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THE ILLUSTRATED

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EDITORIAL NOTES.

We beg to call the attention of our readers to the admirable article, by the Hon. Mr. Joly, on the cultivation of forest trees. The earnest devotion of our statesmen to the interests of agriculture promise an improved condition of the art before long. Among the most pressing questions of the day are those of arboriculture and the replanting of the thousands of acres of cleared land which are daily going to ruin, and in which a future rural generation might find a prosperous living. Students of arboriculture say, that a thoroughly well managed acre of woodland, in the neighbourhood of a railroad or of a navigable river, would yield at every fifty years from one thousand to five thousand dollars; an average of fifty dollars per acre per annum. Is not this enough to cause us to reflect, now that our public domain, so vast, so rich, is so little productive?

Notice to Secretaries of Agricultural Societies.

The Secretaries of Agricultural societies are requested to fill up the blanks in the lists they will receive this month. The blanks should be filled up by writing the names of the subscribers in such a fashion that all those that have the same post-office address be found together, one after the other. The *post-office* should be given in the address, not the *parish*, as there are not always identical. The lists should be addressed, when they are completed, to Ed. A. Barnard, Director of the Journal of Agriculture, Cap St. Michel P. Q. and they should contain only the names of the subscribers for the year 1881.

This notice is addressed, also, to the secretaries of the "Cercles Agricoles."

Vines.

Our readers are referred to our advertisement regarding the purchase of vines, which will be found on the last page of the journal.

As many people fear to undertake the cultivation of vines we have made arrangements to send to each purchaser a pamphlet containing a full account of the most profitable system to be pursued; and we shall be happy to answer any questions on the subject. It is wise to make preparations in time, that the vines may be planted as soon as the frost is out of the ground next spring. The vines will be despatched by mail the moment the weather is fit for planting, if the order is given in advance. Of the hundreds we sent out last spring we know of no failures—everybody was satisfied.

Centrifugal Separators and Dairy-Schools.

The following letter addressed to one of the most distinguished *agronomes* of the country, will show how much importance we attach to the newly invented machine for separating the cream from the milk.

To C. A. M. GLOBENSKY, Esq., St. Eustache.

DEAR SIR —In reply to your letter of the 12th of September last, I hasten to say that, to my personal knowledge, you have, since March, taken the greatest possible pains to furnish your neighbourhood with a model dairy-school. At my request, you put off the erection of the establishment for some months; but latterly you seemed very anxious, nay, pressing, to put it into operation.

As you did me the honour to consult me on the subject, I feel that I ought to give you my reasons for hesitating to advise the immediate erection of a second dairy-school in the province.

For two years past a great change has taken place in the style of apparatus for butter-making. The cream can now be extracted from the milk, warm as it leaves the cow's udder, with a machine of the *centrifugal type*, which appears to have advantages over any apparatus now in use. This transformation, however, whose real value is recognised in the principal dairy countries of Europe, renders necessary an entire change of buildings, etc., etc. I expect to receive very shortly from Europe further information on the subject.

I ask you to defer the execution of your project for a short time, solely with a view to the benefit of our province; that it may receive the newest and safest lessons in the art of drawing the greatest and completest benefits from our dairy-industry, the importance of which to our country it is impossible to exaggerate.

Such being the case, you will be rendering a real service to the province if you will defer your plans for a short time. The interval will be well spent in studying the numerous questions which arise from this new system.

I am, etc., etc.,

ED. A. BARNARD.

FOREST TREE CULTURE.

BY HON. H. G. JOLY.

The European traveller who visits only the settled parts of this Province, is invariably disappointed at the scarcity and

meanness of our trees. Of course, if he leaves the beaten tracks of travellers, and goes far enough into the wilderness, up the Ottawa and St. Maurice, he will see fine timber, but, in our settlements, we can only show him, here and there, at long intervals, one solitary elm, a model of grace and beauty, and the traveller will feel, as we do, grateful to the man who spared that tree.

On a warm summer's day, the Desert of Sahara, with its lovely oases, would be suggestive of coolness, compared with our country. No trees to shade the dusty roads, shelter the panting cattle, to set off the neat white-washed houses, only far away, hidden nearly out of sight, the patch of small neglected timber which the farmer is compelled by our stern winters, to spare from the general slaughter, as he dies, without fuel.

If every acre of ground were covered with valuable crops, one would try and get reconciled to the absence of trees, and bow to the iron rule of our age which converts everything into cash. But what a small proportion of all that ground is used profitably! We can find plenty of spare room for growing forest trees, they are not only the most beautiful ornaments to a country and the most useful product of nature, giving fuel, timber, shade, shelter, retaining moisture, and a protection against droughts, &c., &c., but, considering the question from a *strictly money-making* point of view, the culture of forest trees is perhaps the *best and safest investment* that can be made.

It is rather difficult, I admit, to induce people to plant forest trees in this Province, where, for generations, they have been brought up to look upon the forest tree as their natural enemy, to be got rid of at any cost, hacked down, burnt out of the way (for want of a better mode of disposing of it), and still troubling the settler for years with its everlasting stump, an obstacle to thorough cultivation. The children and grandchildren of the old settlers remember too well; they cannot be expected to love the forest tree, but self-interest ought to conquer instinct and prejudice. With us, land is not too valuable for forest tree culture. In Europe, where land is scarcer and more valuable than here, they plant, every year, thousands and thousands of acres in forest trees.

To those who say that our country is *too new* to think of that, I will answer that New Zealand, the Australian Colonies, India (so far as the settlement of the land by Europeans is concerned), are newer countries than ours, and they are all taking active steps towards the planting of forest trees on a large scale. In the United States, the Federal as well as the States' Governments encourage the culture of forest trees by grants of land and money, and exemption from taxation, and powerful societies are co-operating with energy and liberality. The Government of Canada has begun by offering free grants to those who undertake the planting of a certain number of trees on the Western prairies, but I will here observe that it will require more active measures to set the people in motion, and especially the establishment of nurseries, where the people can buy young trees and seed, and the beginning of some large plantations, as an example, to show to the people, by practical results, that the culture of forest trees is within the reach of every one.

We see in the papers that the Western railways have started the culture of trees on their own account, the St. Paul, Minneapolis and Manitoba Railway is reported as having appointed a superintendent of tree culture, who has just contracted for three hundred thousand trees, and most of the roads west of the Mississippi and Missouri rivers have also begun to raise trees, in order to insure a supply of ties, and for other purposes.

How many give as their reason for not planting forest trees, that they will not live long enough to get any profit out of them. You do not hear that in Europe. Are people more selfish in America than they are in Europe? Or is the feeling of self-reliance so much more developed in America, that the people here expect the next generation to take care of itself as they have taken care of themselves? Then leave them some timber, if you wish them to have the same chance that you had. It was but a heathen who wrote, more than eighteen hundred years ago: "*Arbores serit diligens agricola quorum fructus numquam videbit*" "The good husbandman plants trees whose fruits he will never see." But I must not drift away from my subject into philosophical considerations, it will be more to the point to show that the profits of forest tree culture are not only enormous, but that their realization is far from being delayed to an indefinite future.

I do not pretend that the whole of our farms should be planted in forest trees; that would be too absurd. Our farms are generally too large for the small number of hands we employ, there are always some odd corners, idle strips, stony or damp patches which it does not pay to cultivate; begin and plant forest trees there, suiting the tree to the nature of the soil—you will find some for every kind of soil. Once planted and fairly started, they will take care of themselves, give no trouble and increase yearly in value, in a wonderful ratio, so well expressed by the Honorable F. B. Hough, chief of the Forestry Division of the United States Agricultural Department, in the address lately delivered by him at Columbus, Ohio.

For years past, I have sought the best and cheapest mode of re-wooding our denuded lands, and have made some experiments, they have not yet been carried over a great many years, and are, so far, most encouraging, notwithstanding my numerous mistakes and enforced absence at the best seasons, and they satisfy me as to the correctness of the statements made by the leading advocates of forest tree culture. I trust not to be charged with egotism if I now give the results of some of these personal experiments, rather than copy or condence what has been written by others, and it will be a great satisfaction if I can induce a few to try for themselves.

In selecting forest trees for planting, the first consideration ought to be the nature of the soil where they are to be planted, if the soil is not favorable to one kind of trees, do not waste your time in planting it there, you will find another tree that will suit the soil. After paying all due deference to soil and climate, you must be guided in your selection of a particular kind of tree: 1st. By the value of the timber. 2nd. The greater or lesser ease and certainty with which the tree can be grown. 3rd. The rate of growth.

I have tried, principally, black walnut, oak, elm, maple, ash, tamarack, Russian pine, and fir and poplar, and will now give some of the results:

BLACK WALNUT.—The value of that wood is so considerable (a dollar a cubic foot at the present time), and it is getting so scarce that it struck me as the most worthy of being introduced and cultivated here. True it did not grow spontaneously any where in the Province of Quebec, but this appeared to me no conclusive reason why it should not grow and flourish here. The lilac comes all the way from Persia, and it spreads out its leaves earlier and keeps them unchanged later than our typical tree, the maple. I did not fear our great colds, for in the West, the natural home of the black walnut, the thermometer often ranges as low as here, though for a shorter period at a time. It was well worth trying.

I procured a bag of black walnut nuts from the West in the fall of 1874, and sowed them at once, it was late in November, we had to remove the snow and break the frozen ground, but I thought the earth the safest place to winter them. They began to come up about the tenth of June following, not five per cent failed, and they have never been artificially sheltered

in any way. It would not be worth while introducing them here if they could not take care of themselves.

Of those left undisturbed where they were sown, I have not lost one; they have now had six summers' growth. I have just had some of them measured, so as to be certain of their size; the height of the four largest is as follows: fifteen feet and a half, fourteen feet and a half, fourteen feet, and twelve feet, and thick in proportion. Those have not been transplanted; now notice the difference between them and those that have been moved.

In the fall of 1875, when they were only one year old, one lot were transplanted, but the soil was not favorable and they have not done well, so far; however, they are beginning to recover. In the spring of 1876 I transplanted another lot; the best are about eight feet high: and another lot last spring, the tallest of which are about ten or eleven feet. All those trees are of the same age as the fifteen and fourteen feet trees, the difference in size results from the transplanting, wherefore it is much better to sow them at once where they are to remain. Plant them thick, as the wood of the young tree is rather soft, like that of our native butternut.

It is contrary to all preconceived ideas, even among those who handle timber every day, but nevertheless true, that the black walnut (*juglans nigra*) and the Canadian oak (*quercus alba*) as a rule increase much more rapidly in growth than our pine and white spruce. I conclude, from counting the rings on the trees after they are cut down, and from watching the growth of the living trees, that black walnut and Canadian oak generally gain one inch in diameter in about three years and a half, while our spruce and pine take about double that time to accomplish the same result; this can easily be ascertained by counting and measuring the rings. Of course there will be exceptions, and it would not be fair to judge by those only; I speak of the average.

It is now time to say something of the profits, and I must be careful to avoid exageration. Judging by the growth of the living trees and rings of the timber when cut, I do not hesitate to say that a black walnut, under ordinary circumstances, at the age of seventy-five years, will have attained twenty-one inches in diameter and will contain at least fifty cubic feet of timber, the actual value of which is about one dollar per cubic foot. (See for prices the *Lumberman's Gazette*, published at Bay City, Michigan, the numbers of the 26th January, 2nd February, and 2nd March of this year.)

For how many such trees, judiciously planted, will there be comfortable room on one acre? It is difficult to find a regular plantation of any kind of trees of that diameter here, to help us towards a solution of the question, and the way in which trees are scattered in the forest and their irregular size leave but a vague impression on the mind, varying according to the personal experience of each. I am not ready to answer the question at present for want of full information, and will not venture a guess, but I do not feel the same hesitation where trees standing in one single row, with plenty of room on two sides, are concerned, in that case, trees twenty one inches in diamater would not be too close, standing at eighteen feet from one another. Take a farm three acres wide, with a road across the width and a row of black walnuts of an average diameter of twenty-one inches on each side of the road, the trees eighteen feet distant from one another, you get sixty trees containing fifty cubic feet each, three thousand cubic feet, worth, at the present price, three thousand dollars.

But it will be safer to sow the black walnut in clumps, pretty close. They will protect one another when young, and, as they grow, they can be thinned gradually. Their culture will entail little trouble, apart from the preparation of the soil, and the sowing of the nut; the work of thinning will soon repay itself with the timber removed. The better the soil, the quicker the growth. Such a valuable tree as the black walnut deserves to be well treated. If possible, find some shelter against the strongest prevailing winds for the young plantation, a belt of older trees, or a hill. They are rather soft, like our butternut; it is the only drawback I have found out so far, but not fatal. Even the youngest trees will get several branches torn off and very ugly wounds without dying; they are wonderfully hardy.

The value of these plantations will increase steadily from the day when they have taken root; they represent an ever-increasing marketable value long before the expiration of that period of twenty-five years which I have indicated—not as the limit of their growth; they will grow for centuries, but—as the period necessary to attain a profitable size, when they can be cut down without waste.

THE BUTTERNUT grows spontaneously here; its beautiful timber can be worked with as much ease as the softest pine; it ranks immediately after the black walnut, and is inferior to it only in the color of the wood, which is lighter. Rubbed with linseed oil, it takes the soft, rich hue of sandal wood, and if judiciously sawn, shows wonderful marks. I recommend strongly its culture, and will be glad to send nuts to those who will plant them, next fall, as we gather a large crop of them.

WHITE OAK.—The acorn ought to be sown as soon as possible after it drops, in the fall, as it loses its vitality rapidly; and to avoid the great check resulting from transplanting, it ought to be sown at once, if possible, where the tree is destined to remain. Its wood is tougher, and not so liable to break when young. I think it ought to grow with at least as much ease and rapidity as the black walnut; ours are rather behind, as they have been transplanted twice. The oak is so useful and valuable, and its culture so easy, that plantation of trees ought to contain a good proportion of oak, provided the soil be not too poor for it.

WHITE ELM.—This splendid tree recommends itself sufficiently by its beauty and usefulness to dispense me from dwelling at any length upon it; it grows rapidly in a deep, damp soil. I have not grown it from seed, but by taking up young trees from a low island, where they grow in abundance. It appears to bear transplanting better than the oak, walnut or maple, and can be moved safely at a much larger size than any of those trees.

MAPLE.—If you wish to raise a maple sugary with the smallest amount of expense and trouble, go to an old maple grove in the fall; the ground is covered with a thick carpet of seedlings. After rain, you can pull them up by hand with the greatest ease, without breaking any of their small roots, if you are moderately careful. Plant them at once in a corner of your garden, about two feet apart each way; weed during the first two summers with a light hoe. We found, after four years, the trees fit for transplanting, about five feet high, and the thickness of a man's thumb. As the ground was mellow and free, we took them up with little damage. Of course, there is still the objection of transplanting, but in a less degree than when you seek your maples in the woods, where their roots are mixed up with those of other trees, stumps and stones, and must be more or less torn up with violence. There is an immense difference in the comparative cost of the two processes, which will tell upon the hundreds of trees required to make a sugary worth working. Those small trees never fail (at all events, none of those we transplanted did), while much larger trees, more injured in the moving from the forest, die in great numbers, and the survivors are seriously checked. I have been told that the seedlings would overtake them, but have not yet had time to verify that statement. Maples will begin to yield a reasonable quan-

tity of sap for sugar, when about twenty to twenty-five years old.

THE ASH.—It is well known, and its different varieties are found very useful, especially the white ash, which recommends itself for its elasticity, its wood is beautifully marked, and is largely employed in the making of furniture, panels, &c. It will thrive where the walnut, oak and maple refuse to grow, or only linger miserably. I remember part of a maple avenue, where, year after year, the maples had been replaced over and over and failed; at last, we had recourse to white and black ash, none failed, and they are progressing most satisfactorily.

TAMARACK will grow in damp, wet ground; we have succeeded with them where even willows had failed; the value of its timber and leaves is too well known to require any comment from me.

RUSSIAN PINE (*Pinus Sylvestris*).—In making new plantations, especially from seed, it is no more trouble to try foreign than Canadian seed, and, however strange it may appear, I find it easier to procure the seed of the Russian and the Himalaya than of the Canadian Pine. One may find among foreign trees valuable additions to our plantations, such as, I think, the Russian Pine, native of the north of Russia. Our climate suits it admirably, and it appears a more vigorous grower than our Canadian White Pine. I cannot give any opinion as to the quality of the timber, as they have only been sown in the spring of 1873. They started rather slowly, and their height and thickness are less than those of the black walnuts sown two summers later, in November, 1874, but they are now beginning to take more rapid strides. I measured the season's growth of one of them last year, on the third day of July. It showed twenty-six inches in length, gained in about thirty days, as the buds of the coniferæ do not open much before the beginning of June; the year's growth was already over, and from that moment it only thickened and hardened into wood.

Since the growing season of our trees is so short, we ought to lose no time if we wish to help them along, by thinning, removing useless branches, mellowing the ground, or otherwise, all that ought to be done before June, so as to afford them every chance during the growing month. I think the *Abies Nobilis*, or White Fir of Washington Territory, is the fastest grower among the Coniferæ.

POPLAR.—I must beg the indulgent reader to listen to my plea in favor of this tree, and not condemn it unheard. I speak of the kind known as Cotton Wood or Populus Canadensis (not to be confounded with the Balsam Poplar and the Aspen). Its growth is wonderfully rapid; twenty-three years ago, in November, 1858, I stuck in the ground three cuttings, it was my first trial at tree culture. They are now over sixty feet high, one is twenty five inches in diameter, the second twenty-four inches, and the third twenty-two inches, an average of one inch a year in diameter. In every new plantation, in a country completely denuded of forest trees, and especially in re-wooding our Western Prairies, I would recommend, at the start, a plentiful use of this Poplar, without neglecting, of course, more valuable trees. It strikes at once from cuttings, which can be procured and transported anywhere with the greatest ease. Thanks to its rapid growth, it will soon enliven the scenery (as it is a handsome tree), afford shade, shelter the other trees in the plantation, and supply timber, not of the first quality, but better than none, until the slower growing trees are ready with their more valuable contributions, and it can easily be cut down when the room it occupies is wanted for better trees. This poplar has been introduced from Canada into France, where it is designated as the "Peuplier du Canada," and considered as a useful and profitable tree.

I must now close this long article. The results of my experiments are nothing to boast of; practical men would have done much better. If I had chosen the soil for the different kinds of trees more judiciously, had not left them much too long without thinning them, and been able to attend to them in the proper seasons, I am convinced that, as a whole, they would be much finer. At all events, it shows that any one who will take the trouble, can begin the culture of forest trees without previous training. I do not speak of orchards here. Having no School of Forestry in Canada, we must educate ourselves, we have got books written on the subject by eminent and practical men, and we have got, always opened before our eyes, the great book of Nature.

First Lessons in Farming. (Young Man's Department)

It would puzzle me to say whence I derived the information contained in the following pages. It is the result of many years study, and though some few hints may spring from original thought on my part, I doubt not that for the greater part I am indebted to the works of Liebig, Boussingault, Lawes, Tanner, and other well known writers on agricultural subjects. In fact, I rather *make* the lessons than *compose* them. I mention this lest I be accused of plagiarism, or literary theft, a form of dishonesty much more *common than is usually supposed.*

As the farmer is a manufacturer, so it is necessary that he have a raw material to work upon. In his case the raw material is *the soil*, and out of it, the farmer's duty is to call into life the various finished products which he carries to market in his carts, or which walk there on their feet.

The soil is the surface of the land, and is of varied composition and of different depths. There are clays, loams, and sandy soil, in some places the parent rock is almost at the surface, in others you may dig for feet or yards, even, without reaching it. Thus, on the soils of the South of England the plough in many places brings up the *chalk*, whereas, on the neighbouring *Upper green sand* we frequently find three feet of fine loam before the rock is reached.

Below the soil, by which, in general, is meant the depth of the plough-furrow, lies the subsoil, and it is upon the quality of this that the quality of the soil depends. Now, all soils are formed from the breaking up of rocks, not necessarily of the subjacent rocks, for sometimes the materials have been transported for miles by water and other agents, but it may be taken as an axiom, that the *parent of soil is rock.* Bear in mind, please, that *clay*, when found, as in the London and Paris beds, in *couches* of great depth, is considered by geologists as *rock.*

From these rocks, of various degrees of hardness from the *Serpentine* of Cornwall to the *Rag* of Kent, soils are formed by three active workers: one visible, rain; the other two, carbonic acid and frost, invisible.

We all remember the old proverb: "Constant dropping of water will wear away a stone." As the water falls, in rain, upon a rock, it dissolves parts of it, and carrying those parts away, gives place to the action of future rain after the same fashion.

Referring to the lecture on Meteorology, in the number of this journal for Feb. 1881, you will see that the air or atmosphere contains, besides oxygen and nitrogen, a small proportion of carbonic acid. Now rain, in falling through the air, catches, as in a net, some particles of air, and carries them down in its course to the earth. The oxygen gas, finding itself in comfortable quarters, immediately makes acquaintance with its new neighbours, and finding among them some congenial friends, sets itself to work to form (chemical) combinations with them, which extremely intimate social intercourse ends in the old resident's entire transformation. Carbonic acid,

too, being present in the rain, dissolves matters which the pure water would have left untouched. Thus, in process of time, holes are formed in the rock, and these become larger and larger, exposing fresh surfaces to be acted upon by renewed supplies of rain.

And now the most mighty agent of the three sets to work. Frost, God's plough, as it has been aptly termed, finds a hole in the rock filled with water; as this water expands by cold it increases in size, and the particles of wet rock are pushed apart to make room for the water which is freezing. When the thaw succeeds, the rigid bands relax, and parts, sometimes large sometimes small, of the rock fall off, and, the same agency continuing, are gradually broken up and pulverised. Thus water, with its associated gases, and frost, abrade our hardest rocks; the lowest forms of vegetation, finding food prepared for them, seize upon the opportunity, and their rootlets, penetrating the newly formed soil, immediately proceed to perform their duty of offering this food to the digestive powers of the plant. Dying, when its course has been run, the original plant is succeeded by others, which in their turn die, and thus, by a species of green manuring, decayed vegetable matter is added to the soil; which by degrees becomes fitted to supply the wants of the higher forms of vegetation.

But, though rocks are almost invariably, the primary source of soils, we must not imagine that they have been allowed to remain where they were first formed. Were that the case, there would be little difference between the soil and the underlying rock, except that the condition of the former would be finer, or more broken. Many a wonderful change has taken place on the face of our globe: soils have been washed away from their parent rocks, and, mixed with the constituents of other rocks, have been deposited far from their original site in some distant valley. These are the *alluvial* soils, and fortunate is the man whose farm is situated on one of them.

Peat is about the only exception to our general rule. It is formed almost entirely of vegetable matter which has grown and decayed in the place where it is found. Peat often contains as much as 97 o/o of vegetable matter, consisting of aquatic plants and mosses, and is generally found in hollow places where the water is dammed back. Growth succeeds and dies away, its abundance depending upon the supply of water; decaying matter accumulates, and at last the bed of peat begins to show its head above the water; then, tougher, woodier plants establish themselves on the top of the peat, giving that deceptive hard-looking surface to the bog which has led so many men to a sudden death. (1)

Mechanical division of soils.

The classification of soils is simple enough: sands, clays, and loams; with their subdivisions, as sandy loams, clay loams; and the peculiar ones, as chalk soils, which need not trouble us here, as we have none. I wish we had, for they are very jolly soils to farm; never too wet to plough, never so dry as to parch the crops, and they suit sheep to a nicety.

If any one should wish to make a *mechanical* analysis of his soil, he may proceed as follows: With a sieve separate the coarser part, stones &c., and dry the finer part carefully. Take, say, 200 grains of this and mix thoroughly with a half-pint of water, shaking well for a few minutes. Let the mixture repose for a minute, or so, to give the sand a chance to go to the bottom, and then pour off the muddy water into another vessel—pour quickly, and if you think some clay remains with the sand, wash again and proceed as before You have thus got the two substances in two vessels, and when the super-natant water, which will soon clear itself, is poured off, you may dry and weigh both sand and clay.

(1) In 1841, I had to be dug out of a peat-bog, in South Wales, on which I had imprudently ventured when out trout-fishing.

The subjoined tables show in what proportion the two materials, sand and clay, are generally found in our soils:

Name of Soil	Percentage of Sand
Sand	80 to 100
Loam	40 to 60
Clay	40 to 20

Again, for the discrimination of *loams.*

Name of Soil	Percentage of Sand
Sand	80 to 100
Sandy Loam	60 to 80
Loam	40 to 60
Clay Loam	20 to 40
Clay	20 to 20

I do not think that on this side of the Atlantic we have any real clays; at least, I have never seen any thing stiffer than a clay loam, which, in my opinion is the most valuable of all soils, as with proper dunging and cultivation it becomes tender and friable, very retentive of manure, and will grow anything you like to ask it, if, only, you ask in a proper manner. Our Oxford clay, in ploughing which I have seen four powerful horses "stuck," has no equal here.

You see, then, that what we have been in the habit of calling *light land* is heavier than we have thought it; clay being light takes longer to subside in the experiment we have been trying than the sand, which sinks immediately. Thus, when the course of a river is suddenly interrupted by any barrier, we find along its banks, at the highest part, gravel, lower down, sand, and lowest of all, clay, as you may see any day at Chambly tracing the Richelieu from the *Bassin* up to "Yule's Bridge."

Chemical Analysis of soils. This is a very different sort of thing, and I do not intend to trouble my readers much with it. My own opinion is that its study will, eventually, be of the greatest possible use to agriculture, but, at present, there is clearly something wanting which nobody seems able to supply, viz. the difference of plant food in an active or passive state. For instance I do not believe any chemist can tell, from an analysis of a particular soil, whether *potash* will, or will not, benefit that soil. However, numbers of the best men are working away at the various questions involved, and they will sooner or latter, arrive at a conclusion.

We all know that soils consist, of two parts: one part which can be burned, and the other that won't burn. The part that is burned does not go out of existence by any means, it is only sent off in its gaseous form; this is the *organic* matter, the remainder is the *inorganic*, and remains behind as ashes.

Inorganic Matters in Soils.

Silica.	Lime.
Phosphoric Acid.	Ammonia.
Carbonic Acid.	Potash.
Sulphuric Acid.	Soda.
Chlorine.	Magnesia.
Alumina.	Oxide of Iron.

There are other inorganic matters found in the soil, but the above are sufficient for our present purpose.

Silica. or *silicic acid,* plays a very important part in the soil. It forms a great proportion of sandstone, and enters largely into the composition of granite and other crystalline rocks. With soda and other alkalies, or with an alkaline earth, it forms *silicates.* Clay is a silicate of *alumina,* and the fertility of clay soils depends very much upon the presence of a peculiar form of silicate of alumina which I will try to explain, though in the absence of the numbers of the journal of the Royal Agricultural Society in which Professor Way gave his discovery to the world, I fear I shall make a mess of it:

To the best of my recollection it was this: There exists a

class of bodies which Way calls *double silicates*. Thus a silicate of alumina may have part of its alumina replaced by an equivalent quantity of lime, soda, potash, or ammonia. So we have a silicate of alumina and lime, another of alumina and potash, and again one of alumina and ammonia. All these double silicates are of great use to our crops, and the strangest thing seems to be, that alumina itself does not enter into the composition of our plants, but contents itself with preparing their food, and handing it to them when it is ready for their use. When we come to study the *liming of land*, we shall see more about the value of these double silicates.

Phosphoric Acid is, I may say, one of the most important constituents of the soil. It enters in large proportion into the formation of every one of our cultivated plants, and forms a great part of the skeleton of every animal. This substance is present in no soil in very great quantity, our most fertile lands seldom containing more than 2.5 per cent, i. e. one part in two hundred.

The *Organic*, or *burnable*, parts of our soil are, as we have seen, gaseous in form. They consist of substances which have grown under the influence of animal or vegetable life, and have thus become *organized* as part of some living plant or animal. Perishing, as they do, the inorganic matters which had formed part of the animal or plant are added to the mineral matter of the soil, while the organic matter forms a series of substances which practically yield to the soil—Carbon, with Oxygen and Hydrogen, in various forms of combination; and Ammonia with other nitrogenous matters.

The forms which these matters assume are various, but the chemist can detect them under all their disguises, and the knowledge thus obtained enables us to extend our classification of soils beyond the results obtained by our *mechanical* analysis. This determines whether a soil is a sand, a clay or a loam, but *chemical* analysis determines whether it is calcareous or peaty, that is, rich in lime or in vegetable remains.

How plants feed.—We have only one mouth, a plant has a million, visible only by means of a microscope. Plants, however, do not eat with these tiny mouths—they only breathe, and drink, like a little child, whose only substance is taken in a liquid form: it is necessary to the substance of every plants that its food be dissolved in water. The first meals are contained, in a solid form, in the seed itself. Take a few grains of barley steeped in water and keep them warm and damp—you will see in a few days that the roots will start from one end, and then the *plumule*, or green stalk, start from the other. These could not come into life when dry; but when the food in the grain was liquified and became capable of giving nourishment, the plant immediately took advantage of it, and put forth its infant roots, gradually imbibing all the store, and then, in our case, perishing for lack of further food.

But had the grain of barley been put into the ground, by the time the reserve of nourishment in the grain was exhausted it would have grown accustomed to its environment, and could have found its way to obtain support from the earth itself, until its leaves had sprung forth from the plumule, then the myriad little mouths on the leaves would have gone to work and added a third source of food—the air—to the other two—the seed and water. It is worth anybody's while to go into a *malt house* and watch the way in which the grain behaves from the first appearance of the root until the *plumule* or *acrospire* has grown half or three quarters of the way up the back, when the *maltster* puts it on the *kiln* to stop its growth, lest the green leaf should escape and begin to feed upon the sugar formed in the process.

What crops are made of.—We have seen that every plant is made up of two sorts of materials: one sort distinguished as organic, the other as inorganic; whereof, if any vegetable matter be carefully burnt, the former vanishes in smoke, the latter remains, constituting the ashes. The ash left behind consists of mineral matter entirely, and on being submitted to chemical analysis, is found to be a mixture of several kinds of substances, the proportion varying in different sorts of plants. Some varieties of plants contain more of one material than others, and some plants contain more ash than others. The seed and the straw of our grain crops, for instance, contain very different proportions of one of these inorganic matters, silica, but, at all events, every one of the substances in our list of inorganic matters is taken up by plants and worked up into their structure, except *alumina*, which, as we saw, seems to be a sort of agent to present the food to the plants in an acceptable shape, and not plant food at all.

The *organic* matter, we saw, when the plant was burnt, flew off in a gaseous form, this consists of *carbon*, with the elements of water, namely oxygen and hydrogen (*acid-maker* and *water-maker*), and ammonia and other nitrogenous matters. These exist in plants in a great variety of forms, some easily recognized in one place, but utterly different in appearance in another, and they have been divided by scientific men into two classes; *nitrogenous* and *non-nitrogenous*. The compounds containing nitrogen you will always know by their names invariably ending in the letter *n*. They are principally these. *Albumen*, *Fibrin* (gluten); *Casein* (legumin). They used to be called *Protein compounds*, from their frequent change of form, but *nitrogenous* is a more convenient, because less fanciful, term.

The *non-nitrogenous are Starch; Gum; Sugar*; *Cellulose* and *woody fibre*, and *Oil*. The difference between the groups is simply this: the non nitrogenous bodies are composed of carbon, hydrogen, and oxygen, the nitrogenous group contains nitrogen in addition to the carbon, hydrogen and oxygen.

Starch is a white granular body, very abundant in grain and potatoes. If you cover a tumbler with a piece of fine muslin or cambric, and wash a little wheat flour on it with a stream of water gently falling as you wash, in a short time the water which reaches the tumbler will become milky, and on being allowed to repose for a short time will deposit a white grainy substance: this is starch. On the muslin cover will be found a glutinous mass, like soft strings of india rubber; this is the *gluten* of the wheat.

Gum you all know by sight—some of you, doubtless, by taste—it is generally in a liquid state in plants, but exuding through a broken part of the bark of trees, becomes hard and transparent.

Sugar, too, is found in great quantity in a liquid form in the cane, sorghum, sugar-beet, &c, but it is also present in our cultivated crops, even when not in sufficient abundance to be separated for use. Flowing through the plant with the sap, it promotes growth in many important ways.

Cellulose, or cellular matter, is so called because with it the plants are built up. When in the incipient state, it is tender and fragile, but when old it becomes hard and strong, and at last becomes *woody fibre*. This is the change which takes place in the passage of young grass into over-ripened hay. All these substances are very much alike in composition, and sometimes pass from one form into another, but it is worth remembering that, although the quantity of carbon varies slightly, the weight of oxygen is invariably eight times the weight of hydrogen, and this one of hydrogen to eight of oxygen is—water. Thus, any of these non-nitrogenous matters may be represented as made up, in different proportions of carbon and water, as:

Carbon.		Water.		
50 lbs	with	50 lbs	make	100 lbs of woody fibre.
"	"	37½	"	87½ " humic acid.
"	"	72½	"	122½ " cane sugar, starch or gum.
"	"	56	"	106 " vinegar.

And, do you ask how woody fibre for instance, can be formed from carbon and water? I answer, thus:

Whereas the root of the plant is continually employed in sucking in liquid food, the million mouths of the leaves are occupied in inhaling gaseous food Carbonic acid is composed of carbon and oxygen · all day long the leaves are absorbing carbonic acid from the air; the plant appropriates the carbon and rejects the oxygen Water abounds in the sap of the plant, hence water and carbon are both abundantly present in the pores or vessels of the green leaf. Now as woody fibre consists only of carbon and water chemically combined, it is easy to see how, when these matters meet in the leaf, woody fibre may be produced by their mutual combination.

The three principal nitrogenous bodies we mentioned above, Albumen, Fibrin, and Casein, are very like one another in composition. They are sometimes called *albuminoids*, from their leading representative, albumen, which occurs in a nearly pure state in the white of egg. Gluten, occurs as we know, in wheat, and is largely composed of fibrin, an albuminoid met with in blood, from which it can be separated by gently beating the blood with a few twigs. Small threads, or fibres will adhere to the twigs, and will consist of the fibrin of the blood The value of foods depends greatly on the quantity of these albuminoids they contain. *Casein* occurs in the curd of milk, and in pease and beans, when it is termed *legumin*, from these plants belonging to the order *leguminasce*. The following tables will show how little these albuminoids differ in composition from one another: Albumen consists of:—

Carbon	5484
Hydrogen	709
Nitrogen	1583
Oxygen with Phosphorus and Sulphur.	2224
	10,000

Vegetable fibrin consists of:—

Carbon	5456
Hydrogen	690
Nitrogen	1572
Oxygen with Phasphorus and Sulphlum..	2282
	10,000

I hope to resume this subject next month.

ARTHUR R. JENNER FUST.

REVIEWS.

The Journal of The American Agricultural Association-July and October, Vol. 1. Nos. 3 and 4.—New-York: Published by the Association, at 127 Water Street—1881.

The American Agricultural Association does not seem to have grown up, but to have sprung suddenly into mature life, like Minerva from Jupiter's—well, the simile is rather trite. They do not appear, in the United States, to have much difficulty in securing contributors to such a publication as the one under consideration; and the surprising thing is, that there is no signs of what we call trash, and literary men call *padding*. One great and good feature strikes the reader forcibly: the writers are not restrained from expressing in the very fullest manner their convictions, and thus, as I believe in almost all modern magazines, truth is brought out by that action of mental friction which can alone produce it. I used to think that the people of the United States were afraid of truth; but this journal, written by men from all parts of that extensive country and of all shades of opinion, shows me, plainly, that I was most egregiously mistaken.

There is only one blot in the publication: a reply to an article in the first number written by Mr. Edward Atkinson, of Boston, and reprinted in the present issue. The author of the reply, the Hon. L. E. Chittenden, "President of the Anti-Monopoly League," whatever that may mean, seems to have forgotten that, even in politics, a certain amount of respect is due to an opponent. It is hardly polite to term an opponent's argument an "artful,skilful,deceptive presentation of selected facts, calculated to mislead the people instead of instructing them, written to serve the purposes and perpetuate the control of the most despotic and anti-republican monopoly that has ever existed—the present railroad monopoly of the United States." If this is the style used in polemics among our neighbours,I do not wonder that so many *gentlemen* refuse to enter the arena of public life. Why, our journals are hardly more illbred in this province of Quebec!

Au reste,the Editor puts the answer to Mr.Chittenden rather neatly: "Railroad companies that can be obliged," by competition,I suppose,"to reduce their profits in ten years 58.6 o/o, and to reduce the cost of working 49 o/o, and their charges to their customers 52.4 o/o, as Mr. Atkinson shows, are monopolies of which we cannot have too many."

Professor McBryde's article, on "Ancient Husbandry—Rome and her provinces," will well repay perusal. He shows that the *Silo*, or rather *Siro*, is no new thing, but was practised by the Orientals long previous to their invasion of the West. That the Romans dried their wet lands by means of covered drains, most people who are interested in ancient agriculture know, but it will probably be new to my readers to hear that as, 50 years ago, the people in the South-East of England made drains of straw twisted into ropes and covered with earth, so,Columella, writing 1800 years ago, recommends the conduits to be made of "a bundle of twigs twisted together in the form of a rope," and this in the absence of small stones or of gravel, which he evidently considers the better ducts. These drains are to be made three feet deep, shelving in width from top to bottom; and when finished, they are to be levelled with the surface, and the grass or turf replaced. They burned the stubble, but were in doubt as to its effects; whether the ashes afforded plant-food, or the fire destroyed some evil matters in the earth; which latter idea, *illis omne per ignem exoquitur vitium*, seems to be a forerunner of the excrementitious theory of De Candolle. "The value of tillage was fully appreciated, and many different styles of ploughing were practised." Straight furrows were clearly held in great estimation, for a man who ploughed crookedly was said *delirare*, or as we should say "to be delirious"; and the boy who mismanaged the harrows was said *prævaricare*, whence comes our word, to prevaricate.

Green manuring was a common practice. Columella says: "If the lupins, vetches, lerlls, etc., are ploughed down when green" (preferably, when in flower), "they fully supply the place of farmyard manure." Columella and Palladius, both, give instructions for the cultivation of lucern which differ very little from those in Stephens' Book of the Farm.

But, to my mind, the directions for the cultivation of wheat are the most striking of all the passages of Columella's book. Hallett, of Sussex, Eng., is the choragus of wheat culture, but our friends of ancient Rome, Celsus among others, were far in advance of him, "For seed, the best ears should be selected at harvest and separately threshed. The best grains picked from those that refuse to pass through a fine sieve should be chosen." And the great agronome, Virgil, says; "I have, nevertheless, seen seed long carefully selected degenerate unless the largest grains be culled by hand, for thus it is fated that all things should deteriorate, and revert to their original states;" adding by way of illustration, the simile of the boat, which all my classical readers will remember.

The experiment Farm of the "Rural New-Yorker" seems to be conducted on the same principle as Dr. Lawes' well

known establishment, and will probably be productive of great good.

Curiously enough, a passage in the French Journal, written by M. Chapais, on the earthing up of corn, finds here an echo. So long ago as 1867, I found that "the lateral roots of corn extend, late in the season, well across the rows, and in earthing up, the soil is taken from the extended roots, where it is most needed, to heap about the stems where it is less needed. The objection that, in ploughing to hill up, some of the lateral roots are severed, is not worth much, as nature will, for every rootlet cut off, supply a dozen successors; but the real injury is, that whereas the plants had, with 3 feet between the rows, unrestricted feeding ground of 18 inches on each side of them, when earthed up, as the practice is usually carried out, the roots are confined to a range not exceeding 8 to 12 inches in surface measurement, and they are consequently crowded together in a most disadvantageous position. I spoke of this in my essay on root crops &c., in the first volume of this journal.

The "Rural New-Yorker" seems to be astonished that some shrivelled grains of *Defiance* wheat produced a return of fine long ears with good plump berry. I am not at all astonished at it, as I well remember that in spring, Cambridge market, used to be full of samples of fen-grown Chevalier barley, which, thin and poor as it was, when sown on the chalk soils of Essex, Hertfordshire, &c., produced the finest malting barley in the world. As for Spring wheat and Fall, or Winter wheat, they are one and the same thing, only a special habit of growth has been superindued by constant sowing at a fixed season.

I should recommend every one to read "Farmers and the Tariff," by Professor Perry. It contains nothing new, but it puts the old truths in the full light of day.

Professor Sheldon's account of the state of agriculture in Britain is hardly so clear sighted a report of the condition of things that country as I should have expected. The value of land, as he says, has doubtless fallen some 20 per cent in the market, but the farmers, particularly in Scotland, are not looking for impossible remedies for their misfortunes. All the information I can gather, public as well as private, tends to show that, in the long run, the loss will fall upon the landlords. "A new race and a new order of things will spring out of new conditions," but the tenant farmers will not be the vanishing quantity.

A quantitave analysis of a manure cannot be had here for less than $50! In consequence, the market is full of rubbish, and the unscientific farmer is a prey to all kinds of rogues and sharpers. Would not the practical chemists at the new beet-sugar factories help them in any way? In England and Scotland, the two chemists of the Royal and the Highland societies do this work for a mere trifle. In Ohio, hundreds of tons of fertilizers are annually sold, and the chances for fraud were great and tempting; but a law has been lately passed by that State making the Secretary of the Board of Agriculture the inspector of fertilizers, and giving him power to expose and severley punish fraud in their manufacture or sale, as well as to publish results of all official analyses made under his direction, and to show, at least approximatively, the real and comparative value of the different manures offered for sale in Ohio, thus furnishing a guide as well as a protection to purchasers.—A. R. J. F.

McCORMICK'S HARVESTER.

A full description of the annexed engraving of the gold medal Reaping and String-binding machine will be given next month.

ON CRABS AND CRAB HYBRIDS.

By CHARLES GIBB, ABBOTSFORD.

It is of the Hybrids between the Siberian Crab and the common apple that I especially wish to speak; a class of fruit of the greatest value in our Northern climate.

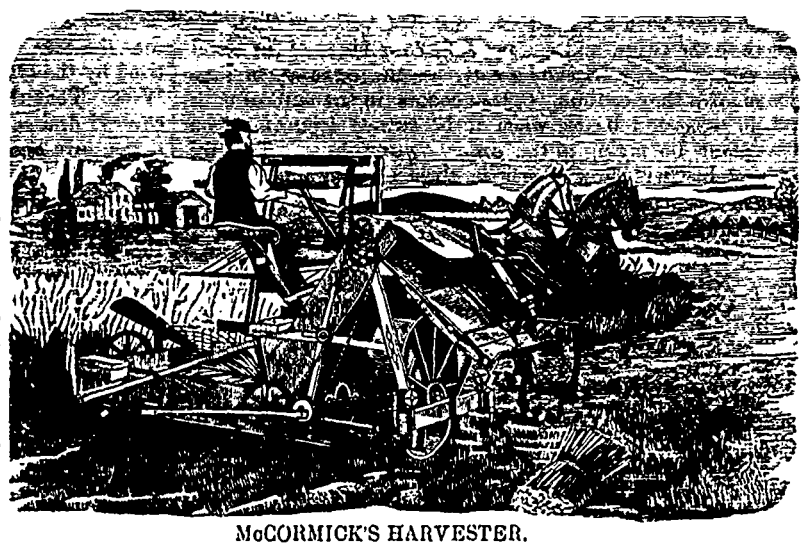
Let us weigh their merits and demerits.

The *good points* of a crab are:—1o. Hardiness and productiveness 2o Early bearing. 3o. Thinness of skin of the fruit .4o. Brisk sprightliness of flavor.

The *weak points*.—1o. Smallness of size of fruit. 2o. Astringency of flavor.

Most of the kinds described below have all these good points, with increased size, and in many cases without the slightest astringent or *puckery* flavor.

The following 15 varieties I have grown and fruited. They may all be considered trees of *decided hardiness* and early bearing,



McCORMICK'S HARVESTER.

unless stated otherwise. I describe them as nearly as possible in order of ripening.

EARLY STRAWBERRY (*of Minnesota*).—This, like most of those that follow, I have grown from root grafts planted in the spring of 1873. So that I have had every opportunity of watching their growth and hardiness It did not come into bearing until the past year, and is therefore not as young a bearer as crabs usually are—yet the form of tree gives every promise of heavy bearing in future. It is as large as Transcendent; striped, and mostly covered with red; is of good texture, and brisk and sprightly in flavor, and ripens with Red Astrachan Hence its special promise of usefulness, as an early, edible fruit, that can be grown where the Astrachan cannot. Perhaps, too, it might be grown as an early market crab, if so, for near market only, as it would not stand distant carriage any better than Red Astrachan.

HESPER ROSE (*of Minnesota*).—Is larger, but more appley and flat in flavor, and quite inferior to the above.

F X L. (*of Wisconsin*).—Is a soft texture, yellow, non-astringent subacid crab, but lacks character, and is therefore inferior to some others.

BRIERS SWEET (*of Wisconsin*).—Is a cross between Bailey's Sweet apple and the Transcendent, by A P. Tuttle, Baraboo It has decided beauty, and large size, but somewhat lacking in that Siberian sprightliness which makes these non-astringent crabs so liked by those who know them It must be a good sweet crab for baking.

HESPER BLUSH (*of Minnesota*).—This is to all intents and purpose a small apple with some astringency. A profuse bearer, yet a poor thing, not worthy of culture.

GENERAL GRANT (*of Minnesota*).—Although an early and heavy bearer and of good size and rather dark color, yet I cannot consider it worthy of culture; of use only for cooking.

GIBB (*of Wisconsin*).—A seedling raised by Geo. P. Peffer, of

Powawkee, and named, it would seem, after the man who first observed it to be in bearing in his orchard. It is large in size—averaging two inches across, by an inch in depth. The skin is yellow, with a blush of dull red on one side; flesh, unusually yellow, crisp and juicy, with a rich mingling of sharp acid and sweetness. Its astringency is so slight that it is hardly observable unless specially looked for. The flesh is quite firm, but breaking, though not melting, until it becomes mellow and ceases to be crisp. It fruited heavily, with me, for the first time this year. The tree is a medium grower, and if of but medium hardiness for a crab, yet hardier than Fameuse, I should say, the stalk, too, is short, and it greatly lacks beauty, so essential for a market crab.

Its thinness of skin and sprightliness of flavor are Siberian characteristics which make it a favorite. The Rev. R. Burnet, of Pictou, N S, late president of the Ontario Fruit Growers Association, pronounced it "the best crab he had ever tasted." It is a crab, which, if surrounded by the best of apples, will all be eaten before the apples are touched Season from Sep. 15th to 30th.

ORANGE (*of Minnesota*) —Is an unusually early and heavy bearer, of fair size, except, when bearing too heavily, thin skin, and is free from astringency. It has a long stalk, and though orange is the wrong color for a market crab, yet it is bright and rather taking in appearance. It is not equal in richness, to Gibb yet is a crab I think very highly of.

SWEET RUSSET (*of Minnesota*) —Is a short textured little fruit I rather like.

GOLDEN SWEET (*of Wisconsin*).—This I tasted at Wawantosa, some years ago, and thought highly of it as a brisk, thin skinned sweet crab, free from astringency, and one that keeps till Christmas I recommended it to friends, saying that I had tasted it and knew it to be good Some years after I again tasted it in Wisconsin, but found that year, that it was somewhat astringent. Strange enough it has been more than slightly astringent with me each year. I therefore cannot recommend its culture.

MINNESOTA (*of Minnesota*).—Is a very large fruit of fine texture and good color, but seems to me likely to prove a shy bearer as I had been led to expect before planting. At Excelsior, Minnesota, Mr Peter Gideon showed me a long dark red crab, of rich acid flavor, which he then called by the above name, but this is not the fruit mentioned above.

AIKEN'S STRIPED WINTER (*of Iowa*) —Is of good size, sharp acid, and thin skinned. It is not as good a keeper as its name would imply With me, it has been a late fall fruit. It is a good cooking crab. It is a very heavy biennial bearer, though the tree is not of special hardiness It is too good to be condemned, yet there are others of at least equal merit.

MEEDEN'S WINTER (*of Minnesota*).—Is a favorite with Dr Hoskins of New Port Vt., who speaks of it as the spiciest and richest desert apple of its season.

It is a little under-sized, but thin in skin and good in color, in flavor and in texture. I am not able to rate it as highly as does Dr. Hoskins, yet I have fruited it but one year as a standard in orchard, and before only as a top graft in other trees. So my experience is very limited

MARENGO No 1 (*of Illinois*) —This is the latest keeper of the Marengo group. I have but one tree of it, and from some cause the fruit has been under-sized, smaller than that I have seen in the West. Even were this not the case, the fruit does not seem of special value

QUAKER'S BEAUTY (*of Minnesota*).—Is a nice, rather spicy, acid little crab. Said to keep till March I have not kept it, but its texture suggests that it would keep pretty well. Tree not of special hardiness, and the fruit lacks size and beauty.

SOULARD (*of the Western States*) —Is interesting to a botanist as a sample of the (Pyrus Coronaria) American wild sweet-scented crab. To a fruit grower it has but one point of merit. It is the longest keeper in this list of crabs. Its flavor is bitter, and acrid beyond anything one might expect, yet it is said to be as unfair thus to judge it, as to test a quince uncooked. There is truth in this. Still, I find baked Soulard a failure.—Stewed, it largely loses its astringency, but not its bitterness, even with an amount of sugar that would spoil cranberries, yet, with a little lemon in it and lots of cream, it makes *fair* apple sauce. Its only merit is that it keeps.

The following well known kinds I will note next.

MONTREAL WAXEN —This is the variety known in Ontario and in the States, as the Montreal Beauty—the mistake is a very old one As one may see in 1st report Montreal Hort. Soc. 1876, p. 17., of late years it has been largely sold about Stanstead under the name of QUEEN'S CHOICE

It is an invariably early and heavy bearer. The fruit has good size and beauty, and fair color, and is but slightly astringent.

MONTREAL BEAUTY.—Is but little known except in the Province of Quebec. It, like the above, seems to have been a seedling of the late Robert Cleghorn, of Blinkbonnie Garden, in Sherbrooke Street; and its right to its name is attested by the fact that all the nurserymen of the past generation, except one, propagated it as such. The fruit is well known. It has perhaps higher color, but a thicker and less transparent skin, than the above, and is more astringent.

TRANSCENDENT.—This is, in all probability, a true Siberian Crab (*Pyrus prunifolia.*)

It is the first that we have mentioned that is not a hybrid of the Siberian Crab and the common apple Its origin is unknown It is such a hardy and thrifty growing nursery tree that it has been largely planted, specially in unfavorable localities for apple growing in the North West, where whole orchards of it have been planted as a market fruit for culinary use.

Its weak point is its astringency, which makes it a cooking fruit only.

HYSLOP.—This too, like the above, seems to be a true Siberian. It bears less than Transcendent, but has sold at slightly higher rates, on account of its great beauty and slightly prolonged keeping qualities It is even more astringent than Transcendent, yet is good for cooking Once at a hotel, in Vermont, I tasted Hyslop pie; the astringency of the fruit was scarcely perceptible; the skin so thin that it was not noticeable in texture; but its deep color had stained the fruit red.

RED SIBERIAN, YELLOW SIBERIAN, and other crabs of this class, are useful as jelly crabs, or perhaps the larger kinds for canning. For jelly small size and astringency matter but little, deep color is the special thing needed.

CHERRY CRAB, CURRANT CRAB, &c, are other species from Siberia, known as the berry crab (Pyrus Baccata) The cherry is grown to a fair extent for jelly and may be known by the falling off of its segments, leaving the fruit berry like —This species also crosses with the common apple —As early as 1807, the late T A. Knight obtained prizes in England for the Siberian Harvey, seedling of the cherry-crab pollenized by Golden Harvey—Foxley from Cherry and Golden Pippin and others were produced at the same time, but were considered of value for cider only or mainly.

The following kinds are less known to me than those first mentioned.

ROSE OF STANSTEAD.—Is early, well colored, of fine grain and fine quality. It has been largely grown in the Stanstead and St. Francis districts. I have not grown it, but have seen it in fruit in different places. Sometimes the fruit is somewhat defective, but I am told, by those who know it well, that this is exceptional. It is a crab of combine. fine qualities and ripens soon after Red Astrachan.

VAN WYCK SWEET (*of Fishkill, N. Y*).—Dr Hoskins, of Newport, Vt. has found the tree somewhat tender in nursery Two trees from Geneva, N Y., have proved hardy with me.

The fruit is not of special beauty and judging from samples grown bymyself and from others given to me by Dr. Hoskins, not as rich in flavor as I expected.

WHITNEY'S No. 20 (*of Illinois*).—This I tasted at Mr. A. R. Whitney's, at Franklin Grove, some years ago and was much struck with its fine texture and good flavor. Mr. Tuttle mentioned it to me as the best crab he knew of. It was fruited by R. W. Shepherd, jr., at Como, this last season.

I can only say that the tree seems a model of hardiness, as I have grown it in nursery. This crab combines beauty with fine quality, and ripens, I should think, about the same time as the peach apple.

BAILEY'S CRIMSON.—Is a seedling by John W. Bailey, Plattsburg, N Y. I have not grown it, but have seen the parent tree in full bearing, and the younger trees also in part bearing in Mr. Bailey's nursery.

It is of fair size; in color mostly a dark crimson, often purplish on one side. The flesh is yellowish, subacid, and fine flavored, but I think a little astringent. In this crab we have great beauty combined with good quality.

WHEELER'S SCARLET (*of Knowlton 2*).—Has a peculiar carmine tint which no other crab has. It is of good size, but its flavor is inferior, and it is only fit for cooking.

GENEVA OR LADY ELGIN (*of Illinois.*)—This is No 4 of the Marengo group. It is of fair beauty; fine in texture: not astringent, of good flavor, but somewhat lacking in spiciness. The tree, too, is of slender and feeble growth for a crab.

This hybridizing of the Siberian Crab with the common apple is by the same process that has given us most of the luscious grapes we now grow.

Mr. E. S. Rogers, of Salem, Mass., gathered the best kinds he could get of the New England Fox-Grape, and fecundated them with the best foreign kinds We all know with what result.—Lindley, Wilder, Agawam, and many others, of real value in our cold climate.

So in the same way, the Cherry or Berry Crab of Siberian (Pyrus Baccata) and the Siberian Crab (Pyrus Prunifolia) is fecundated by the common apple and the Russian apple (Pyrus Astrachanica). The

result is a race of improved fruits, crab in tree and leaf, crab in hardiness, and yet delicate and spicy in flavor

The Minnesota Experimental Fruit Station at Excelsior is carrying on a most interesting series of experiments, under Peter M. Gideon. It was he who produced the Wealthy, that large promising winter apple, whose hardiness is so nearly on a par with Duchess—an apple likely to enlarge the area of our culture of winter apples, northward. It came up among a lot of crab seedlings from seed sent from Maine Mr. Gideon, at the time, suggested that the crab probably was its female parent.

The Northfield Beauty of Vt, believed to be from crab seed, is a good sized, well colored winter apple, which Dr. Hoskins thinks very highly of.

Soon after the fruiting of the Wealthy, Mr. Gideon sowed the seeds of a crab close to which was a blue Pearmain apple. In time, these fruited, and the result was a lot of worthless crab and two like the blue Pearmain, which had evidently fecundated the parent apple, and taking directly after their male parent.

This orchard, planted with the special object of crossing, contained in 1868 about 745 trees. At first, Siberians were intermingled with less hardy long keepers, but the Siberian seemed to control the season of the offspring. Later, Iron-Clad apples have been planted among high qualitied long keepers, topgrafted, with the hope that hardy females will produce a hardier progeny, yet like the male in flavor and texture.

Enough I have said to show the value of this race of hybrids. Would that we had in this Province an Experimental Station, where we could undertake the trial of all new fruits that seem worthy of trial; that would introduce, test, and, if worthy, disseminate, the pears of Central Russia and Sweden, the Russian mulberry, the Siberian apricot, the crosses of the Duke and Morello cherry from Sweden and Northern Germany, the Chickasaw plums of the North West; all hardy races of fruits adapted to our hard climate.

The above highly valuable article is well worth studying. We re-echo Mr. Gibb's wish for an experimental *fruit station* in our Province, with the object of testing and producing fruit trees specially adapted to our soil and climate. And should our wish meet sufficient good will to come to a practical result, then would we wish again that Mr. Charles Gibb, of Abbotsford, be placed in charge of such Station. We know of no man in this Province who has worked harder and more successfully in the testing of fruit and fruit trees, and in the dissemination of useful knowldge to the fruit grower.

A Method of Leading Cattle.

Mr. J. W. Gilman, Kearney county, Nebraska, writes of an arrangement of the halter for the easy leading of cattle

Method of Leading a Cow.

that are inclined to hang back. He says:—"I learned the method from a young Dane in my employ. I had two cows, neither of which would lead with any degree of comfort; to lead them both at once was out of the question. One day I noticed the Dane leading them with as little trouble as if they were well broken horses. This ease in leading was due to his taking a half-hitch in the halter around one ear of each cow in such a way that it would not slip off. This idea has been worth a great deal to me." To those who have tugged and worried over a cow that would not lead at the halter, this hint will be welcome.—*American Agriculturist.*

Slips or Cuttings.

The two ways of striking slips or cuttings, which I am about to describe, will, I am sure, be highly satisfactory to my readers. The engraving 1, shows how to strike cuttings, or rather

Fig. 1.

Fig. 2.

layers, of the pink. Twist a piece of lead-paper into the shape of a cone, and fasten it to the branch you wish to layer with a pin. Fill the cone with rich mould, and keep it damp. In a few days the layer will throw out rootlets, when you may separate it from the parent stem and pot it.

Geranium cuttings should be treated as shown in engraving 2. Break, nearly in two, that part of the stalk which you intend to be the end of the slip. A callous will form there after it has hung from the stalk for a few days, and the striking of the cutting will take place as soon as it is inserted in the ground. This is a safe plan for striking *abutilons, begonias, pinks, cactus, etc.* If the stem should not break easily, a slight incision may be made with a knife.

J. C. CHAPAIS.

Peterson's Double Cream Separator.

We gave in our November number a very full description of Laval's improved cream separator. The engravings in this number represent a still newer machine the full value of which we are not yet able to appreciate, as it will require several careful comparative tests, in order to find out which of the various cream separators is the best; for there are quite a number competing in Europe for supremacy. This fact shows how the new centrifugal process seems to have taken a strong hold of the European dairymen's attention. In figure 2, some idea of the working of the machine may be obtained. The milk runs into a funnel, seen in fig. 1, and enters into the machine at A through a number of small apertures. The milk is separated from the cream by the centrifugal force in the rapidly revolving wheel, the skimmed milk being forced to the further sides of the wheel, the cream uniting in an inner circle, close to the centre. When the separation is complete, the skimmed milk is withdrawn at B and the cream at C by means of spoon-shaped tubes seen in both figs. 1 and 2.

Experiments on Potatoes in Ireland.

Professor Baldwin, has been conducting experiments on the growth of potatoes at the government farms of Glassnevin, Cork, and Athy. His report to the Cork Agricultural Society is a very interesting record of fact, and worthy of our

best attention. Some of the best potato land I ever saw, barring the alluvial, or *warp*, lands of Yorkshire, lies under my view as I write; and the yield is—90 bushels, or 2½ gross tons per acre! Farmers must really give up the idea that a dressing of rotten straw will grow a full crop of anything. The plants they cultivate demand food, and food they must have, or else they will refuse to yield a remunerative return for the labour expended upon them. Potatoes are fetching a rare price—60 cents a bushel—and it is really sad to

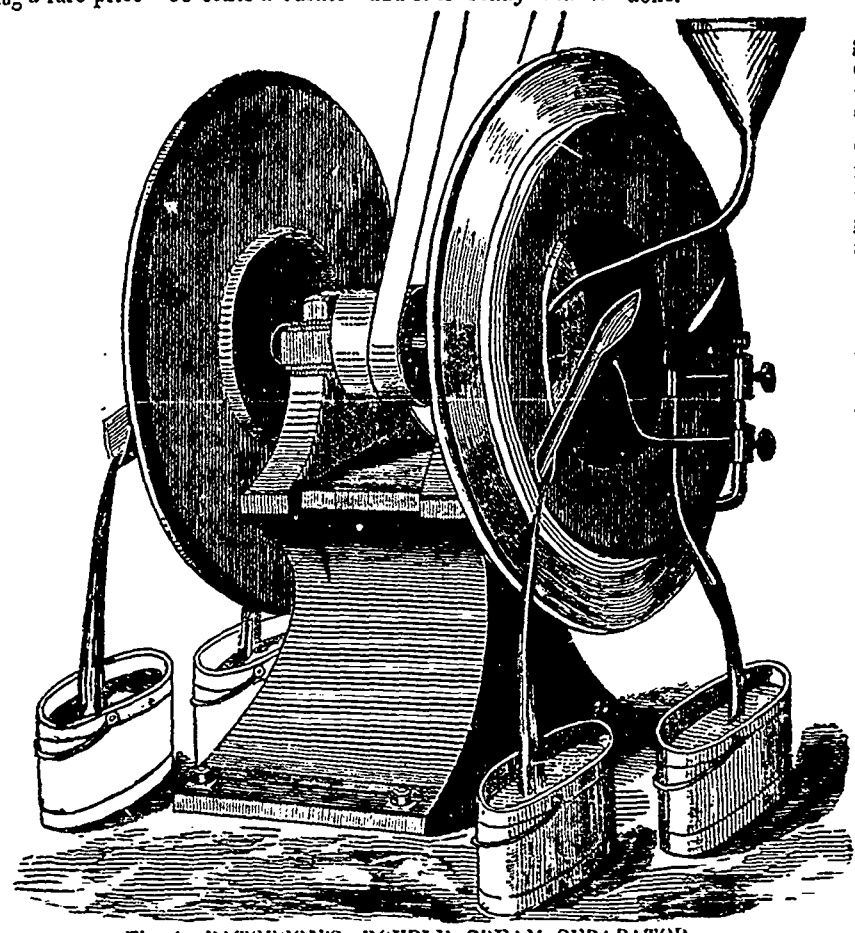


Fig. 1—PATERSON'S DOUBLE CREAM SEPARATOR.

hink that an acre is only worth $54, instead of, at least, $108; five tons, or 180 bushels, being only a moderate crop, if the land is fairly done by. Just analyse a crop, for a moment, and see what a trifling weight per set comes to: 27 inches between the drills and 10 inches between the sets, there will be 23,232 sets to the acre; and if each set produces one half pound of potatoes, there will be 193 bushels per acre! At 12 inches apart, the crop will amount to 19,360 plants, equal to 164 bushels. So, it is easy to see that, on the average, our sets of potatoes produce *less than half a pound each*. I think that, taken roughly, our old calculation, in England, was pretty correct; namely, that each good sized tuber represented a ton or 40 bushels, per acre. The following table will be found correct:

Distance between drills.	Dist. between plants.	No. of plants. per acre.	Weight of plants	Bushels per acre.
27 inches.	10 inches.	23,232	¼ lb.	96¾
"	"	"	½ lb.	193½
"	"	"	1 lb.	387
"	12	19,360	¼ lb.	82
"	"	"	½ lb.	164
"	"	"	1 lb.	328

This table will be found useful in calculating the weight of any root crop, allowance being made for miss-plants, which, whether from carelessness in cutting the sets or from whatever cause, are far too frequent in our potato fields. Immense pains have been taken of late years to get at the bottom of this question of profitable potato growing, but if the practical farmer *will* not take advantage of the results worked out for him by men of science, I do not see what is to be done.

The potato crop in Ireland is no longer the staple it used to be before the disease nearly crushed the small cultivators more than thirty years ago. There are still, however, 800,000 acres devoted to its growth in Ireland, and its importance as one of the means of feeding the population is, therefore, very great. The faults of the farmers there seem to be pretty much the same as the faults of our people; they don't change their seed, and they don't suit their system of cultivation to the particular soil they occupy, and to the sort of potato they grow. During the terrible year, 1879, *Champions* were imported in large quantity into Ireland; and it is computed that this change of seed added £1,000,000 to the wealth of the island in one year!

But it is time to turn to the more practical par of our subject. At Glassnevin, on a strong, deep, clay loam, the largest amount of produce per acre was obtained from an application of 4 cwt. mineral superphosphate, 2 cwt. sulphate of ammonia, and 5 cwt. of kainit (mineral potash) per acre; yield 10 tons 19 cwt. 4 stones per English acre. (1)

Next in point of yield came 4 cwt. of dissolved bones, 1½ cwt. of sulphate of ammonia, and 5 cwt. kainit—yield 10 tons 13 cwt., kainit alone 9 tons 17 cwt.; Peruvian guano gave 7 tons, 19 cwt., 4 stones; mineral superphosphate, 7 tons, 9 cwt., 6 stone; nitrate of soda, 7 tons, 3 cwt., 4 stones. Ground bones came next with 6 tons, 19 cwt.; ground coprolites, 6 tons, 15 cwt., 2 stones, while sulphate of ammonia with mineral superphosphate yielded 6 tons, 11 cwt. 4 stones. *No manure* gave 6 tons, 3 cwt., 6 stones, showing that the land was in much too good heart to be perfectly adopted to an experimental crop; and sulphate of ammonia, alone yielded only 5 tons, 9 cwt, 4 stones, or considerably less than where no manure at all was applied, which is of

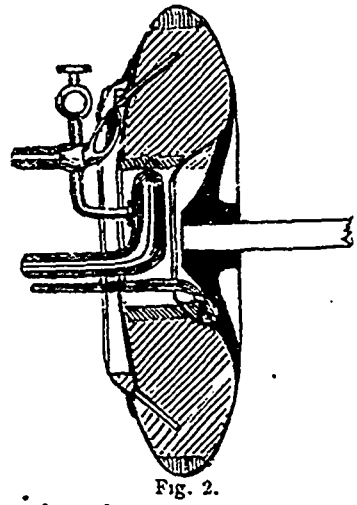


Fig. 2.

(1) The cwt. of 112 lbs.; the tons 40 bushels of 56 lbs.

course an accident, as it is absurd to suppose, that this invaluable manure could damage the crop—the land as I said above was too good.

From these and other data Mr. Baldwin arrives at the following conclusion: on improved land, a mixture of three manures, viz: 4 or 5 cwt., of superphosphate, 5 cwt. of kainit, and a small quantity of manure capable of yielding ammonia, is likely to yield the maximum crop, taking into account not only the total produce, but the degree off soundness.

At Cork, where the soil was a good sandy loam, kainit topped the list with 10 tons, 16½ cwt.; 6 cwt. bone superphosphate, 2 cwt. sulphate of ammonia, and 5 cwt. of kainit, coming next with 9 tons, 4 stones; while 7 tons, 17½ cwt. were yielded by 4 cwt. mineral superphosphate, 2 cwt. sulphate of ammonia, and 5 cwt. kainit, *no manure* giving 3 tons, 15 cwt.

At Athy, on an inferior sandy soil, which for several years had received large doses of phosphates giving small returns, the results were confirmatory of the two other series of experiments. The unmanured plot yield practically the same as those which received *undissolved* phosphates. *Dissolved* phosphates increased the produce, on the average, to the extent of 2 tons, 3 cwt., 4 stones per acre in excess of the *undissolved*. The maximum yield was 6 tons, 7 cwt. 4 stones, from the application of 6 cwt. kainit superphosphate, 1½ cwt. sulphate of ammonia, and 5 cwt. kainit. The unmanured plot gave 2 tons, 12 cwt., 4 stones, while below this were, in the following order, ground bones, ground coprolites, sulphate of ammonia, and, lowest of all, nitrate of soda, which only yielded 1 ton, 14 cwt., 4 stones. Mr. Baldwin is experimenting with *shoddy*, as a source of nitrogen for the potato crop. As his report was written before Professor Voelcker had given his opinion that, in the sandy soil at Woburn, shoddy seemed to be ineffectual, and as that article has been used with beneficial effect for many a year in our Kentish hop-gardens and wheat-fields, I am inclined to think there will be a very pretty contest between the two chemists. My opinion is that Mr. Voelcker has hardly allowed times for the action of the nitrogen in the shoddy to become operative, and, like the fish-guano at Woburn, it will be found of greater value the third year than the first. It is certainly the cheapest source of nitrogen we have.

The greatest yield of the different varieties of potatoes experimented on was given by Taylor's *purple forty-fold*; 17 tons, 19 cwt., 3 stones, or nearly 800 bushels to the acre; Nicoll's *champion* coming next, with 16 tons, 14 cwt., 3 stones or nearly 700 bushels; and Carter's *magnum bonum*, with 15 tons, 8 cwt., 3 stones, or 620 bushels to the acre. Carter's had the smallest percentage of diseased tubers. These are crops, and though we cannot expect, with our climate, to equal them, we might get a little more out of our soil than we do, as a farmer at Knowlton has frequently grown 400 bushels to the acre, and I dare say he is not quite perfect. I can lay my finger on a spot where there are at least 30 tons of mangels to the acre, and by the side of it, at most, 110 bushels of potatoes. Now the labour employed in growing the two crops is about the same, all that is wanting for the potatoes is a little artificial manure. ashes are cheap enough, there are bones to be had at a reasonable price; and the sulphate of ammonia we send abroad, could be bought at the Montreal Gas Company's works. The change of seed could easily be managed—the sort I should recommend are Magnum Bonum and the Champion from England, and a fresh supply of Early Roses from Ontario or the States. Dr. Girdwood, of St. Anne's, tells me that his imported potatoes have yielded this year in the proportion of 13 to 10 in comparison with last year; and I doubt not that next year, the third since they were brought here, they will be better still, as I find that, generally speaking, it takes three years to thoroughly acclimatise both grain and potatoes.

About 20 bushels per acre of hardwood ashes, would fully equal kainit, and, except on recently cleaned land where the brush, &c., has been burned, should never be omitted in the preparation for potatoes.

ARTHUR R. JENNER FUST.

AGRICULTURE.

Paris, September 1881.

The *Société Nationale d'Agriculture*, has the excellent habit to pass in review the history of the country's agriculture for each year. the *resumé* is ever the product of M. Barral, who in addition to being an able chemist, is one of the most pratical minds in France, and whose long public career has ever been associated with the progress of the age. A few gleanings from that interesting document: It draws attention to the discoveries of Pasteur, who not only has found a remedy in inoculation, against the terrible stock plague *charbon*, but has pointed out, that the origin of that malady, is due, to the burial of deceased animals in lands over which cattle subsequently range, and thus catch the animalcules or plague-germs, as thrown up by worms from the pits where the carcasses have been interred. The United States are accused of having introduced the phylloxera into France, whether the charge be accurate or not, the antidote has come from the same source, as the grafting of American vine stocks has been found efficacious in resisting the ravages of the vine bug. Testimony is borne to the happy results attending also the employment of sulphuret of carbon, and above all, to the adoption of autumnal irrigations and rich spring manurings, known as the Faucen process, and whose author has been recompensed by an *objet d'art*. In what may be designated, industrial agriculture, the cultivation of sugar beet ranks high, and its development has received a fresh impulse from the reduction of the inland duty on sugar. Connected with this progress, is the now general adoption of the extraction of the juice by the process known as *diffusion*, imported from Austria, instead of the old plan of presses. The pulp resulting from the new system, has been found to be more nutritive for feeding purposes. In the northern and central regions of the country, where beet culture prevails, this pulp has next to revolutionized stock farming; agriculturists in the neighborhood of the factories, no longer rear stock; they purchase the lean kine in other districts, and fat them. It is a branch of farming very remunerative, as the demand for fresh meat exceeds the supply, and no danger is apprehended that America will be able to compete in furnishing live stock to the butchers. The distillation of alcohol from beet and maize, also has made important progress, and M. Savalle, has demonstrated, that rectified alcohol is so chemically pure, that it is of no importance from what substance it be obtained. Despite the development in the preparation of the cheese and butter industries in Denmark, England, and Sweden, France continues to hold her own. It is satisfactory to observe, that Mr. Duclaux has obtained a medal for his beneficial labors in the role of animalcules in the manufacture and ripening of cheese. Respecting eggs, France not only exports millions for consumption, but for hatching too, and for the latter, supplies incubators Mr. Joseph Boussingault, son of the veteran chemist, has also been honoured for his researches in agricultural chemistry: nor have the national teachers been overlooked, for their humble, but important services. One schoolmaster aged 75, and 50 years in harness, has been pensioned; he is happy, as he boasts, "I am going now to commence new experiments." Some local agricultural societies award premiums to the

school mistresses for inculcating general notions of farming, dairy management, and house-keeping, to their pupils.

This year's harvest will be inferior to last season's, wheat will represent a less yield of 30 millions of bushels; barley, is fair; rye, good; oats, bad: maize, passable. On the whole in point of cereals, France and Russia are the most famed countries in Europe. Forage is next to a failure: beet is suffering from abnormal fluctuations of temperature, but the vintage promises to be excellent in quantity and quality.

The Electricity International Exhibition, has from an agricultural point or view, some attractions. In principle the application of electricity is simply a transmission of force, the secret of the economic utility of that power has been found; the applications will come in due course. Professor Dehéraire, exhibits his experiences on the influence of electric light on vegetation; M. Felix, on the application of electricity to ploughing and threshing: M. Albaret, to the lighting of farm yards and agricultural operations, and others, to the heating of incubators, and the examination of eggs, by electricity.

In the south of France, where the climate is hot and the country mountainous, rearing sheep for their milk, to produce cheese, (Roquefort) is largely extending. The best milking ewes ought to have 4 or six teats, the udder voluminous, the wool rare, and secreting much grease; ears long, head small and without horns. Sheep with four teats ought to be sought. In the agricultural college of Montpellier, there is a ewe with two lambs, and yielding milk from six teats. So far the experiments have not succeeded in obtaining an animal producing much milk and a good fleece at the same time; counting milk, lamb, and wool, a ewe produces net about fr. 48 yearly; six quarts of milk yield 1 lb. of cheese. The Chilians, to obtain special skins much sought after, cross the sheep with the goat, experiments are being conducted in the end of a similar crossing, for improving the milking capacities of ewes. Goat farming does not pay, the animal is destructive, its flesh held in little repute, and its offal of no value.

To combat the epidemic of typhoid fever from which horses now suffer, a veterinarian urges the use of arsenic as an infallible cure or preventive, he holds back, however, the recipe. The stable ought to be sprinkled with a solution of carbolic acid—two ounces in a quart of water. Arsenic imparts a fresh and sleek look to the coat, and, in Vienna, is given to make carriage horses foam at the mouth.

Up to the present the mechanical fatting of poultry consisted in storing the birds in a pigeoned-hole revolving tower and making each shelf with its tenants, pass before a man with a bucket of prepared liquid food, that he injects in measured quantities, through a tube working by a treadle into the throat of the bird.

In Italy and France, the Humane Societies attempted, but without success, to put down this mode of rapidly contributing to our food supplies. An improvement has taken place, instead of the revolving tower, the birds are placed, 6 to 8 in number, under a kind of box or melon frame, and left to enjoy all the liberty they can find therein; the feeding apparatus is maintained, each bird being taken out to be dosed, and then put back to enjoy its confined "constitutional." The frame is heated to a certain temperature, that which aids the putting on of flesh.

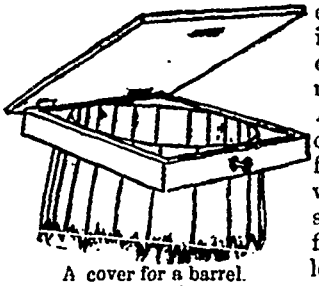
M. Guignet draws attention to cases of pigs having been poisoned, by giving in spring cooked potatoes and their germs, or later, a mash of green potato stalks; he adds, excepting the tuber, every other part of the potato contains as deadly a poison as nightshade.

Among the many prizes offered by the National Agronomical Institution of France, is one of much importance; the right of two of the most successful candidates at the annual examinations, to reside abroad, in the centres of the best farming districts, for three years, at the expense of the government, they furnishing reports on the farming of such countries.

DOMESTIC ECONOMY.

A cover for a barrel, with lock and key.

It is often desirable to lock up barrels containing flour, pork, etc., and a good deal of trouble is taken to contrive an easily-closing lid. The engraving represents a famous sort of cover, to which an ordinary lock can be easily fitted. A frame is applied to the outside of the barrel, which fixes itself on the sides, to which it is fastened by screw bolts. Hinges attach a flat-lid to the frame, and the lock can be easily added. When the barrel is empty, the bolts can be unscrewed, and the cover can be transferred to a fresh one.



A cover for a barrel.

J. C. CHAPAIS.

Canon Bagot on Irish Butter.

At the monthly meeting of the Royal Agricultural Society of Ireland last week, the Rev. Canon Bagot reported to the Council on the success which attended the exhibition of butter at the Dairy Show held at Islington. The rev. gentleman recounted the successes of the various exhibitors, and considered it was a gratifying fact for the Council, as showing the success of the Society's travelling dairy in educating the farmers.

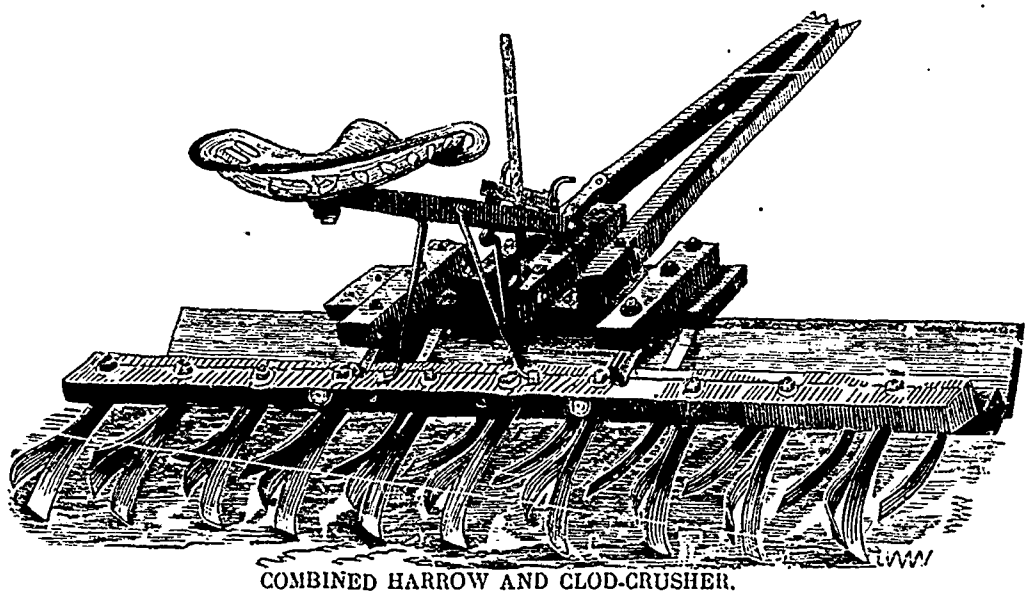
In the reference thereto, he said wherever it had been the farmers won the most prizes—notably, in the county of Longford. Every single exhibitor, without exception, from the county of Longford, was highly commended or commended, which, in the opinion of the judges, was equal to a prize. The dairy was a fortnight in Longford, and the exhibitors from that county had evidently attended to the lessons given. He noticed the same result in others places—Co. Tyrone, for instance. He considered this most satisfactory; but, perhaps, the most gratifying feature of the whole show was the fact that the Munster Dairy School, following the success at Birmingham, had gained the first prizes in both classes, namely, for 6 lb. rolls and 56 lb. firkins. This was the more remarkable, as there were two different sets of judges who had selected the same butter for the first prize. The results have abundantly proved the value of the educational dairy, and it would be remembered that on returning from the continent Mr. Robertson and himself had put education in the forefront as the means of improving Irish butter, and their words had come true. He thought there were a few hints to be derived from the London show. First, they must have butter of firmness and texture, and the exhibitor had taken his advice in having the butter churned in the morning early, or almost at night. They have thus secured greater firmness. They were supplied with air-tight cases, in which the butter was sent to London. These cases were made of wood, with glass tops. There was an inner and outer case. In the inner case the butter was packed, the outer case being air-tight. Whatever air was between the cases preserved the butter in the same condition to London as when it left the dairy. This was one of the hints of success. It was essential that the butter should be firm. Another was the uniformity in salting. Some dealers were of opinion that, as a rule, Irish butter required a little salt, but they were divided on this points; but all said there could not be finer butter. They, perhaps, laid more stress upon the colour. In talking of colour, one or two large dealers pointed out to him butter of

different colours—one whiter than the other. Though the whitest was a better butter, twopence per lb. more was paid for the inferior, because the whitest was unsalable with them. He had learned the exact shade of colour, and was having a paper printed to the shade, so that it might be distributed, in order that farmers might see the exact shade most approved in London. It was a light but very bright straw colour. Good butter of palish colour might be depreciated to the extent of 2d. per lb.

Then came the question of how to obtain the colour. The dealers said, "Do it naturally if you can, either by feeding or by the use of Channel Island cattle; and if you cannot do so by these means, it must be done artificially by using annatto, or by any other means, but it must be done well." The fourth point stress was laid on was the uniformity in packing by which greater value was added to Irish butter and in this respect they had beaten English exhibits, which were shown in every conceivable receptacle, from honey-soap boxes to large baskets. It was remarkable English butter got so few commends It was gratifying to learn from the judges that in London they could take any quantity of Irish butter, and, in the face of all the competition, they need not be afraid in the least, as the Irish butter was better than Danish, French, or any other kinds. It was no small gratification to the council and himself to find every county in Ireland represented, excepting two. He said the council might not have been aware that the Secretary of the Royal Agricultural Society of England had lately visited some of the large butterine manufactories in Holland He had given him some figures on the extent of the trade. They showed the startling fact that there were sixty butterine factories in that country, and one of them turned out ninety tons per week for the London market. However, the dealers said the consumption of butterine would not injure the Irish trade, as there would be always a demand for the genuine article made within twenty-four hours of sale.

Combined Harrow and Clod-crusher.

We have a high opinion of this implement as being useful in many ways. It answers the purposes of a cultivator, a harrow, and a clod-crusher, and is a capital machine for both winter and summer road-making. Messrs. Nash & Brother 22 College Place, New-York, are the manufacturers. We intend to try it on the first snow roads, and our readers shall have the earliest information as to the results.



COMBINED HARROW AND CLOD-CRUSHER.

VETERINARY DEPARTMENT.

Under the direction of D. McEachran, F. R. C. V. S., Principal of the Montreal Veterinary College, and Inspector of Stock for the Canadian Government.

Diseases of the Horses Foot.

QUITTOR is the name given to fistula which occur at the coronate just above the horn of the hoof from which there is a discharge of pus caused by the irritation of some foreign body or diseased tissue within the hoof. It is attended by considerable swelling, lameness, and suppuration. It may occur in any horse's foot and it may be simply a single sinus in the laminae and coronate or it may communicate, with numerous sinuses running in all directions and not infrequently producing disease of the os pedis or its lateral cartilages. This latter condition proves very difficult to heal, and not infrequently becomes incurable.

CAUSES.—It often supervenes on neglected corns attended by suppuration, which not being allowed a free orifice to escape by, burrows under the horn of the wall; and, causing disease of soft textures, fistulous openings are produced; and in many cases, the bone becomes diseased, caries sets in, and an almost incurable condition results. Bruises of the heel, or wall pricks from nails, or whatever causes irritation followed by suppuration, may give rise to quittor. Injuries to the coronate by being stepped upon with sharp caulkings during winter often result in quittor.

SYMPTOMS.—Pain and lameness, swelling of the side of the foot with a fistulous opening from which a purulent glairy discharge takes place, which if associated with disease of the bone or cartilage, is offensive, the surrounding tissues are infiltrated, and the hair is bristling. The pain and lameness is slight or severe according to the extent of the disease and the irritability of the patient. The foot becomes deformed by one sided contraction in some cases, while the lower part of the foot contracts, and the growth of horn at the coronate is exuberant and bulging.

It is more commonly seen in the fore feet than in the hind ones.

TREATMENT.—The shoe must be removed, and if the disease be caused by a corn, that excrescence must be pared

out opening up the heel freely, the wall on the course of the sinus should be thinned by the rasp, and the opening in the coronate enlarged. It should then be freely injected with a solution of corrosive sublimate in alcohol, and wrapped in a large hot linseed meal poultice, changed two or three times a day. Should it not yield to this treatment, the horn of the wall in the course of the sinus should be freely cut away exposing the fistulæ and converting them into open wounds. Caustics can then be directly applied, and the diseased tissues destroyed, which will slough out, leaving a healthy healing surface beneath. When the cartilages or bones are diseased, it is sometimes necessary to scrape them, and dress them with dilute hydrochloric acid. Such cases often become incurable.

During the treatment, in these cases, the foot must be kept soft and the toe shortened, as it is apt to grow rapidly and become hard. After the discharge has stopped and the wound is healed, care must be taken in applying a shoe which will not press on the weak part and produce lameness; a bar shoe, or three quarter-bar, is best, so as to distribute the pressure and protect the weakened quarter. Quittor usually leaves more or less thickening of the coronate and of the hoof growing from it.

PRICKING BY NAILS IN SHOEING.

When we consider the thin wall of the hoof to which the shoe has to be nailed, and the fact that very few indeed of those who make this art their special business take the trouble to familiarize themselves with the structure, or even the physical character of the hoof, but practise the driving of nails into it as a mechanical art; the wonder is, not that the sensitive attachments are sometimes pierced by the nails, but that it is not of far more frequent occurrence.

Some feet are more liable to this accident than others, owing to the thinness and brittleness of the horn necessitating frequent shoeing and the consequent destruction of the wall, leaving but little horn for the nails to be driven safely into. The destruction of the foot by the injudicious use of the rasp and knife of the farrier; the breaking of the wall by imperfect cutting of the clenches, and the violent wrenching off of the shoe, all render the foot more liable to injury from this cause.

In many cases the sensitive parts are not actually penetrated by the nail, but it is driven so close to the laminae, that the pressure produces irritation, followed by suppuration and results are as severe as if this penetration had taken place.

Owing to the unyielding nature of the hoof, the pain is severe when the contained tissues are inflamed, and the horn not undergoing the suppurative process, the pus forms sinuses underrunning the sole or wall, detaching the horn, and ultimately making an eruption at the coronate, leading to troublesome quittor.

SYMPTOMS.—Where the nail actually wounds the laminae, the pain is immediately evident, and an observant farrier will at once notice the expression of it by the flinching of the animal. Too often, however, the drawing away of the foot is attributed to restlessness, flies, or temper, and the poor animal is further punished by unmerciful blows. When not so pierced, the acute symptoms do not show themselves for several days, often for a week. When caused by the working of the nail in the horn by concussion on the road, irritation is produced, followed by inflammation and suppuration, and the foot is found hot, and very tender to tapping with a hammer, or squeezing with a pair of pincers. The lameness is severe and continuous, the weight is thrown off the opposite side from that on which the injury has occurred, and when the injury is at the heel the horse steps on the toe.

The process of removing the shoe is attended by considerable pain, and when removed, the nail hole is found discoloured, and generally there is oozing from it a black fetid fluid which infiltrates and discolours the surrounding horn of the sole. Should it have continued for any length of time, there will be more or less detachment of the horn, and the sole will be under-run.

TREATMENT.—At once remove the shoe as carefully and painlessly as possible; with a sharp fine pointed drawing knife open up the nail hole till a free vent is made for the pus to escape by, thin the sole and wall round it, and immerse the foot in a bucket of hot water for fifteen or twenty minutes, then apply a hot poultice of linseed meal, which should be changed at least twice a day. When the inflammation subsides, the poulticing may be discontinued and the foot dressed with tar. The shoe should not be applied till the lameness disappears, when it should be put on so that the wounded part may not be pressed upon by it, nor should any nails be inserted near it.

WOUNDS OF THE FEET FROM NAILS BEING STEPPED UPON.—In cities this is a very common accident, owing to carelessness in sweeping on to the streets nails and *débris* from warehouses, where packing boxes are constantly being broken up, also in the cartage of old materials from condemned houses, and other sources. The nails being buried in the mud are stepped upon, and penetrating the foot, produce results of the most disastrous nature.

Unfortunately the parts most easily penetrated, the frog and the lateral clefts of the frog cover the most delicate parts of the foot, viz, the tendon, the navicular *burs*, and the coffin joint itself Should a nail penetrate any or all of these parts, the case is well nigh hopeless from the beginning, whereas a nail may pierce the sole, or even become embedded in the bone itself without producing any very serious results, provided it is immediately properly attended to. It will, thus, be seen, that a puncture of the under surface of the foot is dangerous or otherwise according to the part punctured.

When the nail breaks within the hoof and becomes lodged in the deep tissues, the care is complicated, and prospects of recovery lessened.

Under certain conditions of the system at the time of the accident, there is a liability to Tetanus or Lockjaw which is by no means an uncommon signal of wounds of the feet from nails.

SYMPTOMS.—There is lameness almost immediately; often most acute pain. If the joint or navicular bursæ are involved, there is usually considerable irritative fever, and a discharge of synovia, and as it is, almost invariably, accompanied by shrinking or destruction of tissues in the articulation, followed by suppuration, the case is often hopeless from the beginning.

A simple wound of the sole is trifling as a rule, if the nail is at once withdrawn, the seat of puncture freely opened up to give a ready escape for the discharge, it speedily heals up; not so however, the case where the tendon, burs, or joint, are involved.

TREATMENT.—Remove the nail, pare the horn round the puncture thin, open up freely, and soak the foot in hot water for half an hour and apply a poultice. This case usually requires the skill of an experienced veterinarian, and even in his hands, many cases will be followed by such changes as render the animal practically useless.

OMNIANA.

Something really must be done about cotton-seed. It is ridiculous to suppose that we are going to pay $45 a ton for the cake, or refuse, when the seed itself, delivered at Manphis, is worth only $9 a ton, of which the planter takes only $3 for his share, freight &c. devouring the remainder. Mr. J. H. Moore, Arkansas, has used this food largely, and speaks very highly of it as a preventive of liver-rot. In 1854, he bought a lot of half-bred Merinoes, from Kentucky,

and fed them entirely upon cotton-seed, and what they could pick upon the rough pastures. They ate two pints a day, and did well on it, 31 ewes rearing 45 lambs, some of which dressed 60 lbs. in the month of june.

I gather from the Ontario Agricultural Commissiou's Report that 95 per cent. of the bones grown in this country are exported! only 5 per cent are retained. No wonder our pastures degenerate. The following is an analysis of the superphosphate made by Messrs Lamb & Co., Toronto.

Moisture	9.64
Insoluble phosphates	31.24
Soluble "	7.92
Ammonia	2.12
Soda Salts	4.82
Organic matter (rubbish)	25.80
Sulphate of Lime (plaster)	18.46
	100.00

I shall return to this subject next month. A. R. J. F.