler hue. In the finest stock, too, the eye of the cow was soft and placid, while that of the bull was lively and full of fire. The "action" of Jersey cattle also indicated, not only their muscular power and their mode of employing it, but that general conformation and adaptation of parts which constituted excellence: a finely-bred Jersey animal, Col. Le Couteur remarked, ought to walk off the ground like a race-horse. By means of this determination of a standard scale of points, the labour and responsibility of the judges were much reduced, while their decisions almost invariably gave satisfaction; as, in the case of any difference of opinion, a third party being called in, the award was at once decided. During the 10 years that he had acted as Secretary to the Royal Jersey Agricultural Society, he had never known the occurrence of an absolute case of dissatisfaction. In reply to inquiries made by the Chairman and Colonel Challoner, he proceeded to state, that no animal received approval excepting through the Society, the members being allowed a free exhibition, while strangers were required to pay an entrance fee; the number of points assigned by the judges being duly stamped on the horn of each animal. Colonel Le Couteur, in reply to further inquiries, admitted that this guarantee of merit might, by unprincipled dealers, be imitated for the purpose of deception. At the present time, many animals were easily passed off as of the true Jersey breed, especially those of black, or black and white colour, from Normandy, and others from Brittany, which were very inferior, as dairy stock, to the genuine animals of that breed.—The Chairman wished to know how the term "Alderney" had been generally applied in England to the Channel Islands' cattle, and whether the animals of that island possessed advantages over those of Jersey or Guernsey.—Colonel Le Couteur said that, on the contrary, there was at the present time scarcely an animal in Alderney that he would think worth purchasing. He explained that that island had belonged to his great grandfather, who introduced into it a great number of the Jer-

sey cattle, which, however, from the inferiority of the pasture, soon deteriorated from the original stock.—Colonel Le Couteur, Mr. Parkins, and Mr. French Burke, then cited particular instances of the great amount of butter yielded by dairy cows, during the flush of grass in May and June, or throughout the year, if fed in a particular way, and tended with great care, namely, 16lbs. a week in those months, or 1 lb. a day in other cases during the year. Colonel Challoner then stated the case of a finely-bred handsome Jersey bull of his own, which, though perfectly healthy and fat, had his skin constantly affected with a yellow powder or scurf of a deep orange colour, especially within his ears and on his tail, a result he could only attribute to an abuse made of him by parties to whom he had been good-naturedly lent.—Colonel Le Couteur then expressed the great pleasure it would at all times give to himself, as one of the Governors of the Royal Agricultural Society of England (or to his successor in the office of Secretary to the Royal Agricultural Society of Jersey), to receive applications from any of its members who required advice and aid in obtaining the best dairy animals which that island could produce. He had had last year the satisfaction of freighting a vessel with 33 head of such stock, to a gentleman residing in Scotland, which arrived in perfect safety, and maintained the high character of the Jersey breed.—The Chairman referred to a challenge given by Mr. Villebois, one of the Governors of the Society, to the county of Bucks, in which he resided, in favour of two of his dairy cows of the Channel Islands' breed, which had produced him both milk and butter of almost unexampled quantity and quality.—Mr. Alcock, M. P., remarked that it would be highly desirable, if in the case of other breeds of cattle, a similar scale of points could be established, in order that the doubt and difficulty of the judges, and the frequent dissatisfaction of competitors, might be removed by the adoption of such a defined standard of adjudication as would have the effect of limiting and defining the conditions of merit in the competing animals.—Colonel Le Couteur stated, that when some years ago he had shown to the late Earl Spencer the scale of points for the Jersey cattle, his lordship expressed to him the desire he felt that such a step should be taken in reference to other breeds.—Colonel Challoner said that he could fully corroborate that statement, for he had the pleasure of being present with Lord Spencer and Colonel Le Couteur at the time it was made.—Mr. Burke remarked that he was also fully aware of Lord Spencer's wishes on that point.—The Chairman felt how highly desirable the adoption of so definite a system would prove; but at the same time he feared that our judges would have great difficulty in defining the required points, and unanimously agreeing to them.—On the motion of Mr. Parkins, the best thanks of the Council were expressed to Colonel Le Couteur for this kind offer on his part, and for the interesting documents and statements with which he had favoured them.

MANURE—ITS GENERAL AND PARTICULAR APPLICATION.

Lime ranks among the soluble manures, a fact which the preparation of lime-water fully establishes; but there are many other chemical salts that are completely soluble in water, and therefore, are qualified to act rapidly upon vegetable roots—such are the sulphates so opportunely noticed in Mr. Cuthbert W. Johnson's article in the last number. To these may by added the potent salt called soda ash, or British alkali, which, according to Dr. Fownes, "contains, when good, from 48 to 52 per cent. of pure soda, partly in the state of mild carbonate, partly as a caustic hydrate, the remainder being chiefly sulphate of soda and common salt." This chemical compound has, of late, been greatly extolled as destructive of the wire-worm; but of this I say nothing, as no positive proof of the fact has been communicated to me. The object which now should be urged, is the great necessity of further and more rigid analyses of the staple earths, and of the plants that grow upon them. Advances have been made, and numerous tables formed, by many able chemists; but the results prove so dissimilar that at present we are constrained to hesitate.

Guano, if pure and dry, not developing any odour of ammonia, ranks among the most excellent and comprehensive of partially soluble meliorators. Its soluble ingredients consist chiefly of sulphates, muriates, and phosphates of ammonia, soda, potassa, and magnesia, in varying proportions—uric acid and oxalic acid also in combination are often traceable. The insoluble bulk of the substance consists of bone-earth (sub-phosphate of lime), in a state of very minute division. This fertilizer will be again alluded to in its place. The point which now claims the cultivator's attention is the applicability of each individual saline material so as to meet the requirements of any cultivated plant, and herein consists the discovery and establishment of the *science of Agriculture*.

Liquids and solutions are always of doubtful application, because, if incautiously or erroneously administered, plants may be at once destroyed or seriously injured, of which we possess proofs in the pot-culture of exotics; but the case is different when we apply farm and fold-yard, and it may be also deodorized fecal substances; these contain all the elements which come under the second head of meliorators, and as not a particle of undecomposed solid substance can pass into the absorbments of the roots, there is little danger to be apprehended,

unless they are incorporated with the land in too great abundance. Farm-yard manure has stood the test of ages: if prepared with judgment, according to the principles established by chemical discoveries, it will contain all the elements of vegetable organization; and if by age, or improvident management, it shall have lost its ammonia, become too much carbonized, and, to a corresponding extent *effete*, it can be restored by guano, so far as the ammoniacal salts are concerned. And here, by the way, I venture to suggest that in this manner guano can be employed to the utmost advantage, and without any risk or danger to young seedling plants. All land possesses more or less of organic matter; it is indispensably necessary that it should do so, otherwise plants could not be supplied with those hydro-carbonous substances which constitute their bulk. Now, farm-yard and other decomposable manures when deposited in the ground (the deeper the better when the straw and other fibrous matter is little reduced) are converted by gradual fermentation into humus—that product of animal and vegetable decay which cannot be imitated by art, but which, by a sovereign law of nature, is inevitably present in all land that is duly cultivated. Hence, and by induction from observed facts, we must insist upon the incorporation of that manure which is supplied by the processes of the farm itself. Fermenting matter must be employed, and the ground is its natural recipient, for thereby heat becomes developed, gases extricated and retained, in a position where they are in close contact with the roots of either vegetables or shrubs, which thus can select and absorb such as are suitable to each. I can by no means admit the theory of Liebig so far as to restrict the nutrition of plants to the absorption of carbonic acid only, whether by the leaves, or by the spongiolets of the roots. The decomposition of humus, or of more crude vegetable matter, must evolve other gases: and as every plant will require hydrogen, and many the compounds of hydrogen and carbon, and of nitrogen, it follows that those gaseous products resulting from fermentation will be duly absorbed and assimilated.

It has been asserted that rotten dung contains more humin (the old name for humus), weight for weight, than fresh dung, and therefore, that if the fertilizing power of manure is in proportion to the quantity of humin which it contains; and if it can be proved that the quantity of this is as great in black spit-dung as in the more bulky form of unfermented dung, then the concentrated state would certainly be preferable in point of economy every way. The suggestion was plausible, and so far as mere top-dressings were concerned, might be correct; but as the preparation of humus in the heart of the soil at a considerable depth below the surface, is the object which ought to be aimed at, we claim the right to believe that every advantage connected with fermentation and its products, will be secured by that proper application of manures which retains the fibrous matter of recent compost heaps replete with animal urine.

I close this article, as land can be injured, and rendered almost barren by a redundant quantity of humus, by which, being glutted, it is made to approach the character of a peat bog, the only certain remedy which chemistry has instructed us to apply, will be quick-lime, reduced pretty nearly to powder, and thus incorporated in sufficient quantity with the soil. By the peculiar affinity with which it attracts and fixes the deleterious humus acid, it will, as before stated, correct the existing evil, and convert a poisonous agent into a gradually available manure.—*J. Towers in Farmer's Magazine.*

English Farm.—My next visit was to the county of Essex. I first called on a gentleman, to whom I was introduced, about seven miles from St. Paul's who farms 1000 acres, and who pays, of rent and taxes, £4000 yearly. Although a large breadth of wheat is raised on this farm, it is principally devoted to the cultivation of potatoes and vegetables for the London market. The tenant is a gentleman of large capital and of great enterprise, and conducts his establishment with judgment and economy. He keeps 80 horses for the labour of the farm, and for carrying the produce to the city; the tolls for which cost him £150 a-year. He employs an immense number of labourers, who are all, except his h semen, paid by piece or task work; the total amount of wages paid to them annually exceeds £6000. In 1846, he had 500 acres of potatoes under crop, which were taken up early, and sent to the market before any disease got amongst them, and it was said he cleared £15,000 by the transaction. He plants generally 400 acres of the Prince Regent and Early Shaws species, these being the kinds which bring the best price. Vegetables, such as cabbages and broccoli, of which last he has frequently 70 acres, are afterwards planted. He sows 100 acres of onions, a small part of which is sown in September; and should they stand the frost, which is not always the case, they are ripe in June and fetch a high price. The usual time of sowing is in March. The two kinds most approved are the white Spanish and the white or brown Globe; the former meets with the readiest sale, but the latter is the most prolific crop. 8 to 10 lbs. of seed are sown per acre, according to its soundness, which is always previously tested. The yield is from 250 to 320 bushels per acre, of 50 lbs. per bushel, and the selling price is from £3 to £4 per ton. The cost for weeding the onions is £3 per acre. The vegetables, after being reaped, are put in sheds for selection and assortment; and so much

value being exposed without being protected by lock and key, two night watchmen are kept on the premises. The former tenant on this farm was paid £130 a-year for taking away the dung and spent hops from the brewery of Hanbury & Co., who keep 120 horses; but a competition having arisen, the present tenant pays £50 yearly for the manure. The hops are little valued, and are mixed up with the dung, which they rapidly ferment, owing to their heat when carried away. The grains of the breweries are sold to cowkeepers principally, at 1s. 6d. to 2s. per quarter. No cattle except cows are kept on this farm, and the tenant sells the milk by contract to a public institution at 10d. a gallon—this being the usual wholesale price in the city—which is again retailed at 15d. The Londoners complain much, and not without cause, on the inferiority of the milk supplied to them; but this evil cannot be altogether remedied. Adulteration might, to be sure, in a great measure, be prevented; but, independently of the heterogeneous feeding of the cows, the grass evidently wants some of the properties requisite to produce really good milk, just as it is now ascertained that turnips grown in England are inferior in nourishment to those in Scotland. I was told by a suburban farmer that, the skimmed milk is so inferior that a great part is given to pigs, and, when sold, it brings a half-penny per quart.

Green Vegetable Manure.—This has been used for upwards of 2000 years, and in countries where the art of culture has been most attended to. Various crops have been sown with no other view than to be buried in when fully grown, to render the soil fit for crops of more importance. Every species of vegetable in a green state acts more or less as fertilizer, some probably more than others, according to their power of draining organic matter from the air, and inorganic from the subsoil. It is therefore, no detriment to the soil to be covered with weeds, providing they are not allowed to seed, and that they be dug into the ground, instead of being hoed down and raked off, which latter process is a direct robbery of the soil. Green vegetable manure is most effective on the light sandy soils, and least so on peaty lands. It is surprising how much valuable manure is wasted in gardens by carrying it to the compost heap, instead of at once burying it in the soil; and how much is lost or neglected in woods and waste places, from mere indolence, or from want of knowing that rampant nettles and rank growing plants, such as tansey, mugwort, prickley, comfrey, constitute a great amount of the food of plants. Tree leaves and the mowings of lawns are valuable manures, and far too seldom turned to useful account. For using green vegetable manure it should be applied as soon as possible after it is cu Many crops might be sown for the express purpose of being dug in when at their full size, and of all garden plants, perhaps there is none better than borage, which yields a very heavy weight of crop before perfecting its seeds.—*An Amateur Gardener.*

Stables, should invariably be made for a single row of horses only; as when double, the horses are apt to kick one another, to become overheated in summer, &c., and there is more trouble in getting the harness conveniently hung up. The stalls should be made from 5 feet 6 inches, to 6 feet wide, according to the size of the horses kept; the stall boards 9 feet long, and 7 feet high at the horses' heads; the beds 10 feet long to the strand or gutter; the passage behind 6 feet broad, and the height 9 feet to the loft floor, if there is one, or the walls 9 feet high if there is not. A recess should always be obtained if possible, for the corn chest, spare harness, &c., the manger should be 2 feet long, 1½ wide, and 1 deep, placed in the left hand corner, and if of cast metal with a bar across the middle to prevent the horse from throwing out the food with his nose, so much the better; the rack should extend from the manger in a *line with it*, instead of being placed overhead as is usual, and should be made of spars 3 inches broad, and reach within 6 inches of the ground, and being only 3 feet high, a horse is enabled to eat his fodder in the same manner as he grazes, and this is surely more natural than looking up to the hay loft, like the fox to the grapes, with hay seeds constantly falling in his eyes and ears. A few loose boxes should also be provided for in-foal mares, rearing stock and invalids.

Having the conveniences, &c., farmers may then proceed to breed and rear good stock, and it is of importance that they bear in mind the following ascertained facts—that foals receive *two-thirds* of their character from their sire, and only *one-third* from the dam—hence the importance of breeding from superior males. It is also well known that the sire from which a mare *first* breeds, gives *his* impression to all subsequent stock bred from the same mare by whatever horse. Old mares, *i. e.*, mares over nine years, also breed more wiry and lasting animals than younger mares, and a large number of the great winners on the turf have been out of *very old* mares—therefore avoid young brood mares, and small boned animals—also *blood* stock, which is little better than gambling in the hands of a farmer, and never pays. Feed mares well while they are in foal; but keep them principally on scalded bran, boiled turnips, barley, or linseed, for some weeks before their time of foaling is due. Captain Apperly, the well known writer on horses under the name of "Nimrod," says, "one half a horse's goodness goes in at his mouth," therefore feed your colts

well, and, if possible, graze them when one and two years old, on low marshy land, as it suits their constitutions, and grows their hoofs into proper size and shape. Good keep in winter is also of as much importance, and is repaid both by the size and form of your stock, and the increased value of their dung. Having proceeded on these principles, a good sound-constitutioned stock will be obtained, ready for gentle work on the land, but not on the road. At three years old and at four years old, though frequently receiving a check from changing their teeth, they are ready for full work and keep; and, if all right and sound at five years old, they may so continue, if well guided, until they are fifteen.

APPLES TREES, PLANTING, SOIL, &c.

The best soil for apples is a sound, good loam; and if this runs down a couple of spits deep, the ground will simply require trenching. If it is hungry or bad, gravelly or sandy near the surface, the soil must be taken out, two feet deep to do any good, and be replaced with better. If, as it is almost always the case, the top surface for some little depth is good enough for ordinary purposes, the best way to manage is, to throw out from a three or four feet circle the top or good spit or half-spit, as the case may be, to a heap, and dig out the remainder to place on another heap, so that you may pare the top spit all round for some distance to fill up the hole with, and spread about the bad or hungry soil; for, as the tree covers the space in time, and little good comes of the crop under trees, it is better to let the tree have all the benefit. Let the trees be carefully taken up, and if there be any of the roots that strike immediately downwards, cut them off, or at least shorten them considerably before planting. Let all the bruised or damaged and broken ends be cut off with a sharp knife; for nothing tends so much to neutralize the growth of a plant more than damaged roots. Let the holes be filled up to almost a heap; spread the roots all round upon the soil when you place the tree in the ground, and the collar of the plant should be rather above the level of the soil, because however it may be trodden down the earth will settle lower. The ground should be prepared all over before the trees are taken up, so that when they are removed, the roots may not in any way dry, even at the most tender extremities. Supposing the earth to have settled a few days, the holes for the roots have not to be dug very deep, only just enough to admit the roots without bending or breaking them; and selecting a fine day, with the earth in good condition, bruise the soil well to go into the roots, and as it is thrown in by your assistant, lift the tree and shake it or swing it downwards from one side to the other, so that the crumbs of earth may go between all the fibres, and the whole be trodden solid. In treading them in, remember that the principal place to press the earth down is close to the end of the roots, and not close to the trunk; and when they are fixed, drive stakes down into the ground to hold them fast by means of wisps of straw round the trunk and reversed or crossed between that and the stake, and tied with sack-ties or rope-yarn at the end outside the stake, so that the trunk is grasped firmly by the straw, and the straw being crossed is made to grasp the stake as firmly, and the ends opposite tied fast; care must be taken to drive the stake deep enough into the ground to be firm and steady, that the wind shall have no power over it. The distances for trees in an orchard should be not less than thirty feet; but if the ground is to be used, the trees should be thirty feet apart in the row, and the rows fifty or sixty. In small gardens and limited grounds, where we have no permanent interest, and want immediate advantage, they may be much closer; in fact, so long as the trees have room to grow into bearing, we may limit them, by pruning, to any size we please, because the standard tree may be controlled as easily as a wall tree. Planting espaliers only differs in the form of the tree and the distances; twelve feet apart will do for espaliers in a limited garden, although they could be extended to meet at double the distance. Many have railing on purpose to train espaliers on, but stakes driven into the ground upright in a straight line will answer the purpose; the trees are bought trained on purpose for walls or espaliers, and when planted you have to tie the lower two strong branches horizontally within six inches of the ground, and leave a centre branch, which may be cut to a foot in length, of which the top three eyes may be allowed to grow, two to train out horizontally again right and left, and the third to grow upwards to be cut down to a foot in length, to be treated in a similar way. By this means a good pair of horizontal branches may be made every season until the tree is as tall as it may be wanted. If, however, the tree has been trained a year or two before you have it, you may save all the branches, and bring them down as nearly horizontal as you can; for a well-trained tree, well removed, will be in bearing directly. Espaliers are adapted to limited kitchen gardens, as they may be planted close to the paths, or at the back of borders, next a path, they may be made to separate the quarters, and they seem to occupy no available space.—*Hort. Magazine.*

Riches are but ciphers; it is the mind that makes the sum.

It is the great art and philosophy of men, to make the best of the present, whether it be good or bad.

ON THE AGE OF TREES.

Trees may be considered the most permanent of all natural productions. They exist (as the following list published by Moquin-Tandon in his *Teratologie Vegetale*, translated from *Schleipen's Principles of Scientific Botany* shows) after the most stupendous works of man have crumbled into dust. The following are the ages computed by that intelligent botanist:—Palms exist from 200 to 300 years; Ceresis 300; Cherodendron 327; Ulmus (Elm) 355; Cupressus (Cypress) 388; Hedera (Ivy) 443; Acer (Maple) 516; Larix (Larch) from 263 to 576; Castanea (Chestnut) from 360 to 626; Citrus (Lemon, Orange, &c.) from 400, 509, to 640; Platanus (Plane) 720; Cedrus (Cedar) from 200 to 800; Juglans (Walnut) 900; Tilia (Lime) from 364 to 1076; Abies (Spruce) 1200; Quercus (Oak) from 600 to 1600; Olea (Olive) from 700 to 2000; Taxus (Yew) from 1214 to 2880; Schubertia (Toxodium) from 3000 to 4000; Leguminosæ from 2052 to 4704; Adansonia (Baobab) 6000; Dracœna (Dragon Tree) 6000.

The ages some trees have attained are even very considerably greater than those, and some in our own country may have existed from 1000 to 2000 years. Pausanias the historian who flourished about the middle of the second century, mentions a plane tree of extraordinary size and beauty in Arcadia, supposed to have been planted by Menelaus, the husband of Helen, which would make the age of the tree about 1300 years.

The date upon which Moquin-Tandon founds his calculations are two; and are thus given in "*The Gardener's Magazine of Botany*," &c., for last month, viz., "first from historical data, and second from counting the zones." Thus, the colossal Dragon tree of Oratava is known to have existed, in almost its present condition, in 1402; and comparing it with the younger trees in its neighbourhood, its vast age is inferred. The yew trees at Fountains Abbey in Yorkshire, are known to have sheltered the Monks whilst the Abbey was building. The Abbey is now in ruins, but the trees retain their vigour; the lowest age that can be assigned them is twelve centuries; they are probably much more. But where trees have been cut down, the method of counting the zones has been had recourse to. There is no difficulty in this, when the tree is sound; but in many instances, the older trees are the more likely to be decayed in the centre. The plan then adopted is, to take a square inch, count the zones in it, multiply this number by the number of inches from the bark to the pith, which will then give the whole number of zones, and the age of the tree. The number, however, thus obtained, can only be looked upon as approximations to the truth, seeing that the zones of wood vary very much in thickness, not only one with the other, but in parts of the same ring.

Size is no indication of the age of a tree, as various species grow at very different rates, and the same species under different circumstances. The following table shows the different rates, at which some common trees grow:—

	1st Year.	2d Year.	3d Year
	Ft In.	Ft. In.	Ft. In.
Oak. circumferance,.....	0 10½	0 11½	1 0½
Larch,.....	1 0¼	1 3	1 4
Elm,.....	2 7½	2 9	2 11
Lombardy Poplar,.....	1 8	2 0	2 3¾
Lime,.....	1 8½	1 10¾	2 0

Some trees attain an enormous size by their rapid growth. Species of Eucalyptus have been measured that reached a height of 250 feet, and measured 70 feet round their trunk.

The death of trees does not appear to arise from any natural period being assigned to the existence of their living tissues, or reproductive powers, "as conjectured by the late Thos. And. Knight." When the tissues of a tree are very old they loose their vitality, especially in the centre of the trunks of the trees; and being exposed to the atmosphere, or moisture, they readily decay. The process of new growth is sometimes more rapid than this decay, and thus trees exist with enormous cavities in their interior. The time, however, comes sooner or later, when a separation takes place between the roots and branches, and then the tree ceases to exist, although the tissue that has been conveyed away from it, in the form of slips and grafts, may still continue to flourish. The number of zones in trees will probably give a tolerable approximation to the years of growth in temperate climates; but even here, two may be formed in one year, if any great check of the growth suddenly occurs during the summer. In tropical climates the indication is far more doubtful; Adanson's computation, made in this way, carpied the age of the Baobab's to from 5000 to 6000 years.

AN OLD SCOTCH GARDENER'S VISIT TO A LONDON ASPARAGUS GARDEN.

I called upon Mr Grayson, gardener, Mortlake, in June last, in order to see his asparagus grounds. He is reputed (and justly I think) to be the largest and best grower in England; he has upwards of 50 acres under this crop—a bundle of it containing 150 buds, weighing 37 lbs., was some years ago sent to Buckingham Palace, on the 11th June. I made some inquiries as to the management of it, and was informed that he prepared the ground well by heavy dunging, &c., before planting it; but after this nothing farther was done, unless throwing down the ridges in the fall, and putting them up again early in Spring. Some parts had been upwards of 20 years down, and here the ridges stood highest; the reason for this, I was told, was that the longer it stood the more soil it requires put upon it, as the roots had a great tendency to draw upwards. I said I thought it might do with much

less as I could not see the use of cutting it so long, as at least the one half was unfit for use; the reply was, that it was the custom, and that it would not take so well in the market, if cut short. About 80 people are here employed during the season; it is not uncommon to see upwards of 20 cutters at work at the same time—then there are carriers, porters, tiers, and packers. The instrument used for cutting it is called a knife, but might as properly be called a saw; it is a rod of iron about 15 inches long, ¾ of an inch square, having a wooden handle, with 3 inches at the other end flattened out to an inch or more in breadth, set with teeth. This, I consider a good instrument, as by setting it right down by the side of the bud, you are not so apt to cut the heads of those coming up, as with the knife in general use in Scotland, and by which much good grass is destroyed unseen. I may also state that *all is cut; none, however small, are left*—this I said was not the practice in the North, as it was considered better to leave the small for two reasons, that it would not pay the trouble, and also that it was considered better for the plants not to cut them so close. This was granted, but if they were to say to the cutters, you must leave so and so, some of them would leave too many, others too few, so that they just cut all, and stop short a little sooner, and let all that come afterwards grow up. It is all sent to Covent Garden, and during the season, *a three horse waggon load is sent up every morning* from this garden alone, and here I saw them selling it. The smallest is, here, called *ware*, and is put up in bundles of from 300 to 400, and sold so low as 1s. This is used principally for soups; the general run of it sold at from 3s. to 5s. per bundle of 120. It is all assorted into four different sizes; one very large picked bundle of 150 buds, brought 25s., and here, I may remark generally, that all vegetables and fruits brought to the London markets are more assorted, both in regard to size and quantity, and I must say, a great deal more pains and trouble taken with them, so as to bring them to market in the best possible condition, than in our markets at home, and hence the great diversity of price, as with the asparagus (or, as it is there called, *grass*, every word being cut as short as possible), so it is with all other things. They have it to answer all sorts of customers as far as possible. The quantity here from one grower, in one day, I believe, is greater than what comes to Edinburgh market during a whole season. I am aware that many will have doubts as to the truth of what I say; should any such visit Kew Gardens, they can, by a quarter of an hour's walk from them, see the ground referred to, or in Covent Garden during the asparagus season, by going to the south-east corner of the market in the morning, they will see the waggon, and although as I have, said, Mr Grayson is considered the greatest grower, no one can make a run out of London in any direction for a few miles, but will see a large portion of garden ground under this crop, about 500 acres. What becomes of it all is, no doubt, surprising, and more especially to any one who has not been in London; this, however, will be considerably lessened, when they consider that it contains nearly as many inhabitants as the whole of Scotland, where not one in a thousand ever tasted it; there, not one out of the same number but has; besides, great quantities are sent all over Britain. It is not uncommon for the dealers in the market to have orders from a single eating house daily of from 1200 to 1500 heads. I have seen in the same market one man bringing in a threehorse waggon load of turnip radishes alone, and was told by Mr Lee. a respectable market gardener that I visited in June last, that he had sold to hawkers and sent to Covent Garden during the season upwards of 30,000 pots of musk plant. (*Mimulus moschatus.*)

CHEERFULNESS.—Persons who are always innocently cheerful and good humoured, are very useful in the world; they maintain peace and happiness, and spread a thankful temper amongst all who live around them. He that does not know those things which are of use and necessity for him to know, is but an ignorant man, whatever he may know besides.

SEEING WITHOUT SIGHT.—Let a man have all the world can give him, he is still miserable if he has a grovelling, untutored, undevout mind. Let him have his gardens, his fields, his woods, his lawns, finely ornamented for grandeur and gratification, while at the same time God is not in all his thoughts. And let another man have neither field nor garden; let him look only at nature with an enlightened mind, a mind which can see and admire the Creator in his works, can consider them as demonstrations of his power, his wisdom, his goodness, and his truth; this man is greater, as well as happier in his poverty, than the other in his riches. The one is but a little higher than a beast, the other but a little lower than an angel!

It is truly a most Christian exercise to extend a sentiment of piety from the works and appearances to the realities of nature. It has the authority of the sacred writers upon its side, and even our Saviour himself gives it the weight and solemnity of his example. "Behold the lilies of the field: they toil not neither do they spin, yet your Heavenly Father careth for them". He expatiates on a single flower, and draws from it the delightful argument of confidence in God. He gives us to see that taste may be combined with piety, and that the same heart may be occupied with all that is serious in the contemplations of religion, and be at the same time alive to the charms and loveliness of nature:—*Dr. Chalmers.*

Agricultural Journal

AND

TRANSACTIONS

OF THE

LOWER CANADA AGRICULTURAL SOCIETY.

MONTREAL, JUNE, 1850.

An "Agricultural Education," or Education suitable for Agriculturists, should, we conceive, be provided for the children of the rural population of Canada. If the Government and Legislature have any thing to do with providing for the education of the people, surely there could be no reasonable objection that the system of instruction should be such, as would be the most useful for each class to whom it would be imparted. In almost all the Nations of Europe, including the British Isles, Professors of Agriculture have been lately introduced in their Colleges. This is one step in the right direction, and giving something like an equal chance to Agriculture, as to other business and professions. The first and most important of all professions, has been long enough left to shift for itself, so far as regards a suitable education for it. Since the failure of potatoes, and the casualties to which wheat is liable, parties begin to think that it may be necessary, that the art of providing food and clothing for the human family should be better and more perfectly understood, to secure a contant and full supply and prevent the calamity of a famine and all the misery experienced in Ireland and other places, the last few years. If there is any moral obligation upon us to practice any art in perfection and to the best advantage it is Agriculture, because it is to a Bountiful Creator we look for the increase and the plentiful harvest, and we are scarcely ever disappointed in our hopes, in proportion as we have done our duty properly. In almost every other business it is our fellow-man that we hope will reward our skill and our efforts, but it is the Almighty alone who rewards the skill and industry of the husbandman, by an abundant produce of crops and of cattle. There is great encouragement in this idea to the Agriculturist, that it is upon the bounty of his Creator he is dependant, and not upon the inconstancy and changeable fancies of man. It is upon these grounds that a feeling of independence, and superior station should be natural to the husbandman and it is also upon these grounds that his education should be suitable for him as an Agriculturist, and to fit him for the station he should and is entitled to occupy in every community. It is time that Agriculturists should be furnished with all the advantages to practise their business, that other classes have had long ago. It is also time they should be educated for the station they ought to occupy. Farmers are considered as mere labourers by the class whom they so largely contribute to maintain. Useful knowledge, may be, and is power, to those who employ it to the best advantage. Farmers require the knowledge that would be the most useful for them in their business, as well as that which would be required to fit them for their station as respectable members of the community—and both should be imparted wherever it would be possible.

Next in importance to Agricultural Education, is the establishment of Model Farms. We would not hold out any inducement for their establishment, except that they might be made a certain means of giving practical instruction to youth in the art of Agriculture, and afford encouragement to farmers to adopt an improved system of husbandry, by seeing the effects produced by it on Model Farms. This should be the sole object of their establishment. We do not hold out any prospect of realizing any other profit by them. Under judicious and competent management, they might be made to pay their own expenses,

and perhaps, the interest of the capital invested, but we do not believe they would do more than this, and we should not expect it. The country should be well contented if it paid no more than this, for producing the improvement of our Agriculture, and thereby the prosperity of the rural population. The experiment is intitled to a fair trial, and we humbly conceive that at least two or three Model Farms should immediately be established in Lower Canada, one in Quebec, Montreal, and Three Rivers. The quantity of land for each should not, if possible, be much short of 500 acres, even though half of it should be woodland. There would not be any risk, of a loss being sustained, should the farms have to be sold at a future period. The improvements made would be security against this. It would be desirable that sufficient land should be secured in the commencement, should the plan succeed as it must do. Five hundred acres of land would be required for a District Model Farm to show every branch of husbandry in full operation. The expense need not alarm this fine Province, for if she would not be able to bear it, she is far below our estimate of her. We would not propose, that what is understood in Britain as "High Farming," should be the system adopted at Model Farms. A good and judicious system of Agriculture, that every farmer might adopt upon his own farm, would be the most proper and most useful, and the most likely to attain the object sought—the general improvement of Canadian Agriculture. We cannot say, what the land might be purchased for, or what description of buildings might be upon the land, but we are convinced that no farm that is purchased will have buildings suitable exactly for a Model Farm, without alterations, and additions being necessary. We must also be prepared to find the land requiring much improvement, before it can be brought into a state of proper cultivation, and put into a judicious rotation of crops, yielding profitable products. But in the progress of accomplishing all this, the very best instruction will be being imparted to those employed upon the establishment, and to all farmers who may come to visit it. We must not expect that the moment land is purchased for a Model Farm, there is nothing more to be done but enter upon it at once, and commence a perfect system of Agriculture, rotation, and ample products, with a stock of dairy cows in full milk, and yielding a large return in cheese and butter. The first year will be necessary to put all things in good working order, and provide suitable stock and implements. It would be difficult to provide much manure the first year for a large farm. Indeed, we believe, should a farm be purchased for this purpose, the most judicious plan to adopt would be, to summer-fallow all the land that would not be fit to produce a profitable crop the first year. This would be bringing the land at once into a state of fertility and productiveness, and affording opportunity to clean, drain, manure, and seed it down with the crop for grass, in the course of a year. By no other means could this be so well, and so cheaply accomplished. We should say that there is scarcely a farm in the country that would not require to be summer-fallowed, to break up thoroughly and mix the soil, and take out all roots of weeds. In general, farms have been continually ploughed in the same direction, the same furrow-slice turned over in the process of ploughing, and hence the soil is never thoroughly broken up, and pulverized as it should be. Summer-fallowing, draining, and subsoiling, (where it could be done to advantage) is actually necessary in most Canadian lands. This process, properly executed, would increase the depth of the soil, open it to the influence of the atmosphere, and act most beneficially in fertilizing the soil for future production. As this matter

of Model Farms may come under the consideration of the Government and Legislature, we think it our duty to submit our humble views on the subject as Editor of this Journal. It would be wrong to hold out any encouragement for the establishment of Model Farms that would not be likely to be realized. We humbly conceive that, the general good that they *must* produce to the country under *judicious* and *competent* management, would amply compensate for the pounds shillings and pence expended in their first establishment, without requiring any further profit. The capital expended would be secure in the land, stock, and implements; and the farm, we have no doubt, would pay its own expense,s together with the interest of the capital employed.

Every farmer should make as much manure upon his own farm as possible, and he will find it far the cheapest manure he can obtain. Their are various ways of increasing the manure upon a farm, if they are only employed judiciously. As regards liquid manure, we conceive the very best and cheapest way of saving it, on ordinary farms, is to provide the cattle and animals, of every species, with abundance of litter while kept under cover. The urine will thus be absorbed, and all that is valuable of it remain, in the manure or straw. It would be a great advantage, also, to keep the manure under cover while in the yard. In case that there are means for collecting the urine, perhaps it could not be better employed than thrown over the manure heap. According to Springel 30,000 lbs of urine contain only 2,250 lbs of manuring matter. Hence the application of urine is a very considerable expense and trouble, if it has to be carted far. If farmers would apply all their straw to littering their animals, or as much as was necessary of it, there would not be much necessity for liquid manure tanks, nor would farmers suffer much loss from not having them. There is certainly a great waste of manure in most farm-yards in Canada. Indeed manure would appear to be no part of the farmer's care or attention, nor would it seem that he thought manure necessary. On very many Canadian farms, there is not one-fourth of the manure made that should be made. The cattle eat all the straw, and if any stray particles happen to remain in the manure after it is thrown out of the stables, they generally eat it also. Compost heaps might be made upon every farm, that would greatly augment the quality of manure. Upon these heaps, any urine that could be had, might be thrown to advantage. It is in the summer compost heaps should be made. Materials can be easily collected; moss, clay, road-scrapings, lime, ashes, weeds, dung, salt, in fact every substance that can be collected might be made use of. Farmers convenient to towns and villages may, and should collect all the manure they can obtain, but those at a distance from such supplies, should endeavour to have abundance upon their own farm, *and they might have it.* There is no farm under good management that could not supply the manure required; perhaps with the assistance of summer fallow, and ploughing in green manure. There is no excuse for allowing farms to be exhausted, and deteriorated, as there are always means to prevent deterioration. The great want here is skill and capital; and one is as much required as the other. The deterioration and exhaustion of the lands of Canada, should be prevented by all means, and this can only be done by supplying manure to them in proportion to the crops taken from them annually. We regret to say, that in many cases, the crops are very small, but we are convinced that the manure applied is proportionably smaller. Keeping cattle, to consume the straw on the farm, and not giving them other food, cannot keep the land in a proper state of fertility. Our system of farming in a great part of Lower Canada, requires a very great improvement, and to effect this improvement should

be the principle object of solicitude with a paternal government. This country is circumstanced differently from the British Isles. In the latter country, the great landed proprietors have an interest in promoting Agricultural improvement, and will be sure to do all that is possible for it. We have no such proprietors here, and unless the government and Legislature take the matter up, we do not see any great chance of the necessary improvement to Canadian Agriculture. It may be very convenient to leave this matter to private enterprise or private interest; but in that case other interests besides those that are private will be sure to suffer for the neglect. It may be presuming too much for us to speak so plainly on this subject, but we should not act justly to the cause we advocate, if we did not state our convictions as to what is required to accomplish the object for which this Journal is published. We may be in error, but we can only be convinced of this by the most clear demonstration that we are so. This country has incurred a large expenditure on Canals, and purpose to expend more on them and on Rail-roads; and we rej e at it, but we would much prefer seeing those Canals and Rail-roads fully employed, transporting our own Agricultural products, than those of any other country. Canada is sufficiently extensive to yield products that would give a large business to Canals and Rail-roads; and there cannot be much question as to the profitableness of their being so employed, rather than in carrying foreign products. We offer no objection to the employment of our Canals, &c., in transporting any products they can obtain the carriage of. We only say we would prefer to have them employed on our own farmers' account. Parties may imagine Canada to be unfavourable for this, that, and the other production, but we are convinced it is as capable of producing the food of man and domestic animals, as any part of North America; and if it does not do so at the present, it is the fault of our system of Agriculture, the want of practical skill in the Science and Art of Agriculture, and the want of sufficient capital employed in farming.

AGRICULTURAL REPORT FOR MAY.

We have never seen the commencement of May more unfavorable for Agricultural operations than the present year, particularly when there had scarcely been any Spring work executed in April. About the 4th of May, the soil was becoming in good order for harrowing, but on the night of the 4th the weather changed, and continued to rain nearly forty-eight hours, producing very high floods in all directions in the neighbourhood of Montreal, and we believe very generally throughout the District, if not further. Never was the necessity of good drainage more manifest than this Spring. We may conceive the advantage that farmers possess in Britain on thorough-drained land, when they do not consider the drainage perfect, unless they are able to work upon it in a few hours after the heaviest rain ceases. We have seen plans of large farms, where every acre that its arable is thorough drained, and where lands that were previously waste are made arable by drainage. Upon thorough-drained farms, the Agriculturist may cultivate every species of crop, at the proper time and in the best manner. In fact he can grow what he pleases, and not allow any plant to grow that is not for his advantage. Thorough-drained land can be cultivated as a garden on a large scale, and may be brought to yield a produce of three or four times the value of insufficiently drained land. It is quite a pleasing and easy work to cultivate and manage thorough-drained land, compared with that which is not so. It never becomes hard by drought, or too soft by excessive rain. The rain passes through it and fertilizes it. The dews have the same effect. The air can also enter the soil, which is so necessary to the perfection of crops. In soil not thoroughly

drained the rain does not pass through it, but remains upon and in the soil, until evaporated by the sun and wind, leaving the soil so hard as to prevent all the good effects of the fertilizing qualities of rain to the crops. This renders the soil impervious to air and dews also—so that rain, dews and air, are comparatively of little use to growing plants on ill drained soils. This is not a theory of the fancy, but a certain fact, that can be proved by a reference to crops growing upon drained and undrained soils.

We are fully persuaded that there is not a greater defect in Canadian husbandry than the insufficient draining of the soil. Its ill effects are perceptible in all directions, from the commencement of the Spring to the end of the Fallploughing. In the sowing of the seed—in the growing of the crops—in the harvesting, and in the ploughing of the land in the Fall, all exhibit unquestionable proofs that the lands were not in the best state for working in proper season, or producing good crops. This may not apply to every quality of soil, but it will to much the largest proportion of the lands of Lower Canada.

The long protracted cold weather in May, has been severely felt by many farmers who had not provided themselves with sufficient winter keep for stock; and we have been told that in many instances the thatch of barns has been taken off to feed the cattle. It may be imagined what nutriment poor animals find in old straw that has been exposed as thatch for many years on buildings. One of the worst features of cattle keeping in Canada is—that very many farmers make no adequate provision for cattle either in summer or winter. In the summer they have to subsist in the best way they can, in ranging over land that was in tillage the year previous, and not sown with any kind of grass seeds or clover, or upon some wild wooded pasture. In winter, they have to live, if they can, on straw, or in fact upon what should be only considered waste fit for making manure; such is not the proper mode of keeping cattle with any hope of profit to their owners. Straw might certainly be made use of for cattle, if they also were supplied with a portion of hay or roots, but without this, it is absurd to keep cattle in our cold winters on straw alone. It appears as if farmers only kept cattle to consume what would otherwise be waste. In the British Isles, the *very best* of the lands are kept for the pasturage of cattle and sheep, and the best of the produce, with the exception of wheat and barley, is given to them in winter. They are, in these countries, considered the most valuable appendages of the farm, and regarded as the best paying part of the products. Our system is altogether faulty in Canada. We have had constant opportunities of seeing hay sold in the Montreal market for much less than its cost to the farmer. Indeed, for more than half the time we have been in the country, hay has been sold for so low a price, that the purchasers have not paid the farmer the price it cost to cut, cure, and take it to market, so that the land upon which the hay was grown, was in reality the property of the man who bought the hay, instead of the farmer. Under a better system this could never occur, and particularly if the farmer was in circumstances to keep over some of the hay of a plentiful season for a year of short crops, as they do in England. Under a judicious system of husbandry, cattle and corn, hay and pasture, are kept in due proportion to each other; hay is never sold at a very low price, while cattle, perhaps, are half starved upon straw; nor could hay be sold at a very high price if the large surplus of one season was kept over to supply the deficiency of another season; this would be more favourable for all parties, to seller and buyer. There is no excuse for farmers to be short of provender for cattle, when, by a little care, abundance might be grown on lands that are now left waste. When the season was too far advanced to grow a crop of grain that would be

likely to ripen properly, the land might be sown with oats, buck-wheat, Indian corn, or rye, and cut down green, (the oats when in ear), and dried and saved like hay. This would be much better than waiting for a late crop to ripen, and perhaps the whole be rendered useless by rust, except for manure. We propose this plan only for farmers who have not sufficient meadow, or other means of keeping properly a due proportion of cattle to the quantity of arable land. We wish we could convince farmers that it would be their interest to do this, and that the land might immediately be ploughed up after the green crop was taken off, and undergo a sort of half summer fallowing, as a preparation for a future crop; it would be much better to do this, than have it as at present, growing scarcely anything but weeds. A produce, we believe, equal to two or three hundred bundles of hay, might in this way, be raised per acre, at the cost of ploughing and harrowing once, and two or three bushels of oats or rye, or one of Indian corn as seed. Even one acre of roots, such as mangel-wurtzel, swedish turnips, carrots, or parsnips, would also be a great means of supporting the farmers' cattle given with the straw in winter, and this might be easily managed, and the weeding and hoeing be done by the farmer's family. We give the following extract from the "Farmers Herald," on the subject of growing oats for fodder for animals, in order to encourage farmers here to make the experiment:—"I cut a certain acreage of oats before any part of the straw ceased to be green and succulent; it was made into hay, not as hay is frequently made, by exposing it to bleaching, and the destructive action of sun and rain, but by putting it up into small stooks, as is done when the grain is ripe; it thus dried without exposure. This oat-hay was (of course not thrashed) given in the winter to sheep, cattle, and horses, and put in their racks, side by side with the best clover hay; the animals invariably preferred it to the clover hay, leaving that untouched; they throve well upon the oat hay, and its high nutritive qualities are confirmed by chemical analysis. I carefully weighed from the same field a like acreage of ripened oats, and its straw, and the money produce of both kinds is as follows, per Scotch acre:—

An acre of ripened oats gave 36 bushels, at 2s. per bushel,.....	£3	12	0
150 stone of straw, at 24 lb. to the stone, at 3d. per stone,.....	1	17	6
	£5	9	6
Deduct cost of thrashing,.....	0	7	0
Net value of the acre of ripened oats,.....	£5	2	6
The acre of unripe oats gave 205 stone of hay, at 24 lb. to the stone, value as compared with hay 10d. per stone, say 205 stone,.....	£8	10	10

Leaving an increased value of £3 5s. 4d. over the ripened oats, and in addition, saving all the risk of a bad harvest."

We can very well credit the above statement, and it certainly affords great encouragement to try this plan in Canada, where farmers, in many instances, have not sufficient meadow lands. We fear the weather will have greatly retarded the sowing and planting this spring; indeed we do not recollect during our residence in the country more unfavourable Spring weather. We feel this more particularly from the generally defective state of our drainage. Ill drained soil is cold, and becomes dried and baked with the heat and drought of summer, and impervious to air or moisture, unless in long continued rains. Every practical farmer knows the difference of crops grown upon the baked soil we have described, and those that would be produced upon well drained, well pulverised soils, open to air, dews, and moderate showers.

The foregoing part of our Report was written previous to the 20th of May, and we expected

that every day would bring a favorable change in the weather, but up to the 27th it continued extremely unfavorable, and it is a remarkable fact, that we have never seen the atmosphere exhibit any indication of settled fine weather, *for a single hour*, from the 1st of May to the 30th. If we had not a promise that never fails, of "seed time and harvest," we should have considerable cause for alarm, that so much of the Spring sowing remains unfinished at the latter end of May, as it certainly does this year. The worst feature of the matter is, that the ploughed soil will be overrun with the roots of grass and weeds before the seed is sown, and also that lands, remaining so long ploughed, perhaps very imperfectly drained, will become so saturated with moisture that the soil will run together and form a very unsuitable seed-bed, that when dried again will be nearly as hard as a brick. These are consequences that we may expect to result from the weather we have had this Spring. We must not despair, however, of having fair average crops, notwithstanding present prospects are rather discouraging. Farmers should do all in their power to have the seed put in, as well as circumstances will admit. We know that there will be much difficulty in executing the work properly in the short time that remains for doing it, and this is the greatest evil of late seasons, small capital, and high-priced labour. We believe that farmers this Spring have ventured to sow wheat early, where the soil was in a fit state for harrowing, and we hope they will not have any cause to regret having done so. They are, from present appearances, much more likely to have a good crop, than those who have not yet been able to sow. Early sowing would certainly be desirable if the wheat could escape the ravages of the fly, even with partial damage. The experiment will be fairly made this year, and if early sowing succeeds, we shall have cause to be thankful. We have sown at various times from the 20th of April to the 20th of May, and we shall report the result, and we hope other farmers will do so. It is not yet too late to sow buckwheat and almost every variety of root crop, and we would strongly recommend farmers to sow, as long as there is a chance of the crop succeeding. We have never seen the grass look better or more promising; but it is the month of June that produces the hay crop, and makes it either a heavy or a light crop. It is fortunate that the pastures are green, affording some food even now for the stock, but the ground is so cold and saturated with moisture, that the cattle required housing to the end of May. The trees have been unusually late this year in coming into leaf; we do not recollect to have seen them so late in Canada. It appears, by accounts from other countries, that they have experienced cold, wet weather as well as we have in Lower Canada, so that we are not singular in this respect. This season should be a very useful warning to us, to be always prepared, as well as it would be in our power, for adverse seasons. Doubtless, much is in the farmer's power to guard against an unfavorable season; by ploughing well, and draining sufficiently in the Fall, the land will be in a better state in Spring to work at the very first opportunity of dry weather. If this is not done, while waiting for the moisture to soak and evaporate, rain may come as it has done frequently this year, and wet the soil again, and thus delay the sowing from day to day until too late. We may appeal to every farmer if they have not found this to be the case; and it is certainly very frequently the fault of the farmer that sowing is so often delayed beyond the proper time. The skilful farmer can do much to overcome the disadvantages of unfavorable climate and soil, but we by no means admit that the climate and soil of Canada are unfavorable, but very much the contrary, on an average, compared with any other country we are acquainted with. 30th May.

In our last we stated that although we had very good farmers in Canada, that the very

best managed farm in this Province would not bear any comparison to the best managed farms in the British Isles. If there is any doubt upon this point, we have it in our power to satisfy this doubt, by reference to the "Transactions" of the Royal English and Irish Agricultural Societies, and the Highland and Agricultural Society of Scotland, which can be seen at the Rooms of the Lower Canada Agricultural Society. The Reports, and Plans of British Farming, in these "Transactions," and in Agricultural periodicals, would satisfy any party how far Agriculture is behind that of the British Isles, in every part of North America. We do not pretend that good farming is general in the British Isles, but we do say that where good systems are introduced on farms in these countries, we have none to compare with them in North America. There is no such thing as a whole farm being thorough drained in this country, indeed there is very little thorough draining in North America that we are aware of. A large capital is employed in British farming or they could not have such good crops or stock. This is not the case in Canada, with few exceptions. There is a general want of capital, unless farmers can make it themselves by the help of labour in their own families, and great industry, and skill in its application. We seldom find in this country capital and skill with the same parties to commence business with in farming, and this circumstance is one of the greatest impediments to the progress of Agricultural improvement. Those who have capital may not have been brought up as farmers, and may want the skill required to employ it to the most advantage in Agriculture. On the other hand parties who may have the best practical skill and experience in every branch of husbandry, may not have capital to farm to any advantage. There are other parties who have neither skill or capital, and what are they to do as Agriculturists? It is from all these causes that our general state of Agriculture is not what it should be. Farmers possessed of skill and capital in the British Isles, are not likely to leave their Fatherland, and all their dearest connections to settle in North America. Losses and disappointments, may induce many to sever all the ties that bound them to home and connections, to seek their fortune in a foreign land, but in most instances they want capital to enable them to farm as they were accustomed to do in the land of their birth. There are cases in which all these various difficulties are overcome, by the energy and good fortune of the parties, but they are the exceptions, not the general rule. The man who has capital, without much practical skill in Agriculture, is the most likely to succeed, if he takes a pleasure in Agricultural pursuits, and is possessed of good judgment, that will enable him to employ the most skilful and efficient labour upon the farm. Such men will very soon acquire a sufficient practical knowledge of husbandry, to enable them to farm very advantageously. Capital applied under such circumstances, will not be wasted, and will produce, by example, much benefit to the public. Where there is means, every work can be executed in a proper manner, under skilful superintendance or by skilful labourers. The most skilful practical farmers, may see a thousand things necessary to be done upon their farms, without having it in their power, from want of capital, to have them executed, and hence they may labour all their lives under these disadvantages, and not be able to overcome them. A defective cultivation and deficient products one year, may cause the same defect a second year, and for twenty years, without some means of overcoming it and curing the defect. We will not say that this is invariably the case, but it is certainly so in a great majority of cases. Some of the most successful settlers

in this country have been brought up to hard labour, and many of them have acquired a good knowledge of farming in the employment of others, which they have turned to good account. These parties, are in numerous instances, in very good circumstances in this Province and in the United States. The secret of their success was—that they had been taught, by labour upon lands of their own or in the employ of others a good share of the practical art of Agriculture, and that their habits were frugal, and industrious. With these qualities, parties can scarcely fail of success in this country, particularly when they have help of labour in their own families. Single men can soon accumulate capital, and men with families who work. can do so likewise and work the farm. These latter parties will not, probably, adopt any high system of farming, but content themselves with such a system as will enable them to accumulate the most property. Very few of them are disposed to advance with the new systems now in progress in the British Isles, or venture upon making any experiments that they are not practically acquainted with. It would be unjust to condemn them for persevering in a system which they are perfectly satisfied with, and which it would be well for the country that all farmers who practice an inferior system of husbandry, would adopt. In the British Isles, rent-paying farmers, are frequently men of large capital, and are able and willing to expend much of it on labour and high farming, and where farmers have not capital, the proprietors of the soil advance money for draining and other improvements, the farmer only paying 5 per cent interest in addition to the rent. These circumstances will account for the superior Agriculture of Britain, and the very large products obtained. A perfect system of husbandry we conceive to be that, which yields the greatest amount of value in products annually, such a system, we admit, may not in all cases be the most profitable. In all other arts, perfection is considered to be that which produces the greatest amount of value or utility in any particular art; and why should it not be so in Agriculture? If the expenses are too great to accomplish this, there must be something wrong, and there should be means of reducing them to due proportion to the value of the products.

To raise Seedling Potatoes without the aid of Glass.—Prepare a bed of rich light soil, sow the seed thinly between the middle of April and the middle of May, in drills eighteen inches apart, covering them with about half an inch of fine earth, which will be all the better if mixed with some finely sifted coal ashes. When well up, and about two inches high, about the end of June, thin them to about eight inches, plant from plant, using a small trowel for the purpose, and carefully lifting the intermediate plants which should be transplanted into a similarly prepared bed, eighteen inches row from row, and eight inches plant from plant, give a little water from a fine-rosed water-pot, to settle the earth about them, and, if the sun be strong, shade them for two or three days. When ripe, take them up and store them carefully in a dry cool place, mixed with sand and fine peat mould. Many of them will be a good size. In the following season plant them out in rich dry soil, in rows not less than twenty-eight inches apart, and from ten to twelve inches, root from root, keeping those that most resemble each other in colour and form together. By the end of the second season the seedlings may be tested, and those which are likely to turn out valuable varieties separated from the worthless. We have not cultivated the seed here, but we believe the above method is the best or as good as any that can be adopted. We would recommend strongly any parties who may have saved seed from the apple produced on the potatoe vine,

to endeavour to raise new varieties of the potatoe.

FOOD OF ANIMALS,

Fermentation, which may be regarded as a sort of cooking afforded spontaneously by nature, adds greatly to the nutritive qualities of the substances which undergo this process, It has long been recommended to allow the barley, intended to fatten cattle, to germinate, and this may be regarded at the first step in the process of fermentation, which the grain undergoes when used for making beer. By this means, the saccharine principle becomes more fully developed, while the food is unquestionably made more digestible and nutritious. Hence, cattle-dealers seek with avidity, and employ with great advantage, the residue of breweries, distilleries, and starch manufactories. A part of the grain thus prepared, or its refuse, is used largely for feeding cattle in Belgium, Alsace, and generally in the immediate neighbourhood of all large manufacturing towns. The nutritive properties of the food are further augmented by rendering it sour, or, at least, it tends in this state to render the digestive function more energetic. Hence, the farinaceous substances used for food, especially when it is intended to fatten the cattle, are made in a great number of places to undergo acetous fermentation. Indeed, all the modes of preparation already enumerated are but little useful to animals destined for hard labour. Seasoning renders the food more agreeable to their taste, more digestible, and therefore more profitable. Common salt is probably the most powerful and useful of all substances for this purpose, and hence it is employed almost everywhere with advantage. It sharpens the appetite, excites to drink, facilitates digestion, renders the flesh of animals intended for the table, of a superior quality, and either promotes, or supplies the acidity induced by the second stage of fermentation. All mammalia seek salt with as much avidity in their wild state as in that of domestication, and show a degree of pleasure, which is a sure index of its utility when mixed with their food, and of its power of correcting the hurtful qualities of their aliment when it happens by some accident to have become vitiated.

In addition to those precautions, which are essential to the proper selection and preparation of food for the domestic animals, it is of great importance to regulate the rations or quantity of food distributed to them at intervals, in order that they may be rendered as profitable as possible. The quantity of food ought always to be in proportion to their age, state of health, the violence of their exercise, and final destination, always observing, at the same time, the general principle, that the quantity of the food must be more considerable when it is less substantial, as any diminution in its nutritive qualities can only be compensated by a proportional increase of its quantity. It is always impossible to determine, in a fixed and positive manner, how much of each kind of food an animal should consume in a given time, because this depends upon a great number of circumstances relative to its species, its race or breed, the peculiar constitution of the individual, its employment, as well as its age and state of health. The daily allowances further change with the very variable nature of their food, the different ways in which it is administered, the state of the atmosphere, the season of the year, and several other circumstances, all of which should be taken into consideration before we can determine their proper daily rations with any degree of accuracy. Hence result the various and contradictory opinions emitted on the subject by most writers who have attempted to fix quantities. Some have laid down, as a principle, that certain domestic animals will daily consume their weight of watery food, such as turnips, beet-root, or green clover; while others have fixed for the same animals a fourth part of their weight of cabbages, carrots, and parsnips, and a fifth or sixth of beet-root, potatoes, and Jerusalem artichokes. There must be, however, a great variation, according to the different circumstances just enumerated. It appears to us that all these matters should be regulated by particular and individual trials, and be left wholly to experience. This is of more real use than the futile attempts made in most practical books to fix quantities, and which only serve to demonstrate the real ignorance of the persons attempting to enforce them. Physiologists, and all who have studied this matter properly, know very well, that although there are certain well-ascertained general laws which regulate the entire animal economy, each individual possesses a peculiar constitution, or *idiosyncrasy*; which more or less serves to modify these laws. Hence we frequently find a disparity of effects resulting from the same apparent or real cause, and these variations show themselves in the quantity of food which animals consume, as well as on a great many other occasions, the explanation of which can only be obtained on the principles already explained.

Along with the really nutritive food, there must always be mixed a certain quantity of ballast, that is, of some coarse and slightly nutritious food, otherwise the sides of the stomach, as well as the intestines, will not be sufficiently distended and stimulated, so as to perform completely the functions for which nature intended them. Unless this condition is rigorously attended to, the digestion, elaboration, and assimilation of the nutritive juices, will always be incomplete, even in healthy and well-constituted animals. It is therefore, a very important error to overload the stomachs of these animals with any

very nutritious food unmixed, even when it is exclusively intended to fatten them.

In respect to the distribution of their food, it is only necessary to notice one excellent maxim, *good food, a little at a time, and often.* They should be allowed to eat quietly and slowly, in order that they may digest the largest quantity of food in the shortest possible time. Regular intervals of feeding should be observed, with occasional fasting, which serves to appetize them, and give an impulse to their digestive organs. They should not, however, be allowed to grow impatient, which occasions a loss of animal force and nutrition. Digestion never proceeds rapidly as long as the animal continues eating. It is only when sufficiently filled that the circulation becomes accelerated, the temperature of the body more elevated, and digestion proceeds with its greatest activity. All these phenomena succeed in the course of a few hours, after which the temperature of the body falls, the respiration becomes moderate, and hunger returns. It is only at this time that more food should be given, in small rations at a time; and when treated in this manner, the animal consumes less, and derives more benefit from its food.

To alternate and vary the kind of food used is always necessary, because the continual use of the same aliment does not sharpen the appetite so well as a judicious selection and rotation. A variety of food serves to stimulate the digestive organs, and prevent that disgust which the same diet continued too long always occasions by its uniformity. Care should be taken, in respect to these changes of food, to avoid a sudden alteration of diet, especially from green to dry food, or *vice versa*, for these are always more or less prejudicial. It is also very important not to overload the stomachs of labouring animals, immediately before they set out to their work, as is too frequently done, for this often occasions indigestion, or at least renders it imperfect or laborious. From want of food or other circumstances, these animals are often obliged to submit to a long fast, which they are always better able to endure in proportion as their food has been the more substantial.—*Rural Cyclopedia.*

POTATO CULTURE.

Having paid great attention to the planting of potatoes now for about thirty years, perhaps a few remarks on the manner of planting, may be worth a place in your valuable periodical. The potato is a root that almost every old woman supposes she knows how to plant, but from my experience and observation, I can see there are but few people who know how to plant to procure a *heavy* corp, and the only reason is this, that it costs a little more labor at the outset; but I am positive the crop will pay any reasonable expense in preparing and manuring the land. Many people plough land in the common way, and also plough their potatoes *in* after that, but such people cannot expect to get a full crop in this way, as in general, ploughing is not done more than from four to six inches, and I am quite positive that this is not deep enough for the roots, which when the ground is broke to twelve or fourteen inches, the roots are sure to find the bottom.

The plan I have followed for years is this, always to trench my ground, let it be good or bad, and at the same time put the dung in as I go along about four inches deep; when I have done this, I draw drills about twenty-four or thirty inches apart, and in the row I put strong sets, from sixteen to eighteen inches apart, and find that by so doing, I can get a much larger quantity to the same ground in general, if the land is any way good, 3½ to 4 imperial bushels to the rod to between 5 and 600 bushels per acre. I am of opinion where the ground is dry, potatoes cannot be planted too soon, I have planted in October and November, about four inches deep, and found them do exceedingly well, and my opinion is, that it would be well to plant the whole of the crop much sooner than is generally done, because when the bulb has sprouted and been rubbed off, it does not shoot so strong a second time. I found last season when the blight struck my potatoes, which were in a fine growing state, that by cutting off the haulm, and shaking a few light dead shavings over the whole of the ground and setting it on fire, that the whole got quite ripe, and not *one* tuber affected. Now I think this experiment worth trying, as any one may get a little straw, or any light substance and strew over the ground and burn, and I never found any experiment answer so well, as the roots came to pe fection, and I have them by me now, quite sound. By t e fire passing over the ground stopping the disease, there is little doubt, but the enemy is an insect, but too small to be observed by the naked eye.—*Joseph Young, Diss, Norfolk.*

Horse Cake or Biscuit.—I have received from Mr. Donald Cameron, 3, Sauchiehall Street, Glasgow, a sample of "horse cake biscuit," made up by a judicious admixture of various grains commonly used for horse-feeding. These cakes are about 3lbs. weight each, and are warranted to consist of only the best ingredients, and these scientifically prepared; three of them are considered quite sufficient to maintain a horse for a day, for all ordinary work, and four of these for a horse subjected to severe work; of course, a proper supply of hay will also be necessary. I have uniformly recommended cooked food for horses, both as economical and of easy digestion; and, I have no doubt, but that the form in which this is offered to the public is well adapted for the general feeding of horses. In

many cases its advantages will be considerable, as, from its portable nature, it may be used in many situations and circumstances in which other forms of food could not be conveniently procured—for example in travelling—feeding in distant fields—in cavalry service, &c. In all circumstances where there is little time to spare, this food, from its requiring but little mastication, and at the same time being easy of digestion, may be very advantageously used. At the late discussion at the Highland Society's meeting, reference was made to the desirableness of feeding horses more frequently than is usually done, and the horse cake or biscuit is well adapted for this purpose. The sample sent was agreeable to the taste, and was readily eaten by various horses to which it was offered.—*W. Dick, Edinburgh Veterinary College.—North British Agriculturist, and Journal of Horticulture.*

DIAMOND DUST.

The wretched are great readers of countenances.

It is good and elevating to believe that there are men who preserve in manhood the boyish bloom of their open-hearted teens, but as it is a rare fortune to meet them, let us honor, cherish, and love them in proportion to this scarcity.

In the natural history of insects, the Grub turns into a butterfly, but it often occurs in the the natural history of man, that the butterfly turns into a grub.

We may safely fix our esteem on those whom we hear some people depreciate.

Often from our weakness our strongest principles of conduct are born; and from the acorn which a breeze has wafted, springs the oak which defies the storm.

Benevolence is addicted to few vices, selfishness to fewer virtues, humility is the low, but broad and deep foundation of every virtue; every day is a little life, and our whole life is but a day repeated; when we are alone we have our thoughts to watch; in our families, our tempers; and in society, our tongues.

When domestic virtues display themselves in the midst of privations, and anxieties, and sufferings; when they shine most conspicuously, they are like the snow-drops and crocusses which unexpectedly peep out of the frost-bound soil to diversify the depth and dreariness of Winter, and give us a cheerful foretaste of the coming Spring.

Every time a man breaks a divine law, he adds a thorn to the rod which he puts into the pickle for his own back.

It is the prerogative of genius to elevate obscure men to the higher classes of society.

Wise sayings often fall to the ground, but a kind word is never thrown away.—*Eliza Cook's Journal.*

PARSNIPS.—The varieties of these that have been described or cultivated are the following:

Common Parsnip, alias *Swelling Parsnip, Large Swelling Parsnip.* Roots from 3 to 4 inches in diameter at the shoulder, tapering regularly to the depth of from 20 to 30 inches. Crown generally below the surface-level of the ground.

1. *Guernsey Parnip*, alias *Jersey Parsnip, Panais long, Panais Coquine.* An improvement upon the preceding, the whole plant being larger and finer; roots sometimes 3 feet long, and Dr. M'Culloch states that in Guernsey its roots grow to the length of 4 feet. In quality it is much the same as the common Parsnip.

2. *Hollow-crowned Parsnip*, alias *Hollow-headed Parsnip, Panais Lisbonais.* Leaves, shorter than those of the common Parsnip; roots about 18 inches in length, from 4 to 5 inches diameter at the widest part, ending somewhat abruptly with a small tap root; crown hollow round the insertion of the footstalks, and grows generally below the surface of the ground. The seed should be sown in shallow drills, the drills 18 inches apart, and the plants thinned out to 12 inches from each other; or to 15 inches if very large roots are desired. By good cultivation they have been grown to between 4 lbs. and 5 lbs. weight each. This is the best variety for general cultivation in gardens. The *Forque*, formerly cultivated in Guernsey of the above.

3. *Turnip-rooted Parsnip*, alias *Round Parsnip, Panais rond, Panais Royal.* Leaves, few, root chiefly above ground, from 4 to 6 inches in diameter, in shape resembling a round Turnip, with a strong tap root. It is the earliest variety, and will succeed in ground too shallow for the long-rooted kinds.

In the year 1847, I sent some of the potato seed I had prepared the previous year, enveloped in the viscous pulp, and dusted with charcoal powder, to the Council of the Royal Agricultural Society, a result from which was the following report from *Mr. W. Miles, M. P.*:—(see *Journal*, vol. 8, pt. 2.)

"My Dear Pusey,—You may recollect that, early in March this year, some potato seed was distributed amongst the members of the Council; to my lot fell about half a table spoon of seed and charcoal mixed, which I immediately sent down to my gardener, with instructions to him to do the best he could to procure the greatest number of plants, and the largest quantity of potatoes from each plant, so as to ensure a stock of tubers from seedling plants, the parents of which had appeared to have been in nowise infected by the prevailing disease.—The following is the report sent in to me from my gardener:—

"On the 15th of March the seed was sown in a shallow box about four inches deep, and placed in an early vinery; as the plants came up they

were kept pricked off, three in a large sixty-sized pot, and still kept in the vinery until the plants were three inches high, when they were potted off singly in forty-eight-sized pots, and put into a greenhouse, where they remained until the 15th May; then they were planted in the open ground, at two feet distance from plant to plant in the row, and three feet from row to row. In planting, the plants were turned out of the pots with the balls entire, placed on the surface of the ground at the above distance, and the earth then drawn to the plants, leaving only two joints or leaves above the surface; after which they were well watered with a rose-pot, to settle the earth round the plants. About the middle of June, the roots were appearing very strong on the surface, when three inches more earth was added to them, the same system being continued as often as the roots appear on the surface. On the 5th of August, six of the weakest plants were observed ripening off, and were taken up; the others remained in the ground until the 15th of September."—Of the six lots which ripened off and were taken up August 5th, not one was unsound ;—out of fifteen, taken up Sept, 15th, there were fifty-eight which showed evidence of the disease,

"The actual weight of tubers thus raised from twenty-one seeds was 44 lbs, 8½ oz., discarding all fractions, say, upon an average, 2lbs, of healthy tubers to each plant, The number of plants thus raised per acre would be 7,260, which, multiplied by two,—the average weight of the produce of each of these plants,—will give 14,520 lbs,—6 tons 9 cwt, an acre,"

The produce may be considered very great, and the effect of careful nursery-cultivation. Although the tubers, as a first year's produce from seed, were comparatively of small size, yet, taking the result as bushels of 56lbs., there would be to the acre 258 bushels,—E, J, Lance,

Bagshot, April, 1850,

ON THE CHEMICAL PRINCIPLES OF BUTTER AND CHEESE-MAKING.

Professor Way, delivered a lecture on the Chemical Principles of Cheese and Butter-making, before the members of the Royal Agricultural Society of England, on the 17th ult.

Mr. Way commenced by stating that to understand the circumstances affecting cheese and butter, they must first of all examine the composition of milk. The popular knowledge of milk was that it consisted of butter, cheese, and whey,—at least these were the three parts into which it was usually seen to be capable of separation; but this division of the ingredients of milk left out of the question a substance of whose existence in milk many people were entirely ignorant, but to which, in a philosophical point of view, the greatest amount of attention was due—he meant the sugar of milk. In a chemical point of view, milk consisted of five parts, butter, curd, milk sugar, water, and saline matter. The diagram on the wall gave the relative quantities of these ingredients in different kinds of milk.

COMPOSITION OF MILK.

	Woman	Cow.	Ass.	Goat
Casein, pure curd.....	1·52	4·48	1·82	4·05
Butter.....	3·55	3·13	0·11	3·32
Milk Sugar.....	6·50	4·77	6·08	5·25
Saline matter.....	0·45	0·60	0·34	0·38
Water.....	87·98	87·02	91·65	86·80
	100·00	100.00	100·00	100·00

The sugar of milk, it would be seen, exists in considerable quantity in it, equalling in the cow the weight of the curd. In England, it is believed it was never prepared for domestic or other purposes; but in Switzerland it formed a considerable article of commerce. Mr. Way exhibited a specimen of milk sugar, and observed that it would be found to possess only a slightly sweet taste, which was due to its very limited solubility. This circumstance prevents its extensive use as a substitute for ordinary sugar, because it could only be employed in the form of a syrup, and required so much water to dissolve it as greatly to reduce the strength of any liquid to which it was added Now, milk sugar, although by itself, or in solution in pure water, it would keep well, was very liable to change when in contact with bodies having the nature of ferments. Milk was, when drawn from the cow, slightly alkaline to test-paper, but in a short time it became sour and curdled. This souring was due to the production of an acid from the sugar, which had, from this circumstance, been called the *lactic acid*, or the acid of milk. The same compound was formed in many other circumstances, and its production was not confined to milk sugar, but occurred in the other forms of sugar. Thus lactic acid was produced when Cabbage is cut up and allowed to become sour, forming the sour-krout of the Continent. The sourness of brewer's grains is due to the same acid. Mr. Way exhibited a diagram which showed how easily the sugar could pass into lactic acid.

RELATION OF SUGAR TO ACID.

	Carbon.	Hydrogen.	Oxygen
Cane Sugar.....	12 equiv.	12 equiv.	12 equiv.
Grape Sugar.....	12	14	14
Milk Sugar.....	24	24	24
Lactic Acid.....	6	6	6

Thus milk sugar was in relation to the acid in question of such composition that one equi-

alent or combining proportion of it could, without adding to or substracting from its component parts, produce four equivalents of lactic acid. Now in the natural souring of milk this transformation occurs, but the question arises, how is it brought about? Mr Way had before stated that ferments in general had this power of acidifying milk sugar. It was an axiom with chemists that ferments are substances in a state of decay, and in virtue of that state capable of imparting it to other substances. The difference between a ferment and a fermentable substance was in general this: The body producing a ferment was liable to change by simple exposure to air. The body in which the fermenting process can be induced is not liable to change by exposure to air, but in the presence of the ferment is capable of ready conversion. The class of ferments generally contain nitrogen; the bodies liable to fermentation do not. Mr. Way had collected in a table some of the more important of the proximate principles containing nitrogen, and also some of those which do not contain this element.

NITROGENOUS PROXIMATE PRINCIPLES.

(MULDER.)

	Gluten of Wheat	Casein from Milk.	Fibrin from Blood.	Albumen From Eggs.	Albumen From Blood.
Carbon	54·75	54·96	54·56	54·48	54·84
Hydrogen	6·99	7·15	6·90	7·01	7·09
Nitrogen	15·71	15·80	15·72	15·70	15·83
Oxygen	21·93	21·73	22·13	22·00	21·23
Phosphorus....	..	..	0·33	0·43	0·33
Sulphur	0·62	0·36	0·36	0·38	0·68
	100·00	100·00	100·00	100·00	100·00

NON-NITROGENOUS PROXIMATE PRINCIPLES.

	Starch	Gum	Cane and Beet-root Sugar.	Grape Sugar.	Milk Sugar,
Carbon	44·47	45·10	44·92	40·47	42·57
Hydrogen ..	6·28	6·10	6·11	6·59	6·44
Oxygen	49·25	48·80	48·97	52·49	50·99
	100·00	100·00	100·00	100·00	100·00

Amongst the former would be found casein, the name given by chemists to the principle which is found in the curd or cheese of milk. Casein, as it existed in milk, was in a fluid or semi-fluid state, but most people were familiar with it in the form of curd. If the curd of milk, carefully separated by pressure from the whey, was exposed to the air, it soon began to acquire a putrid smell: in this state it would, if mixed with sweet milk, rapidly cause it to turn sour. The same thing happened in the case of the natural sour milk; by the exposure of the casein to the air it underwent a change, which enabled it to act upon the milk sugar, converting it into lactic acid. This souring of milk was influenced by a variety of circumstances, to some of which Mr. Way would allude presently; but his present object was to explain and enforce upon their attention the consecutive changes occurring—first, by the action of the air on the curd, and, secondly, by the influence of the ferment so produced upon the sugar of the milk. A right understanding of these changes would simplify and explain the greater part of the phenomena which presented themselves in the operation of the dairy.

It was well known that the most minute precautions were necessary in the management of a dairy. One of the most important of these was temperature. The action of the air upon nitrogenous substances was, in all cases, favoured by a moderate elevation of temperature. Practically this circumstance was well understood and applied in the construction of dairies, which were usually sunk below the level of the earth, and were as far as possible shaded from the direct rays of the summer's sun. The use of water as a means of regulating temperature was also known. The plentiful sprinkling of the walls, the floor, and the benches, being intended to reduce the temperature by the cold produced in evaporation. But Mr. Way thought that, by a little ingenuity, much greater advantage might be taken of this well-known law of evaporation. Thus, for instance, it seemed to him perfectly practicable to imitate in dairies the methods of producing cold which were produced in hot climates. One of these was to cover the openings of communication with the external air by mats kept constantly wet, which insured a cool and refreshing breeze. In many instances where the command of water existed, this practice might be worthy of imitation in dairies. The colour of the walls was another not unimportant circumstance in the formationof dairies. In one instance he had known of a large dairy constructed of wood being painted black, or rather covered with tar. As black is the colour of all others the most absorbent of heat, the results may be guessed. Scrupulous cleanliness is another of the essentials of dairy management—the scalding and cleansing and airing of the milk-pans, and other utensils, being of the first consequence. The reason of this was also obvious; any minute portion of milk left from one operation would necessarily become so changed by the next as greatly to hasten the internal chemical changes in the milk. Another class of phenomena was connected with the extraordinary power of minute and inappreciable quantities of animal effluvia to produce change in such a delicately compounded fluid as milk. Thus, it was a rule never to have a dairy near a stable or

or other bad smell; there must be no drain near it, and the cheese itself should, where possible, be separated as far as possible. In these cases, as indeed in all cases of noxious effluvia, it was believed that excessively minute quantities of decomposing animal matter were carried in the air, rapidly inducing changes of a chemical nature in substances susceptible of such changes. In the case of milk, the phenomena were all referable to the tendency of casein to undergo change, which was much enhanced by exposure to impure air.

Mr. Way said that he had now shortly to call attention to the curdling of the milk. It was seen that the natural scouring was due to production of lactic acid; but in what way did this bring about a separation of the curd? This question was best answered by examining the properties of casein. Casein, or the curd of milk, was but slightly soluble in water, but very soluble in a weak solution of an alkali. In milk, casein was kept in solution by a small quantity of soda, which accounted for the alkalinity of the milk when fresh drawn. Upon the formation of the acid, this latter seizes the soda, thus depriving the curd of its solvents, and the consequence was that the curd was immediately set free. The separation of the curd from the whey was assisted by warming the milk; this was the reason why milk, slightly sour, but not curdled, became so when added to hot tea. If this explanation of the curdling of milk was correct, the same result would be obtained by the use of vinegar or muriatic acid; and Mr. Way showed that these acids would curdle fresh milk. The lecturer then went on to say that he would make a very short sketch of the different operations of butter and cheese-making.

Cream.—Cream, he stated, was merely a concentration of milk; the butter, by its lightness, rising and carrying with it a certain quantity of casein; it was therefore merely a mechanical separation. Clouted or Devonshire cream was butter with a large quantity of cheesy matter, and therefore less wholesome than ordinary cream. Cream cheese was one step further than Devonshire cream, being a mixture of casein and butter with a considerable quantity of whey not pressed out. To this circumstance was attributable the impossibility of keeping cream cheese sweet more than a few days. There was a method of preserving cream and milk sweet for some time, which was interesting in a chemical point of view. It consisted in the periodical heating of the milk or cream to the boiling point. If this were done every morning or second morning the milk may be preserved for several weeks. In the same way if fresh cream be bottled and well corked, the bottles then placed in cold water gradually raised to the boiling point, it will be preserved for months. The explanation in these cases is that, by a temperature of 212 deg. Fahrenheit, the quantity of ferment produced by the action of the air on the casein is destroyed; if no further contact of air takes place, the change of milk sugar into lactic acid is suspended; but if the milk be exposed to the air after boiling, a further quantity of ferment is produced, to destroy which, before it greatly accumulates, recourse must be again had to the process of heating.

Mr. Way thought it possible that the bisulphate of lime, the use of which had excited so much attention lately as a means of retarding the fermentation of the juice of the cane, and the beet-root, in the preparation of sugar, might be advantageously employed in the preservation of milk; but possibly the inventor had contemplated this application of his process.

Butter.—The separation of butter in churning was considered a mechanical process, but there were one or two circumstances which seemed to favor the notion that chemical action of some kind occurred during the operation. The circumstances affecting the butter were the same as those affecting the milk. Butter was never entirely free from casein and milk sugar. The casein, although it did not exceed one-half per cent. of the weight of the butter, yet was sufficient to make the preservation of butter difficult. The methods of preserving by salting and pressure, were intended to meet this tendency of butter to become rancid—here, again, possibly the bisulphate of lime might be useful. There was a method of preserving butter for domestic purposes described in Mr. Rham's "Dictionary of the Farm" (p. 113), and which was founded on the separation of the casein and the butter-milk. It consisted in melting the butter and allowing the casein and water to separate and fall to the bottom. The solid butter thus obtained was less finely flavoured; but it kept better, and was much preferable to salt butter for pastry, and other such purposes. To remove the turnipy taste in butter, Mr. Way recommended either stirring the milk as it is drawn, or the addition of a little saltpetre; or the adoption of the Rev. Mr. Huxtable's plan, namely, adding to each gallon of the milk a table spoonful of the clear solution of half an ounce of chloride of lime (or bleaching powder), in a gallon of water. In respect to the theory of the formation of butter in the cow, Mr. Way remarked that it was believed that although fat, (and by parity of reasoning butter) could be formed from the starch and mucilage of the food, that in the presence of sufficient oily matter it was not likely that any such production of fat should take place; then came the question how far oily foods would increase the yield of butter. It must not be lost sight of, however, that butter consisted of two fats—a solid and a liquid; and,

according as the one or the other predominates the butter was firm or soft; the oils might possibly increase the quantity, but would the quality be good? He would suggest as an experiment of physiological interest, an attempt to feed a cow with a mash in which suet as a solid fat should be introduced. By proper measures, best known to dairy-farmers, a cow might be made to eat this perhaps, and it would be interesting to know the results on the quantity and quality of butter.

CHEESE.—Mr. Way remarked that the curdling of milk was due as before explained to acids; which combined with the soda of the soluble curd. In general the production of acid in the milk was brought about by the use of rennet, which was a ferment produced by the lining membrane of the stomach of a calf to the air. The use of rennet presupposed of course the destruction of the milk sugar, and therefore the whey was sour. In Germany and Switzerland, and particularly in Holland, the acetic and muriatic acids were used to curdle milk for cheese. Mr. Way exhibited a diagram of the composition of cheese, which would show that although we believed cheese to be dry, it still retained a large quantity of water.

COMPOSITION OF CHEESE, (JOHNSTON.)

	Skim Milk cheese	Doubl Glou-cester	Ched-dar.	North Wilts	North Wilts. 2dspe-cimen.	Dun-lop-
Water.....	43·82	35·81	36·04	35·58	44·80	38·46
Casein.....	45·04	37·96	28·98	25·00	28·16	25·87
Butter.....	5·98	21·97	30·40	30·11	23·04	31·86
Saline matt	5·18	4·25	4·58	6·29	3·99	8·81
	100·02	99·99	100·00	99·98	99·99	100·00

The relative richness of cheeses was due to the the quantity of butter in them. The rich cheeses were those which it was most difficult to keep. The thorough salting and perfect washing of the curd also rendered cheese liable to change, although, as in the case of butter, every precaution in this direction was unfortunately opposed to the production of cheese of good flavour; those cheeses that keep best, as the Dutch and Suffolk cheeses, being far less agreeable to eat.

Mr. Way wished to make one or two observations upon the effect of dairy cultivation on the land. Obviously by exporting butter and cheese from a farm, we export the same elements as in ordinary wheat, beef, and mutton farming. In addition, however, to the carbonaceous and nitrogenous elements so exported, a quantity of mineral matter, chiefly phosphate of lime, is removed by the cheese and in the bones of the calves. In old pastures this was never replaced, until the practice of manuring with bones came into use. Bones, as exhibited in the diagram, contain 50 per cent. of phosphate of lime.

The organic part was composed of oil and gelatin, the latter of which was a nitrogenous substance, as shewn in the diagram below.

Now it had been found that 1000 lbs. of milk contain phosphoric acid equal to about 3 lbs. of phosphate of lime. Mr. Curwen found that in a mixed dairy of long and short-horns on an average of four years 3700 quarts of milk were annually produced by each cow. Upon this calculation about 27 lbs. of phosphate of lime would annually be carried off, and that without taking into account the bones of the calves removed. To replace the phosphate of lime ½ cwt. of bones must annually be added for each cow that was kept. By a further calculation Mr Way showed that if the use of bones were to replace the nitrogen carried off in the milk about 15 times the quantity would be requisite that was needed for the replacement of the phosphate of lime.

PLANTING MANGELS AND TURNIPS FOR SEED.—Prepare the land deeply let it be clean and well manured; plant the roots as soon as possible in rows three feet apart, and two feet, plant from plant. Mangels and turnips may be planted in the same field, but a second variety of turnips should not be sown within half a mile of each other.

CARROTS.—The preparation of the land for, and the cultivation of the carrot is precisely similar to that described for parsnips; but the carrot may be sown a fortnight later than the parsnip, whether the seed be prepared or unprepared, and carrots delight in deep, sandy soils. The most approved varieties for field culture are the long orange, Altringham, purple, white, and red Belgian. The white varieties grow the largest; but the red ones are the most nutritious. As Spring food for horses, they are excellent: they fatten cattle amazingly, and they communicate no disagreeable flavour to the milk or butter of cows, and pigs thrive rapidly on them.

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