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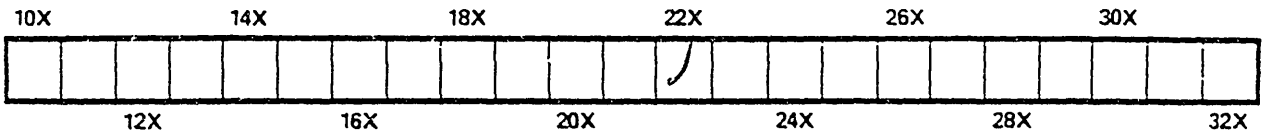

THE

CANADIAN AGRICULTURIST

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Transactions

OF THE

BOARD OF AGRICULTURE OF UPPER CANADA.

VOL. IV. TORONTO, FEBRUARY, 1852. NO. 2.

PRIZE ESSAY

ON AGRICULTURE AND ITS ADVANTAGES AS A PURSUIT.

BY JOHN LYNCH, BRAMPTON, COUNTY OF YORK.

[Read before a meeting of the Agricultural Association of Upper Canada, at Brockville, September 30, 1851:—to which was awarded, as a *Second Prize*, given by the Association, a Gold Medal of the value of £5. One condition in the competition for the Prize offered by the Johnstown District Agricultural Society—the Essay obtaining which was published in our last number—was that the competitors should be restricted to *bona fide* practical farmers.]

"The science of Agriculture is yet in its infancy, and great minds are now directed to the study and development of its true principles. Experiments are in progress to ascertain the qualities of different soils; the comparative nutritive properties of different animal and vegetable productions; and the utility and efficiency of various manures."—*Extract from the Report of the Secretary of the United States of America, December*, 1850.

In the beginning of the world the First Man was sent forth from the Garden of Eden to till the ground, and a Divine decree was made, that he and his descendants should from thenceforth live by the tillage of the earth, or in other words, the practice of Agriculture. Accordingly since that time the descendants of Adam—multiplied innumerably, and spread over all parts of the earth—have mostly practiced and lived by Agriculture. The greater part of them have tilled the earth with their own hands, and those who have not, have mainly been supported by the Agricultural labour of others. And after pursuing that course for five thousand eight hundred and fifty-four years, it is asserted in a State paper of one of the greatest nations of the descendants of that same man, that "The science of Agriculture is yet in its infancy." If this be the case, at what time will it come to maturity? And what great results may not be expected from it in its growth—from childhood to boyhood—from boyhood to youth—and from youth to manhood, when it will appear in its full vigour, some hundred thousand years hence? But it is wrong, perhaps, to treat a subject of so much importance with levity. It is undoubtedly too true, and as wonderful as it is true, that Agriculture is yet, so far, in its infancy, as to be but imperfectly understood, notwithstanding that it is the most ancient of arts, and has been the main pursuit and support of mankind for nearly six thousand years, and that during every period of that time, as well as "now" there has probably been "great minds directed to the study and development of its true principles." While other arts and sciences of far less importance and utility are discovered and apparently brought to maturity and perfection, in a few years, or sometimes less.

The American Secretary of State, of course alluded to the *science* of Agriculture as distinct from the *art*—for though the art of Agriculture cannot be considered as in its infancy, it is comparatively but lately that science has been applied to its assistance. At least according to our present knowledge, for I think it by no means unlikely that both the science and art were better understood by some of the ancients, than they are by us at the present day. The Romans certainly practiced the art to great perfection in their own country, and also carried their improvements into the countries which they conquered. Their establishment in Britain produced such great improvements in that country that "prodigious quantities of corn were annually exported from the Island, but when the Roman power began to decline, this like all the other arts, declined also, and was almost totally destroyed by the departure of that people." * The subsequent decline and fall of the Roman Empire caused a similar decline and fall in the Art of Agriculture over the whole Roman territory,

* Encyclopædia Britannica.

which comprised all civilised Europe and part of Asia. The northern barbarians, who dispossessed the Romans, caring little for agriculture, and it has been asserted that the ignominy thus attached to the pursuit of agriculture—which had previously been held in the highest honour—has continued in a greater or less degree to the present day, and is not yet totally effaced. Indeed I think this assertion is borne out at the present time in some of the Southern States, where none but Negro slaves are employed in Agriculture, and no white man can work at it without degrading himself in the opinion of his countrymen. How different from the opinion of the ancient Romans, amongst whom "the greatest praise which could be given to an illustrious character, was to say that he was an industrious and judicious husbandman!" And this degradation has been held to be one principal cause of the tardiness of any improvement in the art. There are many other obvious causes for its slow progress, some of which I may refer to hereafter. But after considering all the reasons which I have heard or read, or which I can imagine, it must still remain a wonder and a mystery that after so much necessary practice and experience, Agriculture should be considered at this day to be but imperfectly understood.

I would briefly refer to another State paper recently published, which contains some startling statements in reference to the imperfect system of agriculture in our own country. I mean the report of the Select Committee of the Legislative Assembly on the State of Agriculture in Lower Canada. The following is one extract from the concluding summary:—"The soil and climate of Lower Canada are favourable to Agriculture. The people are laborious and intelligent; but they do not, however, derive from the soil more than *one-fourth* of what it can produce. The cause of this is that the system of cultivation is bad." It is certainly a melancholy conclusion that a whole community of laborious and intelligent farmers should be labouring year after year for one-fourth of the produce which they might obtain by good cultivation.

Agriculture, as it is the most ancient, is also the most important, and the most useful worldly pursuit of mankind; and in claiming for it this high distinction, it is gratifying to be able to do so without feeling or exciting the slightest degree of jealousy or rivalry between that and any other pursuit or calling whatever. If there be any pursuit in life which depends for its success upon the ruin or deterioration of some other class or calling, and can only thrive as others suffer, that pursuit is certainly not agriculture. On the contrary, the more agriculture flourishes, the more will commerce, manufactures, the arts and sciences flourish. And the prosperity of commerce, manufactures and science, will always have a beneficial effect upon agriculture. In fact there is no other useful pursuit or calling, that does not receive benefit from the prosperity of agriculture, and does not again, directly or indirectly return a portion of that benefit to the source from whence it sprung. It would be interesting to trace the various ways in which the interests of other pursuits are identified with those of agriculture. If by judicious attention to his business the farmer can grow twenty-five bushels of wheat on the acre of land, which formerly produced only twenty, how many parties will share in the benefit of the additional five bushels, without diminishing the profits of the original producer? The labourer, the merchant, the cooper, the miller, the forwarder, the sailor, the consumer,—and who is the loser? No one. That additional produce is taken from no body. It is so much gained and added to the general stock. If the man of science, by some useful discovery in chemistry, enables the farmer to grow other five bushels, the same round of benefits will result. If the mechanic or manufacturer invent a plan to reduce the expense of conveying a bushel of wheat across the Atlantic, or to any other market, or reducing the expense of converting it into flour, however much he may thereby benefit himself or his class, a considerable portion of the profit will go directly into the pocket of the agriculturist. And even if the improvement does not in any way relate to agriculture, yet if it be productive of benefit to other classes, the farmer will either directly or indirectly, come in for a reasonable share of the good. This reciprocity of interests precludes the possibility of envy or jealousy between agriculturists and other classes, in their respective pursuits.

Some idea of the great importance of agriculture may be formed by observing the general interest which is taken in the prospects of the harvest in Great Britain and Ireland. From the time the seed is deposited in the ground, the progress and ultimate fate of the growing crop becomes a subject of the most intense interest, not only to the British farmer, or the British people, not only to the farmers of Europe—of America—of Canada, but to men of all pursuits and callings in every quarter of the globe, and this interest never ceases until the crop is harvested and safely housed, and its quantity and quality carefully ascertained. Intelligence of the progress of the plant from its first sprouting to its final deposit in the stack or barn, is continually sent to all parts of the world. 'Every frosty night that might injure the young shoot—every suspicious-looking swarm of flies that may hover about the filling ear—every cloudy or rainy day that may retard the harvesting—every

change of weather or of wind that may probably affect the growing crop, is carefully noted down and transmitted with lightning speed, and eagerly received and read in the most remote parts of Canada! There is, in fact, no other subject that excites such general interest. "The State of the Funds"—"French Revolutions"—"Louis Napoleon." "Denmark and the Duchies"—"Papal Aggressions," and all must give way to the grand anxiety to learn the "Prospects of the Harvest!"

This fact shows very forcibly the great importance of Agriculture; but it will show it in a still stronger light when we consider that Great Britain is *comparatively* unfavourably situated for agriculture, in soil, climate and other circumstances: and being besides a maritime, commercial and manufacturing country, it would be easy to imagine that she would dispense with being also an agricultural country, and would depend upon receiving the most of her breadstuffs from other countries, which buy her fabrics, and which are more favourably situated for agriculture than herself. But the number, industry, and necessities of her people compel her to be an agricultural country also. She dare not depend upon other countries for her bread, or the greater part of it; still she cannot produce enough for her own consumption, and a considerable portion must annually be procured from other countries; and the question which causes such great interest in the success of the grain crop of the British Islands, is with them, how much bread they will have to buy; with us and the people of other countries it is, how much we shall have to sell.

This great and general interest manifested in the progress of the British grain crop might lead us to suppose that Britain was the foremost, or at least one of the foremost agricultural countries in the world. This, however, I believe is not the case. I believe that agriculture in many parts of the Continent of Europe, has long been in a more flourishing condition than it has yet arrived at in Britain. I believe, also, that the eminent scholars who have most successfully turned their attention to making science instrumental in the improvement of agriculture were Europeans of the Continent. Still Britain has attained great improvement of late years, and particularly since the commencement of the present century. She is sufficiently advanced to be a good school for Canadians to study in, and it is not of much consequence to us whether or not there are other countries of Europe more advanced in the art than Great Britain, for it is chiefly to her that we must naturally look for instruction and improvement in these respects.

It is, however, difficult to learn agriculture by theory alone; and it is difficult and very unsafe to apply the theory or practice of any one country to another country or section, totally different in climate, soil, and other circumstances. This difficulty has been the cause of much evil, and it is one of the principal causes of retarding the progress and advancement of the art. In connexion with this part of the subject it may be remarked that, though much good has resulted from the various agricultural periodicals which have of late years been so liberally circulated, both in this Province and in the neighbouring States, yet the good has been mixed with some evil, which has given the opponents of "Book Farming," as they style it, some reason for their opposition. Some specious theory is promulgated, apparently well authenticated and proved by ample experiments; and perhaps well adapted to the place, soil, and circumstances which originated it; but which taken as a general rule, and put in practice in a different soil and climate, proves a ruinous failure! And even in the same place, and under similar circumst. nces, schemes and systems which are applauded to day, may in six months time be exploded and condemned, and some new theory, directly opposite, recommended by the same publication; so that the farmer who depends on an agricultural paper as his *sole guide*, will have to change each system he adopts before he has time to test its merits! This evil should not be attributed altogether to the publications themselves—though they must not be considered entirely blameless, but to the want of judgment and care in the agricultural reader. If a farmer in the backwoods of Canada, reads an account of a great crop of corn being grown on the warm sandy plains of Indiana, he should not thereupon plough up and plant with corn, fifteen or twenty acres of his heavy clay land, which in many respects is quite unfit for corn, would yet in all probability produce a good crop of wheat or peas. Or if he reads that some body has 40 bushels of wheat to the acre, which was sown on the first of October, he should not, on that account, wait a month to sow his wheat, if he is otherwise prepared to sow it on the first of September.

These publications, though generally very useful and interesting, should be used with much caution and judgment, or they will do more harm than good.

In taking Britain as our best school for agricultural improvement, it should be carefully kept in mind in what respects the two countries assimilate to each other in soil, climate, and other circumstances relating to agriculture; and in what respects they differ. It will be found that though differing widely in many respects, yet there are some circumstances in which they are similarly situated. Although lying geographically ten degrees further north than Upper Canada, the winters are not so severe as ours, but they

are about the same length, and consequently, as is the case in this country, a great part of the land as well as the care, labour, and resources of the summer, must be devoted to providing food for the cattle and horses during the winter months.

This is a great desideratum in agricultural economy, especially in countries where such long winters prevail. We cannot continue to grow large crops of grain, and keep the soil in good condition, unless we have some means of constantly procuring and supplying the earth with manure, any more than we can continue to plough two acres a day with a good pair of horses, and keep them fat, without a constant supply of nourishing food. I believe the best and most economical manure that can be obtained and used, having regard to the permanent fertility of the soil, is the dung of cattle mixed with the straw and other waste vegetable produce of the farm. And to procure this in abundance, a large number of cattle must be kept. To this end have the late improvements in Britain chiefly tended. Two things have been accomplished there, which in fact constitute the principal modern improvements, both of which are very desirable in this country; a more judicious rotation of cropping, and a thorough system of draining. The latter of these, if not very easy of accomplishment, is at least easily understood, and requires very little assistance from science. In some parts of Canada it is not much required, as on dry sandy soils; but in much of the rich clay land of the country it would undoubtedly prove of immense benefit. There is no obstacle in the way of its adoption, save the expense, which can generally be ascertained pretty accurately beforehand; and a judicious outlay for draining will, in most cases, be found a good investment.

The adoption of a profitable system of rotation of crops, is a question of far greater difficulty. And it is a question that the farmers of Canada should attend to without delay, for by the rotation at present in practice, much of the best land in Canada will at no very distant period be exhausted, and rendered incapable of producing wheat, the staple article of the country. If indeed the most simple system were the best, as it sometimes is in other matters, then the system prevailing most in that part of the country with which I am best acquainted, will hardly be surpassed, for no rotation could be more simple. It consists of fallow and wheat alternately, with as much set apart for pasture, meadow, and spring crop, as will be barely sufficient for the use of the farm. The manure of the barn yard is laid on that part of the fallow which is supposed to have the most need of it, forming a thin coating for one-fourth or one-third of the fallow ground. Some farmers more enterprising than their neighbours, occasionally vary this rotation by growing two successive crops of wheat on a field which has had rather more than its proper share of manure, and this deviation from the general rule though generally resulting in a pecuniary loss to the farmer, yet materially increases his store of scientific knowledge by furnishing him with (for him) satisfactory proof, that wheat will turn to chess! On the other hand some farmers attempting a more meliorating cultivation, but have not generally succeeded in getting so good a return for their outlay as those who adhered more closely to the alternate wheat and fallow system.

This system has certainly succeeded better than any other that has come under my observation; this observation, however, being most confined to strong rich lands but lately reclaimed from the forest. On such lands, it is perhaps the best plan for the present time, or the plan which will give the greatest and most speedy return. And it is certainly not strange that the farmer should hesitate before giving up a system by which he is rapidly becoming rich, for some other plan which has got to be tried, and which he is only certain that it will not make him so good a return for his outlay. Yet if there is any truth in the theory of agriculture, or the experience of other and older countries, the time will come—if this system be continued—when the present rich and productive land of Canada will not only fail to produce the heavy crops of wheat which it now does, but will become incapable of producing wheat at all to any profitable amount. How soon that time may come will depend on many circumstances, but chiefly on the strength and good qualities of the land, and on the extent to which this scourging mode of cropping is carried; and it is advisable for the farmer whose land is now in good condition, to anticipate that time, by adopting a more meliorating system before his land is exhausted, as it is undoubtedly easier and far less expensive to keep land in good condition than to restore it after worn out. The main principle of the improvement of cropping in Great Britain consisted in the introduction of what are called green crops, which answered the double purpose of meliorating the cultivation of the soil, and at the same time producing a greater quantity of manure, by supplying more food for cattle; thus giving the land more food and less labour. By this system the well cultivated farms in Britain, while annually producing good crops are kept in a continual state of fertility, and probably by the same system would produce as good crops a thousand years hence as they do at present. The fallowing is in a great measure done away with, being superseded by green crops; the best lands therefore not being fallowed more than once in seven o

eight years, while here they are fallowed once in two years.

The introduction of a greater proportion of green crops into the agriculture of this Province is certainly much required; but that it would succeed to the extent that it has done in Britain, is very doubtful. The benefit it would be to the soil is unquestionable; but the question which every farmer reasonably asks, and which is not so easily answered is, "*will it pay?*" The returns do not appear so quick and certain as the wheat growing alone. There are several reasons why such a system should not succeed so well here as in Great Britain; the high wages and scarcity of labourers, and the difficulty of disposing of the produce to advantage are serious objections, and the greater severity of our winters deprive us of some of the means of making use of the green crops which are most profitable in Great Britain. But all these objections may be removed by time and circumstances, and it seems to me that, to that system we must come at last. And it would appear to be the interest of every farmer to keep this subject constantly in view, and to consider well how far, and in what manner, this system of husbandry may be best introduced into Canada; and more especially the partial substitution of green crops for the naked fallow.

It is a disagreeable prediction, but I fear it will prove too true, that we must look to a further decline in the price of wheat, as the ground work of any material improvement in the system of agriculture in Canada. At present the farmer cannot by any process realize so much money by growing Turnips, Mangel Wurzel and Clover, as he can by growing mostly Wheat, therefore, he will adhere to the wheat growing; and it would be hard to expect him to do otherwise. But reduce the price of wheat to such a rate that he can realize more profit by growing partly green crops and feeding cattle, and it will be easy to convince him of the propriety of improving his land by growing clover, turnips, and mangel wurzel. It would be much more satisfactory if we would increase the value of the green crop, rather than depreciate that of the wheat, but it seems that one or the other must be done before the cultivation of green crops will be generally adopted in the Province.

It would, however, ill become me at the present time to predict what improvements may not very soon be witnessed, when, apparently, one of the brightest eras for agriculture is just dawning on the country. The organization of a *Provincial Board of Agriculture*, and the appointment of a *Professor of Agriculture in the University*, will be important events in the Agricultural History of Canada. These acting in conjunction with the Provincial Association, and the several County and Township Societies, will produce a concentration of the agricultural science, knowledge and resources of the country, from which a vast amount of good may be reasonably expected. The fund of intelligence thus collected will be again distributed and circulated through agricultural publications. These publications will obtain more support than they now do, and in consequence will become, by their improved character, more worthy of support.

After all we must not depend on any *new light* in agriculture, as the source of prosperity to us farmers individually, so much as upon the proper application and husbandry of the knowledge and resources already in our possession. It will be well for every farmer, before seeking or adopting any new system, to consider well whether or not he has made the most of his present position. Let him see that his land is well ploughed and harrowed, and the seed sown in a proper manner, and at the proper season. Let him see that his fences are safe, that his crop may be secure while growing. Every farmer knows that one hog let into a field of peas, while growing, may destroy as much in one meal as would feed the same animal for a month if he would wait till they are duly prepared for him. Let him see that a portion of his richest and best land is not employed growing useless and noxious weeds, which with a little timely attention might as well be producing wheat or turnips. Let him take care that his crop is harvested at the proper time, and that he makes his hay while the sun shines. When his crop is harvested, let him see that it be properly cared for,—let there no useless waste in thrashing and cleaning, and that the rats and mice be compounded with on the most favourable terms possible, (favourable for the *farmer* I mean,—not the vermin,)—that the straw is properly secured and fed to the stock during the winter, so as to be converted into manure, and that the manure itself shall not be allowed to go to waste. Let him keep the proper number, and no more, of cattle and horses on his farm, *and keep them well*. Let his farming implements be always in proper condition, and in the right place, when they are wanted. Let him, in short, attend carefully to every matter and thing that requires attention on his farm, according to the best of his knowledge and means, and he will be, under Providence, independent of any improvement in the science of agriculture, and at the same time in a position enabling him to take advantage of any such that may appear.

It may be that there is no other farmer in Canada who has neglected any of these matters, but for myself I can safely say that in my experience in farming, I have lost much more by neglect of

the means and knowledge within my power than I would ever hope to gain by any improved system that could be imagined; and I scarcely ever had a poor crop, or any misfortune in farming but what I could, with a little ingenuity, trace to some remissness of my own.

The advantages of Agriculture as a pursuit may be considered as national, and individual. Nations have generally flourished in proportion as Agriculture has been encouraged and fostered, and the decline of Agriculture and of the State, have in many cases been closely connected. If Agriculture is of such advantage to nations in general, it must be of the most vital importance to Canada, which can never be a prosperous country except by agriculture in the first instance. And Canada has many natural advantages for agriculture. Upper Canada, especially, will compare favourably with most countries. With an excellent soil and climate, and her splendid lakes and rivers. She has but one drawback, the long and severe winters. As we can do nothing to change the seasons, it becomes our interest to make the best of them, as they are. As the country becomes older and more improved, however, the winters will undoubtedly become more moderate. And those who have remarked the seasons for a number of years back well know that a considerable improvement is already perceptible. And yet with all the natural advantages which Canada possesses for agriculture, how little has hitherto been done for it by those to whom the destinies of the country have been entrusted? How few of the "great minds" of Canada have been "directed to the study and development of its true principles." And how many of the *little* minds have neglected their farms to attend to some political question, which a sensible neighbour of mine declared "would not make six York shillings difference in the course of a whole year." I would by no means intimate that the farmers of Canada are generally neglectful of their business as compared with any other people: on the contrary I think a more industrious and contented people will not easily be found, and I do not think there is at this time a more prosperous country on the face of the earth than Upper Canada. Still there is plenty of room for improvement in us all; and I do think that agriculture has not had the support and encouragement from the higher powers that its acknowledged importance demands. I think it may safely be asserted, that if as much attention had been given to agriculture, as to many other questions of far less moment, there would not now be a large section of intelligent and industrious farmers in any part of Canada, whose system of cultivation is so bad that they "do not derive from the soil more than one-fourth of what it can produce!"

A better prospect, however, is now before us. The circumstances I have before alluded to, it is to be hoped, will give a fresh impetus to agriculture from which much good will ultimately proceed, and for this improved prospect I consider we are mainly indebted to the enterprise and perseverance of those truly patriotic men, who have under great discouragement endeavoured to organize, and continued to uphold agricultural societies in the different parts of the Province. May they have their reward!

Much has been said in favour of Agriculture as a pursuit to individuals, and much more might be said, but I have no wish to exaggerate its advantages. If any person fond of ease and pleasure should engage in agriculture, expecting to find it a state of perfect happiness, and that he will have nothing more to do than sit under his vine and fig tree, and enjoy himself, he will assuredly meet with disappointment; but a similar disappointment will as certainly await the man of business who shall engage in it in the expectation of acquiring a rapid fortune. To the poor man labouring his little farm with his own hands, or probably the occasional assistance of his wife in the field, it is indeed a life of hardship. But if he has courage, perseverance and prudence, hardship will gradually wear off; with good luck, which too many depend much on—and in vain—but which rarely fails to accompany the *prudent* and *industrious*. The hard work of the farmer ceases to be a hardship to him when he sees that every days' work is laid out to advantage, and is preparing for himself and his family a future state of ease and comfort. And the consciousness of independence procured and sustained by his own exertions and the protection of Providence is a constant support to him, and encourages him to continue and increase his exertions. There are many instances in Upper Canada of men coming on a new uncleared farm, (frequently not paid for,) who were not able to provide themselves with comfortable food and clothing, but who by steady perseverance, industry, and care have acquired comfortable fortunes, and have risen from the station of poor labourers to be men of the first consequence and standing in their localities! The man of moderate means will have still far greater facilities for improving his condition without the hardships which the poor farmer has first to undergo. Agriculture is not the pursuit by which to amass a fortune in a short time, but it is undoubtedly the most certain means of procuring a comfortable competence. Some acquire large fortunes rapidly by other pursuits, especially commerce, greater fortunes than could ever be expected from agriculture. But of the thousands who start in the pursuit of fortunes through commerce, or other exciting and hazardous enterprizes many become

totally ruined, both in pecuniary means, in health, and in character, and indeed in all that renders life of any value. A still greater number fail in ultimately obtaining the necessary comforts of life, and there are few indeed who succeed to the extent of their expectations; while of those who steadily pursue agriculture there are few who fail to secure a comfortable competence.

That the pursuit of agriculture is the most conducive to health, both of body and mind, is too generally known and acknowledged to require any remarks on this occasion.

To conclude, the pursuit of agriculture may be considered as desirable to the higher classes, or the affluent, as a source of healthful recreation and rational enjoyment; profitable to the middle classes as the best means of acquiring and retaining a competency; and necessary to the lower classes, as affording the means of subsistence, and almost the only pursuit by which they can ever hope materially to improve their condition.

The Agriculturist.

TORONTO, FEBRUARY, 1852.

BEET-ROOT SUGAR.

The present extraordinary depreciation of the value of wheat, naturally induces the farmer to inquire, whether some fresh production cannot be profitably adopted—as, in some measure, a substitute for that hitherto Canadian staple; and earnest attention is already being directed to the growth of flax and hemp. The cultivation of the sugar beet has also been suggested, and without expressing any decided opinion as to the profitableness of manufacturing beet-root sugar in Canada, we have taken some pains in ascertaining and arranging a number of facts relative to the manufacture of this article in Europe, that will be interesting and, perhaps, useful to the readers of this Journal.

Within the last few years the growth of beet and its manufacture into sugar, have made very considerable progress in several countries of Europe, particularly France, Belgium, Germany, and some parts of Russia. In all these countries, a large amount of cane-sugar (in some instances as much as 50 per cent.,) has been displaced by that extracted from the beet; and the effects of the competition, are already visibly felt in the depreciated value of cane-sugar; a large portion of which, both of foreign as well of colonial growth, it has been usual to send to the British market, from whence it is re-exported to the continent. Although the domestic consumption of cane-sugar has, within the last two or three years, very much increased in England, the price, mainly it would appear from a diminished continental demand, has been progressively declining, stocks have accumulated, and the trade has been devoid of all animation whatever. We now proceed to state some interesting facts, gleaned from authentic sources, relative to this new source of wealth to extra tropical countries.

The manufacture of beet-root sugar in Europe has acquired an importance, only within the last few years. In 1828, the whole production did not probably amount to 7000 tons, more than a moiety of which was yielded by France, in which country it had a high protection against cane-sugar of Colonial, as well as foreign growth. Such was the effect of the protective duty, that in 1840, the amount of beet-root sugar in France, reached the enormous quantity of 40,000 tons! A change of policy took place, and a gradual diminution of the protective duty determined on, till in 1848, an equalization of duties on cane and beet-root sugars obtained. The effect of this policy was for a time, to paralyze the protected producers of beet-root sugar; from 39,000 tons produced in 1839, the amount in 1841, was diminished to 26,000 tons. The exposure to competition, however, soon led to improvements in the manufacture of beet-sugar, and in 1848, the year when the duties were equalized, the production had risen to 56,000 tons; and it is now said to exceed 60,000 tons, or fully one-half of the entire consumption.

In Belgium there were twenty-two beet-root manufactories in 1850, furnishing one-half the domestic consumption, and last year the number had been nearly doubled. In Germany, beet-sugar had risen from 26,000 tons in 1848, to 40,000 tons in 1851, while cane-sugar had experienced a proportionate decline. Already one-half of the sugar consumed in Germany, is from the beet-root, with every prospect of a progressive increase. In Austria, the production of beet-root sugar has increased from 8,000 tons, in 1848, to 15,000 in 1851. Even in Russia, out of an entire consumption of 85,000 tons of sugar, 35,000 tons consist now of beet-root.

The London *Economist*, to which we are chiefly indebted for the above facts, states, in reference to the working of one of the best and largest manufactories in Belgium, that beet-root at the current price of 12s. sterling, per ton, the cost of a good refined loaf-sugar, is 20s. 9d. per cwt. The great reduction in the cost of beet-root sugar which has recently been effected in the best continental manufactories, seems principally attributable to mechanical improvements in

the machinery, while chemistry has contributed no inconsiderable aid.

"A modern beet-root sugar factory, erected and fitted with all the new improvements, presents one of the most perfect processes conceivable. At one end of a low shed building of one story, the root is taken in as it comes from the field, and in twenty-four hours afterwards, the loaf-sugar obtained from it issues from the other end. The cost of such a manufactory, capable of working three tons of sugar per day, is for buildings, £2000, and for machinery, about £6000,—independent of working capital. One of the greatest improvements of late years, consists of the introduction of the centrifugal machine in more than one stage of the process, by which a better and more perfect extract is obtained. Formerly, (in 1842,) the largest extract of pure sugar from beet-root, was three per cent. Now, in Belgium, it exceeds six per cent., and if the Excise laws permitted the use of the carbonic acid process, it would be immediately increased to 7½ per cent.; so that about 13½ tons of beet-root, would give one ton of refined sugar." In France, the improved culture of the beet now produces from fifteen to twenty tons per acre. Another improvement lately introduced, is the following:—"Hitherto the beet-root factories have been able to work only about five months in each year, from October to March, while the root could be kept sound. Now, a means has been adopted of preserving the root, by cutting and drying it, without any detriment whatever to its saccharine properties; so that in *place of five months, a factory may be worked* the whole year; therefore, the same amount of capital sunk in buildings and machinery, will perform more than double the quantity of work.—By other improvements the molasses, which were formerly so bad, that they could only be used for feeding cattle, or for distilling into common spirits, which were rectified for manufacturing purposes, are now made into excellent gin, quite equal in quality to grain spirits."

In France the process is conducted on the same principles as in Belgium. But in some parts of Germany the mode of proceeding is somewhat different. Each grower, instead of selling the root to the manufacturers, makes it into a raw sugar, which he disposes of to the refiner; this perhaps is not so profitable, but may be better suited than the other method to the altered circumstances of individuals or neighborhoods.

That beet-root sugar will eventually displace altogether that produced from the cane, even in the most favored European countries, as regards labor, soil, &c., can hardly be expected. It is well known that the cultivation of the sugar-cane, and the modes now practised for extracting the saccharine matter, admit of very great improvement; and the competition got up by the manufacturers of beet-root sugar, will assuredly call out the active energies of those of the cane.—Already considerable improvements have been or are being effected in our West Indian colonies and as cane sugar will always possess advantage over all other kinds, for preserving and other purposes, we may fairly look forward with almost a moral certainty that the article of sugar which is at once both a luxury and necessary of life in all civilized communities, will be placed within the reach of the poorest classes of society.

Whether the growth of the beet, and its manufacture into sugar, could be made profitable in this Province, is a question very difficult to decide absolutely, apart from carefully conducted experiments. We hardly think that farmers could grow the roots at three dollars per ton, when the price of labor, and the casualties of weather are duly considered. In England the recent attempts to manufacture beet-sugar, have not proved, as we understand, very successful; but as regards Ireland, brighter anticipations are indulged in; and preparations are there being made, on an extensive scale. We should much like to see the thing fairly tried in Canada, by competent and trust-worthy parties.

At the last meeting of the British Association, Professor Hancock read a paper "On the Prospects of the Beet Sugar Manufacture of the United Kingdom, of which the following is an abstract:—Public attention had been directed to this manufacture by the effort to establish a public company in London for its *introduction into Ireland. He had learnt that,* at Maldon, the manufacture had been attempted by private company; but this attempt led to failure in short time. A manufactory had been recently established at Chelmsford, and contracts had been entered into with the farmers in that neighborhood. The prospects of the manufacture depended on the answers to three questions:—1st. What was the price of beet-root likely to be for a series of years? 2nd What was the price of refined beet-sugar likely to be after 1854? and 3rd. Would it be profitable to carry on the manufacture at these probable prices of the raw produce and manufactured article? As to the price of beet-root, its price varied in France from an average of 13s. 11d. per ton in the north-east of France, to 18s. 5d. per ton in the north-west of France. The average for the whole of France was 15s. 1½d. per ton. In Ireland the price stated to be contracted for the Sugar Beet Company was 15s. 6d. per ton, and the price at Essex was from 18s. to 20s. per ton. Thus it appeared that the present price in Ireland was higher than the average of France, and the present spice in Ireland was higher than the average of the highest-priced districts of France. What the future price in Ireland and England was likely to be was a difficult question, and had not been as yet fully investigated. As to the second question—the price of refined beet-sugar after 1854—it was necessary to take the year 1854, because at present there was a differential duty in favour of home-grown beet-sugar, which would diminish each year, and cease after July, 1854. After that time the short price of refined beet-sugar would most proba-

not exceed 27s. to 28s. per cwt., and the long price would most probably not exceed 40s. 4d. to 41s. 4d. per cwt. Indeed, a fall below those prices might be anticipated from three causes:—1st. From the diminished cost of production of refined cane-sugar, consequent on the increased consumption produced by the fall of its market price from 49s. 4d. to 42s. 4d. per cwt. on the equalization of the duties. 2nd. From the removal of the absurd restrictions now imposed on cane-sugar refiners. 3rd. From the competition between cane-sugar and beet-sugar, if the latter were manufactured to any extent. As to the third question, would it be profitable to manufacture from beet-root at the Irish price of 15s. 5d. per ton, or the Essex price of 19s. per ton, refined sugar to sell at 28s. per cwt? The calculations on this point which had been most relied on were two in number—that of Mr. W. K. Sullivan, chemist to the Museum of Irish Industry in Dublin, and that of M. Paul Hamoir, of the firm of Serret, Hamoir, Duquesne, and Co., the largest manufacture of beet-sugar at Valenciennes, dated 18th of April, 1850. These estimates were as follows:—

Mr. Sullivan's Estimate for Ireland.

60,000 tons of beet, at 15s per ton	£45,000
Cost of manufacture, at 9s per ton of beet	27,000
Total outlay	72,000
Produce, 5 per cent of sugar, at 28s per cwt.	93,000
Estimated profit	£21,000

Same Estimate applied to Essex.

60,000 tons of beet at 19s per ton	£57,000
Cost of manufacture, at 9s per ton of beet	27,000
Total outlay	84,000
Produce, 5 per cent of sugar, at 28s per cwt.	93,000
Estimated profit only	£9,000

Mr. Paul Hamoir's Estimate for France.

61,607 tons of beet, at 12s 11d per ton	38,400
Cost of manufacture, nearly 13s per ton of beet	39,900
Total outlay	78,300
Produce, 4½ per cent of sugar, at 39s per cwt	114,000
Estimated profit in France	£35,700

Same Estimate applied to Ireland.

61,607 tons of beet, at 15s 6d per ton	£46,080
Cost of manufacture, nearly 13s per ton of beet	39,900
Total outlay	85,980
Produce, 4½ per cent, of sugar, at 28s per cwt	81,430
Estimated loss in Ireland	£4,550

Same Estimate applied to Essex.

61,607 tons of beet, at 19s per ton	£58,527
Cost of manufacture, nearly 13s per ton of beet	39,900
Total outlay	98,427
Produce, 4½ per cent of sugar, at 28s per cwt.	81,430
Estimated loss in Essex	£16,997

From these simple calculations it appeared at once that, by only introducing into the estimates the Irish and English prices of beet-root and of refined beet-sugar, the result was so varied as to turn a profit of £35,000 at the French prices, on a capital of £78,000, into a loss of £4000 at the Irish prices, and a loss of £16,000 at the Essex prices. It followed, therefore, that the French estimate did not, as had been alleged, corroborate Mr. Sullivan's estimate; on the contrary, it showed how fallacious it was to reason from the success of the manufacture in France to its success in the United Kingdom, without taking into account the difference of the prices of beet-root and refined beet-sugar in both countries—the difference in economic conditions between the two countries being alone sufficient to make that which was profitable in France unprofitable here. The manufacture of beet-sugar had been first commenced in France when the continental system of Napoleon and the retaliation of England had almost excluded cane-sugar from France.—From that time to the present, beet-sugar had always had the protection of an artificial price—(the present price being 39s. per cwt. in France as compared with 28s. per cwt. in this country.) In every other country in the world where beet-sugar had been produced, it had the protection of an artificial high price. The conclusion was manifest, therefore, that, from any calculations yet submitted to the public, it appeared that the manufacture of beet-sugar could not be profitably carried on in the United Kingdom.

A GOVERNMENT DEPARTMENT OF AGRICULTURE.

It is stated in the papers that Government have made arrangements for creating a new Department of Agriculture,—an object we consider of paramount importance, and if judiciously prosecuted cannot fail of being highly instrumental in promoting the best interests of the country. An office in the Cabinet, in which the true value of agriculture will be adequately appreciated, and its welfare and advancement carefully studied and fostered, is what has been recommended in this Journal from its commencement. The field for the labors of such a Minister is indeed a wide and encouraging one; and there are few, if any parts of it, but would yield a bountiful harvest to diligent, enlightened and patriotic culture. We have already in active operation a system of Agricultural Societies, embracing most of the settled portions of the country; a Board of Agriculture for the Upper Province, just commencing its operations;—the theory of the art forms a part of the regular instruction given to young men in training for school-masters in our Normal Institution; and a Chair of Agriculture is on the eve of being filled in the Provincial University, in connection with an Experimental Farm. Similar agencies, we are happy to learn, have been, or are being brought into operation in the Lower Province; and a Minister of Agriculture, in a country where *four-fifths* of the population are directly engaged in that pursuit, would be a fitting representative of these various instrumentalities,

and would be the means of promoting the great interests of the country in many other ways, as yet untried or unknown. We regard a measure of this kind, come from whom it may, as entitled to the best wishes and support of all who are really anxious to see their country prosperous and advancing. To show that we have no class jealousies, we think that the Minister of Agriculture might advantageously embrace within his sphere of duty our domestic manufactures, Emigration, and all such matters relating to the domestic welfare of the country as are not strictly included by any specific department.—Whatever squabbling mere party politicians may have about this measure,—one thing is now pretty certain, and upon that we do most sincerely congratulate the farmers of Canada, that henceforth our Cabinet will have a MINISTER OF AGRICULTURE!

AGRICULTURAL OPERATIONS AND REMARKS FOR THE MONTH.

Continue the same work as last month so far as your necessities require, in procuring fencing and firing for the coming summer. This sleighing is just the thing for the purpose and the snow not too deep in the woods to move about comfortably; and although there is just now every appearance of long continuance of sleighing, such may not be the case.

Redouble your attention to your stock, for this weather is fearful and trying to them, and I think nothing will contribute more to their warmth than a full belly, but not of cold water.

Thrash out and carry to market your grain, so that you may not be troubled with that work in the Spring, when you have your hands more than full;—and try to clean your grain so that you may obtain the first price in the market. Cleaning grain well pays better than is generally imagined upon first thought;—for in cleaning a load (say fifty bushels) an extra time, you may probably take out one bushel, which might be worth, if sold in the load, three shillings, and that same bushel might be the cause of your whole load bringing one penny per bushel less; and although you have this one bushel less to sell, you have it for your hogs and poultry, for they must be fed on an equal quantity of something else if you have not this; and besides being an advantage to your pocket, it will be a credit to your country. Is that worth nothing?

Another occupation, which is both pleasant and profitable, is the reading of well selected Agricultural works, amongst these stand first to the Canadian, our own Journal; for it supplies both Canadian experience and Canadian practice, and can be had cheap and readily, say at 2s. 6d. per copy for a year, containing 384 pages or more than one full page for every day in the year. And it can be delivered, or sent to your nearest Post-office, for 6d. more, bringing it to the small price of a tenth of a penny per page; and beside the advantage and amusement to yourself, look also to that of your wife and family! In the rural districts of Canada, books are not always to be met with in every side-line and concession. And now that the Journal embraces the transactions of the Board of Agriculture (and that Board should be second to none in the British American Provinces) it will contain all prize essays and Agricultural reports of any importance, each of which conveys much valuable information to those of our calling. I can scarcely imagine any better or more profitable way of laying out part of the funds of each County and Township Agricultural Society than in the purchase and distribution of a copy of this Journal to each of its members. What farmer can read of the experiments and success of others, without feeling some desire to emulate their example? If we had not such a periodical as this to convey to others the experience of the improving and enterprising, the benefit of improved practice would be a long time in extending its influence over a new and thinly settled country like this by merely passing through the medium of personal intercourse. If any improvement takes place in machinery, in large manufacturing towns, where people are huddled together, the news of it flies from one to another without much difficulty, and they are all enabled at once to take advantage of the circumstance;—and how soon do they know when anything is oppressing them, or when they have not the cheap loaf!* On the contrary, with farmers generally they are as ignorant of most improvements as they are of the causes of the present price of wheat; but as I now feel myself approaching political ground, I will drop this subject till I cool off.

The present is a very good time to lay out your intended operations for the Spring, and seek out some good plump seed that shall be quite free from those of weeds; for when once they are introduced on the farm, it is a most difficult matter to banish them; especially the wild mustard, so called in this country, but in the old, charlock, or chadlock. In some sections of the country there are hundreds of acres almost ruined by this noxious weed; reminding one of the fields of Canadian thistles to be met with in Lower Canada, and sometimes in Upper. While on the subject of Spring-sowing, let me draw attention to the spirited list of prizes for flax and hemp offered by Mr. Widder of the Canada Company, that ever true friend and supporter of all Agricultural improvements. Therefore all who can conveniently try the experiment, should do so, in order that Canada may have a fair trial of the varied products of its soil and climate, at our next annual Agricultural, mechanical and manufacturing Exhibition, to be held in Toronto. Let all true friends of Canadian industry and advancement, in every department of labour and

* A gentleman that was at the World's Fair, told me that he saw in many windows in London the 4 lb. loaf at 4d.!

art, produce something for the occasion, and be sure *to prepare in time.*

R. L. D.

Township of York,
January 26, 1852.

INQUIRIES RESPECTING THE ACTION OF MANURES, &c.

(To the Editor of the Canadian Agriculturist.)

PIFFARDINIA, Livingston Co., N. Y.,
January 10, 1852.

MR. EDITOR:—I read your valuable paper with much pleasure and satisfaction. It is always so straightforward to all your correspondents on either side the question, which is the only true way of arriving at facts. It is not constantly puffing your own wares, as is too often the case. It is my opinion that much judgment must be exercised before trying experiments not founded on *practice.* There is so much "*humbug*" in what is *falsely called science,* that the farmer is often led astray by its erroneous statements. This gives him a distaste for reading, justifies him in condemning "*book farming,*" and induces him to pursue his habitual customs, whether it renders a profit or loss.

I am perfectly willing to admit that there is much benefit derived from *true science,*—but there are so many persons aiming at notoriety and "*professorships*" who base their foundation on *scientific words,* technical terms, and grammatical language, for the purpose of displaying their learning, and at the same time their "*noddle*" does not contain a practical idea. They involve themselves in a labyrinth of learned mystery, from which they cannot extricate themselves; and, in attempting to teach others their visionary pursuits, they have signally failed in the result. *Such is too much the fact.* I know many scientific gentlemen who study ancient authors, modern authors, and various kinds of authors, who have turned over as many leaves of paper and print in their *laboratory* as would puzzle the brains and confuse the imagination of a previously strong mind, and who have never turned a furrow or a compost heap in their lives, grope on in these *dark passages* until they are actually swamped in their extensive learning, and absolutely forget the place they started from. Farmers are beginning to understand this. They find that by reading practical letters, frequently published in your paper, and information derived from actual, practical, and other sources, endorsed by sound heads, strong hands, and willing hearts (the best parts of a farmer's capital) that they are more capable of taking care of themselves and their soils than trusting to the dictates of artificial education.

We all know full well that barn yard manure is a substantial fertilizer, and we likewise know that its value is estimated by the kind of food the animals consume; and we are also well aware if it is left in a position to draw away its strength that it is solely the owner's loss; but I for one *do not know* whether any of its substances *ever* evaporate into the atmosphere. We know too that excrements from the feathered tribes are valuable, and probably of more strength than the former, because the ingredients in the urine pass through the same channel, are not exposed to the washing of rains, and are generally conveyed to the land in their full power. We also know that night soil is still more powerful, and when a mixture of good roast beef, venison, some well fed carcases of Southdown, and Cotswold sheep, Berkshire and Leicester hams, well seasoned with wines, liquors, and beer, *to stir them well together* in uproarious confusion, is a valuable deposit. And I would strongly recommend City gentlemen to distribute this *high farming* produce amongst their neighbouring farmers, for the production of premium crops, *and setting good examples with money.* They must be aware that such a gift would be a *substantial one,* and the farmer to whom it was given would have an opportunity of displaying his *true science,* in its management and economy. It must be adulterated with weaker excrements or common earth, plaster, or lime, to effect its immediate action, or left to decay and then used in small quantities, or in any other form the farmer's good judgment may dictate; his *science* in a judicious disposition of it, would command confidence. If applied in its crude state extravagantly, it would destroy vegetation. Every *practical farmer* is aware of all this, and applies his manure according to its substance. But the farmer is highly indebted to chemistry for discovering the means of conveying this highly valuable article from its place of deposit to that where it is more profitably invested, *void of that offensive smell.* I must ask one question on this point which I have never yet seen satisfactorily answered. Is this odour, commonly called ammonia, to be classed with fertilizers? I have an impression from my own observation only, that it is not, and that manure is of no benefit to plants until it escapes from it, nor is it converted into food for them until thoroughly dissolved. It must be in solution before it can be absorbed by the roots (the only means of support to the plant, in my opinion) and when it is in this state there is no smell to it. For instance, apply fresh urine bountifully to a plant, it sickens, and often dies, because it has fed on unwholesome food; but place that urine a short distance from it, where it can be absorbed by the inorganised earth, and there held in solution until that unwholesomeness has escaped, the roots and fibres of the plant will gradually draw toward the spot in search of its food (if the immediate soil is nearly exhausted) and when they arrive there, it will grow luxuriantly; while fully supplied with it, the roots on that side the plant will be strong and vigorous, while on the other they will be weak and dwindling. This is from my own practical observation.

Here is another point on which I would like to gain some information. Does this odour, when absorbed by charcoal, gypsum, or any mineral called absorbents, tend to add strength to them as fertilizers, or is it taken up by them for the purpose of decaying them *prematurely? they not possessing this agent.* This seems to me like a reasonable question. I should like to

hear from some of your scientific gentlemen in your Province on that point. My opinion is that when green manure is ploughed into the earth, and there decays, that odour is taken up by the inorganised matter for the purpose of decaying that also. There is a portion of mineral substances required for plants, and that portion varies in their kinds, and when this decaying agent is absent, and there is a scarcity of these ingredients in the soil, and those waiting for time to decompose, the plant is deficient in them; but if there is an over abundance of this steam, which is the case when the soil is full of vegetable matter, and not sufficient absorbents to exhaust it, it evaporates and contaminates the atmosphere, and when there it is destructive to the human race, if kept constantly in contact with it. Probably, Mr. Editor, I shall be called an *ignoramus* by some of your *learned* gents for thus advancing *my* opinion, for it is all my own imagination, none of it gleaned from *false science*. If I am in error, it will be corrected by their proof to the contrary.

Yours, &c.,

Wm. Hy. Sotham.

Remarks.—Mr. Sotham's inquiries shall receive attention from ourselves or some of our correspondents. In the meantime we recommend him to peruse "*Norton's Elements of Scientific Agriculture*," in which he will find much light thrown upon the points mooted in his communication, and most of his difficulties removed. We think that if he would take a little more pains to make himself acquainted with the leading facts and doctrines of Chemical and Physiological Science, he would see satisfactory ground for expecting valuable aid from these sources to practical Agriculture. Counterfeit coin only shows more clearly the necessity of a careful search for the *genuine* metal. We are obliged for the article, "*Herefords* v. *Short-horns*," written by our correspondent and published some time since in the *Mark Lane Express*,—its re-publication in our pages, in the present state of the controversy, would, we think, throw little or no additional light upon the matter in dispute. We look upon all attempts to settle such a question as which is the best breed, *per se*, of horned cattle, as utopian and impracticable. Short-horns, Devons, Herefords, Welsh, Scots, &c., &c., are each first-rate animals in all such situations as nature, aided by art, has adapted them to; and the specific purposes for which animals are bred, whether for labour, the shambles, or the dairy, or for all these,—are, with other considerations of a subordinate character, essential elements of all calculations of this nature. We are glad to learn that the absurd practice of awarding a prize for *the best animal* (regardless of the breed) in the Smithfield Fat Cattle Show, is to be discontinued. The idea of grouping a Runt or West Highlander with a Hereford or a Durham! It would be just as reasonable to attempt settling which, in the abstract, is *the best breed of Dogs!* We are pleased to learn that Mr. Sotham considers his new locality more favourable to the improvement of his favourite herd of Herefords.

THE LATE PROPOSED PAMPHLET ON THE AGRICULTURE AND AGRICULTURAL SOCIETIES OF CANADA.

Our readers will most probably remember, that a prospectus and subscription list was circulated through both sections of the Province last year, with a view to the publication of a little work on the above important subject; and it was the particular wish of the writer, who had taken much pains, and shewn equal discrimination in the collecting and arranging of his materials, that the work should be published previous to the prorogation of the Provincial Legislature. Unfortunately the proposal did not meet with a sufficiently encouraging response to justify the writer to proceed with the publication, although all he asked was a sufficient number of subscribers, at a mere nominal price, to cover the bare expense of paper and printing. As the appeal was made to the united Province, the result must be considered as any thing but creditable to our taste and public spirit. We are enabled thus to speak of the intended publication, as the writer some time since placed the manuscript in our hands for our perusal and opinion; and we yet hope that means will be found for bringing it before the public, and we embrace the present opportunity of urging the object on all enterprising individuals, as well as agricultural societies. With the writer's permission, we lay before our readers some extracts from a private letter received a short time since, which will show more clearly his views and intentions.

Montreal, Nov. 29th, 1851.

My Dear Sir:—I was only favored with yours of the 18th instant, and think it as well to reply to it without further delay, as I find I have one or two things to gossip about.

Though I regret the delay that had taken place, I am of course quite satisfied with your explanation, and am sorry that sickness should have been one cause. I am also glad to find that you were on the whole pleased with the pamplet,

and more particulary with the hints about model farms and education, and trust that the good opinion inspired by a first cursory reading, will have been further confirmed by a more leisure perusal, though I cannot reasonably expect that we shall agree on all points. Whatever be the pamphlet's merits or demerits, my object was most disinterested and patriotic; and I would not help being persuaded that its publication at the particular time intended, as a faithful reflector of the natural state of things, would have proved useful to our Legislators, as well as to the farming community of both provinces; and I was even sanguine enough to believe that there would have been little or no difficulty in "getting it out" in time, without any further expense on my part, than "the brain." But alas! I reckoned without my host; and you may depend upon it I will not make another such mistake again. With regard to the channel through which the manuscript can be returned to me—if returned it must be—I leave that to your discretion, and should think you would have frequent opportunities for sending a small parcel of the kind by some careful friend, on whom you would depend, to be left at the British American Assurance Office, Great St. James' street. Should you do so, I shall feel much obliged by your getting for me, and sending with it a copy of Mr. Hind's Lectures on Agricultural Chemistry,—which I see by your November number, are not only in print, but going through a second edition, though here altogether unheard of, and unknown.

I am delighted to see the Board of Agriculture in working trim, as I am persuaded that its labors will prove of incalculable benefit to the Province; as well also the doings on the Experimental Farm, which I perceive also you are getting in order; and which I am glad to see you consider "*sufficiently extensive for all illustrative and purely experimental purposes.*" In short, I think you are getting on wonderfully well in the *West*, while the wise men of the *East* seem to stick in "the slough of Despond."

Allow me to congratulate you on the approaching improved, and extended compass of your journal, which I trust will place it on a par with the *Albany Cultivator* at least. I have read Mr. Treadwell's paper in your present number, with a great deal of pleasure, though I think that, as an Agricultural document, the sphere of observations might have been more limited, with greater benefit to our farmers. Would, however, that you had a dozen such men to supply your wants. I see, by the by, that the Board have judiciously ordered five hundred copies of this month's Journal (as containing Mr. T.'s article,) for gratuitous distribution, and that they have also ordered one hundred copies of Mr. Hind's Lectures for the same purpose. You will, perhaps, not wonder at my being inclined to think, that in a truly liberal patriotic point of view, and as an example to the agricultural magnates in this quarter, they might have ventured to stretch a point; and on the recommendation of yourself and Mr. Marks, volunteered half the expense of the publication of my pamphlet in a revised form,—such as, *without the Special Committee's Report*, &c.; in which case I should have had no objections to put my name to it. In the view which I took of things, I shunned as much as possible all narrow sectional prejudices, and made the evidence before me my only guide, and therefore though most blame was found to attach to Lower Canada, what I wrote, was, on the whole, not the less of value to the sister Provinces, and deserved to be equally known there; and by the same rule your Association, and still more so, the *Board*, should similary make a point of extending whatever they do, so as to embrace the benefit of *the whole of Canada*, and not Upper Canada alone. But, to return to the pamphlet; had your Board made such a proposal, the Lower Canada Association would, perhaps, have been put upon their metal, and made to volunteer the other half, which would not have been more than £10. If you think a move would yet be made in that direction, I should be glad to hear from you on the subject, without delay; and in the meantime I shall have no objections to your, with that view, giving Mr. Thomson and Mr. A. Fergusson, the perusal of the manuscript, with the understanding, that they will generously bear in mind that the thing was got up in a hurry, and that considerable *unexpected* alterations have taken place since I wrote.

IMPORTANCE OF RENEWING SHEEP PASTURES.

There are many useful suggestions in the following remarks of an Ohio correspondent of the *Wool Grower*. The climate of the greater portion of the North American continent is decidedly unsuited to *permanent* pasture,—such as characterises the British Isles. There a constant succession of a number of species of grasses obtains during the growing season, and sheep are fed on the same pastures, without being subjected to renewal, for entire centuries. It is most injurious anywhere to keep sheep confined long in one field;—a frequent change of pasturage, and separating the flock into small lots, have been found by experience most beneficial:—

Being myself a practical "wool grower," my experience may be of some value to others who have not been in the business so long as I have. I find that success in raising sheep and wool, depends much upon a "thorough cultivation of the soil." It is generally admitted that if sheep are kept in "good condition"—that is, rugged and strong—they are but little liable to disease, except contagious diseases. One thing I have observed with wool growers who have made it their principal business to grow wool, that they mostly succeed well for a few years; their sheep have been healthy and in good condition; but after that their sheep have declined, their fleeces become light, and many of them become weak, sickly, and die. Then the conclusion of their owner is, that it is necessary that they should be changed to other localities, and when done, a parcel more of them die; but, if they are taken to a more favourable locality, the balance again become sheep in good condition as before, and sometimes better

Now it is a settled principle in philosophy, "that there cannot be an effect without a cause." Then

let us look for the cause of the decline of sheep under the circumstances mentioned. When a man turns his attention to keeping sheep, from other branches of agriculture, he is very apt to go all to that branch Of consequence, he ploughs but little, finding, as his stock of sheep increases, that he needs more of his land in grass, until his fields are nearly all converted into sheep pastures, and in that condition they remain for years. The natural consequence of this is, that the good and wholesome grasses, such as timothy and red clover, die out, and their place is supplied with those kinds that are not so wholesome, such as "June grass," "blue grass," &c.;—and, in addition to this, the sheep often run over it and leave their dung upon it to moulder upon the top of the soil, through and among which the grass grows luxuriantly, undisturbed by the sheep, if they can sustain life without it by feeding upon those places upon which their dung has not been so plentifully strewn, until they almost, and sometimes quite, gnaw the grass out by the root; when, in other places in the same field, the grass is growing luxuriantly, and the owner, seeing it, thinks his sheep are in good pasture, until hunger forces them to eat from the luxuriant grass, which sickens them, gives them the scours and other diseases, and many of them die—some by lingering a week after they are unable to stand—so, at length, he comes to the conclusion that it is best to change his sheep, for they have been upon one farm long enough or too long; which is sorrowfully the case, unless they had better fare.

Now the remedy is here; do not over-stock, but keep a due proportion of all kinds of farm stock. To 200 sheep keep ten cows, six or eight head of horses, and fifteen or twenty hogs. For to support such a proportion of farm stock as this, it will be needful to plough about one-half of the farm every year, and changing with a proper rotation of crops; timothy and clover will be newly set in each field once every four years, which will keep the pastures healthy for sheep; and as many of the older ones sold as lambs raised each year, with a prudent cross from bucks of other families of sheep, will keep a change as regular and certain as the turning of a wheel, and my word for it, the sheep will need no other change, if they have a good shepherd, and but little medicine. Not that I wish to be understood that sheep so kept are not liable to sickness or death; but that they are not as likely to get into a declining, unhealthy condition, as when kept upon pastures that have long had sheep upon them without being ploughed. * * * * * * * I winter my sheep by selecting from the flock the small lambs, the old ewes that appear a little on the decline, and the choice bucks, and give them a little wheat bran, mixed with threshed oats or corn meal, and sometimes a little oil-cake. The balance of the flock, as well as those selected, I feed with corn fodder, when there is snow upon the ground, so that they will eat it; but when the ground is bare and the weather moderate, they will do without any coarse food, if the grass in the fields is not too closely eat off. I have never sheltered my sheep, only in cases of winter lambs, except a few I now have, to keep them safe from dogs.

BLANKETS FOR SHEEP.

A writer in a late number of the London *Agricultural Gazette*, says "we find on examining our mortality tables for the last twelve months, that out of 600 Cheviot and black faced Evehogs, the number of deaths has been but 16. Be it remembered, also, that with the exception of about a score, none of these ever tasted a turnip, but fared with the ewes on the hill. Since we commenced the use of jackets (small blankets) we have especially noticed an extraordinary diminution of the cases of 'sturdy,' or water in the head. Hydatids in the brain are generally understood to be induced by long continued heavy rains, cold winds, and general privation. Any one conversant with sheep must have observed the wool along the back parts in such a way as fully to expose the skin. The connexion between the spine and the brain is obvious, and it cannot be wondered that hydatids (little sacks filled with water) should be formed in the brains of sheep much exposed to severe storms without due shelter. Hence the advantages of covering their backs with some material which will protect them in a great measure from the chilling effects of wind and rain. The material used is woolen, the size being 23 inches by 15. We lately purchased some coarse blankets that made excellent covers, each jacket costing fourpence. The rams were put with the ewes on the 22d November; and we allow 45 to each male."

The above remarks from a flock-master of large experience in reference to the cause of hydatids, or what we should call water in the brains of sheep, are interesting in a medical and physiological point of view. We know one breeder in Vermont who covers the back of each sheep with a half yard of common sheeting, painted to shed rain. The practice is founded in reason, and is likely to extend—literally making cotton tributary to the production of wool. The growers of the former staple will not object if every sheep in the United States and Europe has a cotton "jacket;" for one that will answer every intention can be made cheaper of cotton than of wool. The comfort of domestic animals at the South is sadly, and most expensively neglected.—*Southern Cultivator.*

Farming in Ireland.—An association of English capitalists, comprising several Railway Contractors, has been formed, for the purpose of purchasing land in Ireland, and reselling or letting it in farms, thoroughly drained, fenced and otherwise fitted for cultivation on the English model. Many estates are now selling in Ireland at from 10 to 12 years purchase; the result, it is confidently believed, must be highly beneficial to that country.

Diminution of the Wheat Crop.—The *Journal of Agriculture* states that 12½ bushels of wheat per acre is the present average of the State of New York; that of Ohio being 15 bushels. Thirty years since the former averaged 30 bushels, and the latter 35 bushels per acre. This result is attributed chiefly to the carrying off phosphate of lime from the soil by repeated Wheat crops, without any renewal of that indispensable ingredient. In some sections of Upper Canada the same effects are observable, only as yet in a lesser degree.

Mice in Barns.—A correspondent of the *Rural New Yorker* observes that hay-mows having Spearmint in them were free from rats and mice, while other parts of the barn were much infested; and that a waggon-load of mint scattered through the grain, effectually prevents these depradations.

Effects of Peat Charcoal in preserving Potatoes.—The *Farmer's Herald* states that in putting a quantity of potatoes in the ordinary way, a small quantity of peat charcoal was strewn over the tubers in one of the pits; and on opening it the potatoes were quite sound, while in the other pits two thirds were quite rotted. All the other circumstances being alike, the difference in the result is attributed to the sole action of the charcoal.

PEDIGREES OF SHORT HORN CATTLE.

We have received from the Honorable Adam Fergusson the following account of Durham Stock recently bred by himself. As the facts are arranged under distinct heads, a form so convenient for reference, and comprising within a small compass all that appears essentially necessary for collecting materials for a Canadian Herd Book, we publish the list entire that others may adopt the same, or a similar arrangement We again call the attention of parties that may send in lists of pedigrees to the necessity of writing them in a *very plain hand*, and to be particular in the spelling of *proper names*; some of which, in the pedigrees of two or three horses recently received, we cannot possibly make out. It is superfluous to urge upon the breeders of Stock the importance of having a Provincial list of pedigrees, to which easy reference can be had by the public; and as soon as sufficient materials are collected the same might be published in pamphlet form. Stricter attention for the future, will no doubt be given to the question of *pedigrees* at our Provincial Exhibitions, in case of all stock purporting to be of pure breed; and it would be well for agricultural writers generally, to be more particular in regard to this matter, than, we believe is usually the case. Whatever difference of opinion may exist as to which is the best breed of cattle generally adapted to the climate, pastures and wants of this country,—a matter by the bye attended with almost insuperable difficulties in its solution,—it must be obvious to all that the introduction and perpetuation of the *best blood* of the various improved breeds is a thing of vital importance to the agricultural prosperity of this young country. :—

BULLS BRED BY HONORABLE ADAM FERGUSSON, CANADA WEST.

Date of Birth.	*Name.*	*Colour.*	*Sire.*	*Dam.*	*Remarks.*
April 6, 1845.	Fergus,	Red &W'te,	Wellington,	Pansey,	For pedigrees of Sire and Dam, see . American Herd Book, sold to John Harland, Esq., Guelph.
May 4, 1846.	Althorpe,	Roan,	Symmetry,	Nonpareil,	Sold to E. and W Gwillimsbury Society. For pedigrees of Sire and Dam, see A. Herd Book.
June 10, 1847.	Durham,	Roan,	Duke of Wellington,	Nonpareil,	Sold to Adelaide Society. For pedigrees, see A. Herd Book.
May 27, 1848.	Wheatear,	Red,	Howitt's Y'ng Bull	Nonpareil,	Gave his name from seeing Wheat in ear the day he was calved. Mr. Howitt's Young Bull was bred by Mr. Vail, Troy. Sire Meteor, Dam Hilpa. See A. Herd Book. Wheatear, was sold to Woodstock Society.
June 27, 1848.	Favorite,	Roan,	Althorpe,	Pansey,	Sold to Woodstock Society. For pedigrees of Dam, see A. Herd Book.
May 21, 1840.	Bruce,	Red &W'te,	Durham,	Pansey,	Gave him to Owen Sound Society.
June 12, 1851.	Kossuth,	Roan,	Halton,	Victoria,	Halton was purchased from Mr Vail, and bred by him. Sire *Meteor*, Dam *Lady Barrington*, see A. Herd Book. He was owned by John Wetenhall, Esq., and at his death became, by purchase, the sole property of A. Fergusson, who sold him for a large price to Mr. Chapman, Madison, Co., New York. Halton, when sold to Mr. C., was 3 years old. For pedigree of Victoria, see A. Herd Book.

COWS AND HEIFERS BRED BY HONORABLE ADAM FERGUSSON, CANADA WEST.

Birth.	*Name.*	*Colour.*	*Sire.*	*Dam.*	*Remarks.*
April 20, 1847.	Beauty, -	Roan,	Duke of Wel'gton.	Victoria,	For Sire and Dam see A. Herd Book. Sent this Heifer to my son David.
Febr'ry 4, 1848.	Lady Elgin	White,	Althorpe,	Flora,	Sold to Mr. Ferguson, Kingston, in 1851, with a Bull Calf, by Halton.
April 6, 1849.	Snowdrop,	White,	Durham,	Flora,	
March 29, 1850.	Mayflower,	White,	Halton,	Flora,	
April 20.	Adelaide,	Roan,	Halton,	Lady Elgin	
April 23.	Hawthorn,	White,	Halton,	Lavinia,	Dam out of Lavinia II. Sire, Duke of Wellington, for both see A. Herd Book.
May 1.	Dairymaid,	Roan,	Halton,	Beauty,	
July 1.	Duchess,	Red,	Halton,	Victoria,	
July 1.	Sprightly,	Roan,	Halton,	Daffodil,	Daffodil, bred by Mr. Sherwood, Auburn, N. Y., Sire, Symmetry, Dam Dairymaid, see A. Herd Book. Sold Daffodil in 1851, to Mr. Ferguson, Kingston, with a Bull Calf by Halton.
August 14,	Countess,	Red,	Halton,	Pansey,	Sold Pansey to Noel Becar, Esq., New York, at Rochester Show, Sept., 1851.
April 18.	Cowslip,	Roan,	Halton,	Flora,	
April 19.	Daisy,	Roan,	Halton,	Lavinia,	
July 5.	Primrose,	Roan,	Halton,	Pansey.	

ADAM FERGUSSON.

Woodhill, January 28, 1852.

GROWTH OF HOPS IN ENGLAND.—Our correspondent, H. T., will find in the following table the information he requires. The "old duty," by which all previous estimates or betting are determined, amounts to little more than half the whole of the impost paid into the Exchequer. For example—the old duty for 1851, was £130,055; while the actual Revenue duty amounted to £237,490. The Excise duty on English Hops has received an increase two or three times, and it now amounts almost to £1 sterling per 112lbs. The crop is liable to great fluctuations, as the following table will show; and the same remark applies to prices. The fly, or *aphis*, is one of the most destructive pests to hops, in the old country. For the mode of planting and cultivation our correspondent is referred to the 1st vol. of this Journal, for 1849, pp. 87, 88:

Hop Duty from the Year 1807, with the number of acres of land in cultivation:—

Year.	Acres.	Old Duty.
1807	38,218	£100,071
1808	38,436	251,089
1809	38,357	63,952
1810	38,265	73,514
1811	38,401	157,085
1812	38,498	30,561
1813	39,521	131,482
1814	40,575	140,292
1815	45,150	123,878
1816	44,219	46,302
1817	46,293	66,522
1818	48,593	199,465
1819	51,014	242,076
1820	50,048	138,330
1821	45,662	154,609
1822	43,766	203,724
1823	41,458	26,058
1824	43,419	148,333
1825	46,718	24,317
1826	50,471	269,331
1827	49,485	140,848
1828	48,365	172,027
1829	46,135	38,398
1830	46,726	88,027
1831	47,129	174,864
1832	47,101	139,018
1833	49,187	156,905
1834	51,273	189,713
1835	53,817	235,207
1836	55,422	200,322
1837	56,323	178,578
1838	55,045	171,556
1839	52,305	205,556

Year.	Acres.	Old Duty.
1840	44,805	34,091
1841	45,769	146,159
1842	43,720	169,776
1843	43,156	133,431
1844	44,485	140,322
1845	48,058	158,008
1846	51,948	242,929
1847	52,328	215,805
1848	49,232	212,416
1849	42,798	79,791
1850	43,127	233,393
1851		130,055

Excise Duty on Hops...	0	18	8	per cwt.
1840—5 p. cent additional	0	0	11 6-20	"
	0	19	7 6-20	per cwt.

HORTICULTURE.

THE SCIENCE AND PRINCIPLES OF GARDENING.—NO. II.

ORGANS AND PARTS OF PLANTS.

II.—ROOTS.

The root is a very important organ of the plant, serving to fix it in the ground, or whatever else it may grow upon, and is the medium by which it obtains nutriment from the soil. Roots are divided into numerous branches, and are devoid of leaves or scales upon their surface, and they gennerally descend more or less deeply into the earth, according to the nature of the plant and soil, so as to avoid exposure to light. A knowledge of the functions of the root is of the utmost importance to the successful cultivation of plants in general.

Roots may be regarded for practical purposes, either as fibrous or simple; and according to their capacity and disposition to form numerous little branches, will the plant that possesses them, be either easy or difficult to transplant. Trees or plants that have the habit of producing simple roots—"tap-roots" as they are usually called—are among the most uncertain to remove, unless they are transplanted young, when they will often be all the better for some purposes if they have the tap-root shortened, and are thus compelled to throw out side rootlets. The whole of the cabbage tribe are of this description. Other kinds of plants are thrown much sooner into fertility by one or several removals, because the reduction of the roots checks any propensity they may have to form superfluous wood and foliage. This is the case with most fruit-trees, and with many flowering plants.

Roots spread themselves, either horizontally or downwards. Some plants have a natural leaning to either the one of the other of these habits, and should be planted in deeper or shallower soil accordingly. But, in general, those which have a great depth of earth to grow in will be most luxuriant; while such as have their roots necessarily kept near the surface of the ground will be more fruitful and productive, as shall be hereafter explained.

In very poor sandy or gravelly soils, and especially in pure sand or gravel, the roots of plants have an interesting tendency to multiply themselves, and produce a profusion of fibres; as if for the purpose of picking up nutriment from a greater multitude of quarters, when it becomes more scanty. They likewise, in such positions, occasionally form small tubers on the roots, apparently to enable them to lay up moisture in themselves, against the occurrence of a particularly dry period. The former of these facts is instructive as well as pleasing, for it indicates that shrubs or trees reared on a light, poor, and shallow soil, will have the greater quantity of root-fibres, and thus be best fitted for transplanting. We have recently observed, however, with some astonishment, that trees planted on mere sand-hills, near the sea-coast, form scarcely any fibre, but send down long succulent roots to an immense depth—evincing a wonderful power of adapting themselves to circumstances; for, if they were merely to make lateral fibres in such a spot, like the more humble herbaceous tribes, they must soon perish; whereas, by striking down so deeply, they have the means of obtaining constant moisture in the driest weather.

III.—SPONGLETS.

At the top of every root or root fibre, there is a growing succulent point, like a piece of half formed wood, which botanists call the spongiole or spongelet, and which is the medium by which the great bulk of the plant's nutriment is imbibed. This spongelet, which is just an extension of the half elaborated sap or pulp before it is hardened, is extremely tender, porous and absorbent, and is paler, more fleshy, and transparent than the older parts of the roots. It takes up water and other liquids, and immediately conveys them throughout its substance as a sponge does. It will receive nothing but liquids, though it does not reject any thing they may have in solution. This is a fact of considerable importance, for it shows that whatever is intended for the food of plants, must be capable of being easily removed to a liquid state. Manures, therefore, or chemical applications, must either be readily reducible by water, or be rendered so by the addition of some acid or other ingredient.

As the spongelets play so very essential a part in the growth or sustenance of vegetables, it should always be a leading object to preserve and multiply them, where vigorous development is desired, or to lesson their number in case the plant is becoming too exuberant. In removing some plants, therefore, if balls of earth are attached to their roots, a large portion of the spongelets will remain uninjured, and they will thus experience a less decided check; or, if the increase of the plant's subsequent capacities for enlarging itself be sought, transplantation, with its necessary destruction of many spongelets, will produce a tendency to throw out a far greater number, and thus give the means of future extraordinary growth. It is pretty generally known, that most vegetables possess the power of renewing, and indefinitely multiplying their root fibres, on which the spongelets are situated, wherever these get severed or removed. At the same time, the reduction of the number of spongelets will often,

by staying undue luxuriance, induce a state of greater fertility, or entirely bring it about in plants that have previously been barren.

Newly planted things, being deprived for a time of a large proportion of their spongelets, require a larger supply of liquid food, if it be in the growing season, that the spongelets which remain may take up a greater quantity of it, and thus make good the deprivation. It is for this reason that the early autumn is considered preferable for planting all kinds of trees and shrubs, because there is not, for a long period afterwards, any demand upon their resources, and they are all able to form new spongelets before these are required. The beginning of the spring, or just before they acquire their full power of vitality, is the next best season, as they then have all the strength of the renewed vital energy to enable them rapidly to form new spongelets.

The excretions supposed to be given off by plants through their spongelets, and which were thought to deteriorate the soil, and render it unfit for a second crop of the same kind, are now proved to have little or no existence. The cause of the deterioration of soils by particular crops, for others of a similar kind, will be found in the fact, that certain plants withdraw peculiar gases or elements from the earth, and these have again to be supplied before similar plants can be satisfactorily grown on the same soil.

IV.—PORES.

In addition to the spongelets as a means of taking up food, plants are dotted all over the leaves, stems, and even roots, with numerous minute openings, called pores, which are often smaller than pin-holes, and by which liquid food in the soil, or that which is floating in the air, is freely received. Until very recently it was believed that the nutriment of plants was obtained almost solely through the roots. But it has now been proved that they *can* exist *wholly* on atmospheric supplies, and that they draw very largely from this resource at all times. The pores, therefore, are no doubt the means through which such nourishment is appropriated. But they are also the agents by which respiration is carried on, and probably are admitted. Those on the leaf undoubtedly lead to small air-cells, and are probably similar to the nostrils of animals, or the pores in the human body, or rather to the breathing pores in the sides of insects.

These pores have usually raised lips, which vary in their external forms, and appear to shut when wetted or in the dark, but they are always open when exposed to the dry atmosphere or the sun's light. It is through their pores that plants evaporate most of their superfluous water, similar to what animals do by breathing and perspiration.

The obstruction of the pores in animal bodies is well known to be productive of cutaneous diseases, and the operation of the like cause in plants is certain to induce a sickly state of the vegetable system. Hence the accumulation of dust of any description on the leaves and stem, is highly injurious; and in the absence of rain the gardener finds it necessary to apply artificial watering to out-of-door plants; while those growing in rooms or conservatories, exposed to dust, require a frequent and careful watering or sponging of the leaves, in order to keep them in a growing and healthy condition.

V.—SAP AND PULP.

The liquid matters imbibed by the spongelets and pores of plants, and transmitted through their system, acquire, as soon as appropriated, the name of sap; and after the two-thirds of the more watery constituents of this have been thrown off by evaporation, the remaining third, which is like the blood of animals, will be consolidated into a thicker consistence, termed pulp. The sap of plants, then, is the food which they have taken into their system in its crude state. Being diffused through their stems, and elaborated in the leaves, and the mere water discharged through the pores, it becomes pulp. This last, being the vital part and substance of plants, determines, by its abundance or deficiency, their healthiness or strength. If too little solid matter is taken up by the sap, (as will be the case in poor soils,) the plants will be weakly and yellowish; or, if the amount of light and air supplied to the plants, be insufficient to separate the watery from the substantial parts of the sap, and to bring it to its proper consistency, the shoots will become feeble, drawn, wanting in color, and the leaves pale and tender.

Pulp is chiefly composed of the carbon, or charcoal taken up by the sap, and is itself of a dark blue color; but the transparent tissue of the leaf in which it is enclosed, being more or less yellow, the combination of the two colors forms green, as blue paint mixed with yellow produces green. This will account for the yellow color of leaves when the pulp is deficient.

To Make Young Pear Trees Bear.—I was afflicted by the sight in my garden for four or five years, of the most luxuriant and thrifty young pear trees, which would not bear, but all their strength ran to wood. Vexed at this, I resolved to try the effect of bending down the branches so as to check the flow of sap and cause them to form fruit buds instead of wood buds. Accordingly, the first week of December, 1847, I filled my pockets with stout twine; I drove down some small pegs into the ground underneath my trees, [which had branched low, so as to make dwarfish heads;] I then tied a string to the end of every long shoot, and gradually bringing down the end of the limb till it curved down so as to make a considerable bend or bow, I fastened it in that position either by tying the other end of the string to the peg, or to another branch or a part of the trunk.

According to my expectation, the tree next year changed its habit of growth, and set an abundance of fruit buds. Since that, I have plentiful crops of fruit without trouble—take good care not to let many branches go on the upright system.—*Horticulturist.*

Tapioca.—A milk-white substance is deposited by the juice of the mandioca root, which being collected, and hardened by exposure to the sun, constitutes the article so well known as tapioca, from which wholesome and delicious puddings are made. So very poisonous is the root in its natural state, that it has been found to occasion death in a few minutes when administered experimentally to animals, and it is said that the natives used it with great effect many

years in destroying their Spanish persecutors. It has been ascertained by dissection that this poison operates by means of the nervous system, producing immediate convulsions and exquisite torments, as soon as it is introduced into the stomach. In some instances it has been used in the executions of criminals, in which cases death invariably ensued within five to ten minutes after imbibing it. The fatal principle appears to exist in certain gases which are dissipated by heat. This is conclusively proved, from the harmlessness and highly nutritious properties of the farina, when the process of manufacture has been completed.

It has been stated on good authority, that a single acre of land planted with the mandioca root, will afford nourishment to more persons than six acres of wheat planted in the same manner, and my own observation fully justifies this assertion. Concerning the value of the plant, Southey remarks with truth, that "If Ceres deserved a place in the mythology of Greece, far more might the deification of that person have been expected who instructed his fellows in the use of mandioca."—*Paraon the Amazon.*

Siberian Crabs for Hedges.—I saw not long ago a line of hedge which was made by planting the seeds of the Siberian Crab—a small ornamental variety of the apple, which is well known in the nurseries, and sought after for its little fruit. The tree, naturally, is a small one, and has not exactly thorns, but branches which become somewhat thorny and resisting. It naturally forms a thicket with a good many branches, so that it takes and keeps the hedge form very easily. He sowed the seeds of these crabs in the garden and when the seedlings were a year old he transplanted them into the row where they were to grow as a hedge. They were set six inches apart, in a single row, and the tops were cut off within three or four inches of the ground the same spring they were planted. This made the hedge bushy and thick at the bottom.

The hedge is now five years planted. It has attained its proper size, and having been regularly trimmed every spring, has become one of the thickest and the most impenetrable hedges I have ever seen. It requires trimming but once a year, and seems to me well able to take care of itself the rest of the time. Besides this, it has a fine appearance in the spring, when it is covered with blossoms, and in the autumn, as it begins to bear considerable fruit. Would not the Siberian Crab, or its seedlings, make a good farm fence?—*Horticulturist.*

Canada Balsam.—This Balsam, which is very useful to farmers and mechanics, and principally known as an ingredient in varnishes, may be had from the druggists. It is the pure, unadulterated sap, or turpentine of the American Pine, and is the only remedy for wounds within reach of the backwoodsmen of Canada. It is also used by the Laplanders and other northern nations. See that the wound be perfectly free from splinters, gravel, and all other irritating substances. If a cut, bring the edges of the wound together, pour some of the balsam upon a bit of lint or linen rag folded, and lay it on the injured part. Bind it up, and on no account disturb it unless it becomes painful, thereby indicating that the balsam does not agree with it. If it gets ruffed or loose, it may be necessary to apply a fresh dressing of balsam, but it generally adheres firmly, keeps the wound cool, and does its work of healing steadily, coming away when its part is done, and the flesh sound. The balsam has also been successfully applied to inveterate sores after blisters, or where the skin has been otherwise frayed

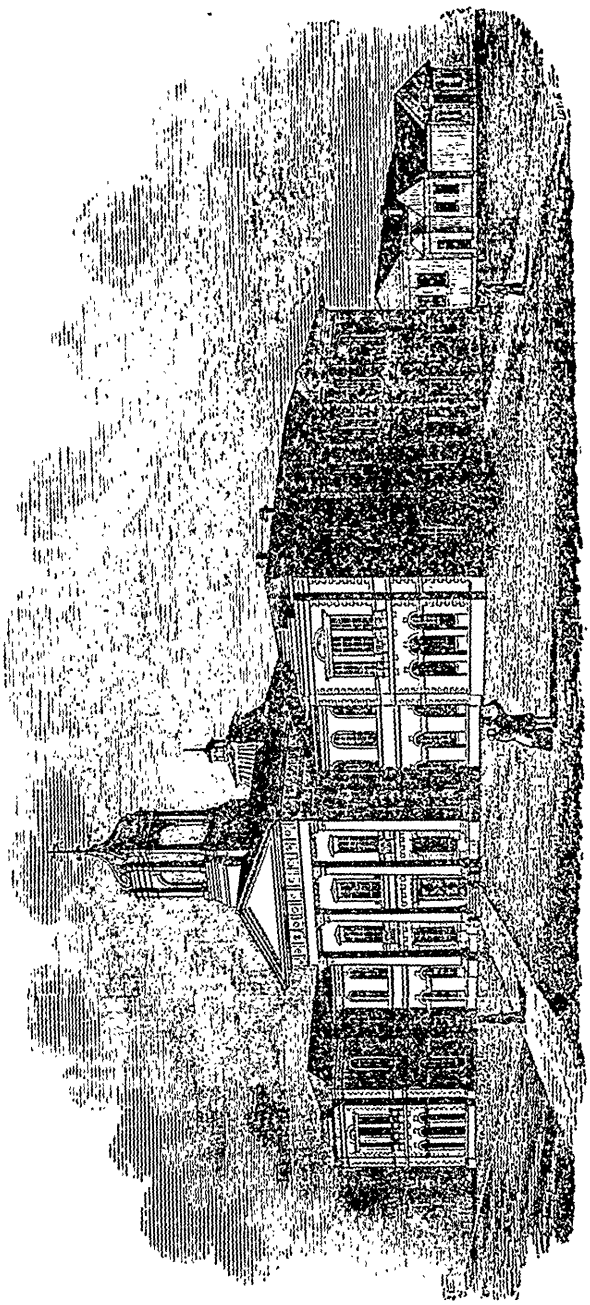
For animals, simply apply the balsam either with or without rag or lint, according to the part injured. It will harden of itself, and form a sufficient protection against the air and the flies.

Family Economist.

The Boundary Line of Knowledge.—We cannot artificially produce the organic acids from their elements. We are still ignorant how they are formed in plants and animals. All that is known on this point concerning the vegetable acids is, that they are formed from carbonic acid and water, the two chief sources of the nourishment of vegetables. But by what power, and in what manner, these two bodies are forced to combine in the grape-vine to form tartaric acid, in the fruit of the lemon tree to form citric acid, in apples to form malic acid, &c. we are entirely ignorant. We here stand as it were on the boundary line of our knowledge. Whether it will be permitted to us at some future period to advance beyond this limit, further investigations must show. In the meantime we must assume that the unknown power which causes the shoots, leaves, and blossoms to put forth from the seeds—we call it vital power—is also able to produce chemical combinations and decompositions more powerful and manifold than it is possible for the chemist to accomplish in his retorts and crucibles. In this sense we regard the organic acids, as in general all organic substances, as the chemical productions of the vital activity of plants and animals. —*Stockhardt's Experimental Chemistry.*

How to Admonish.—We must consult the gentlest manner and softest seasons of address; our advice must not fall like a violent storm, bearing down and making those to droop whom it is meant to cherish and refresh. It must descend as the dew upon the tender herb, or like melting flakes of snow; the softer it falls, the longer it dwells upon, and the deeper it sinks into the mind. If there are few who have the humility to receive advice as they ought, it is often because there are as few who have the discretion to convey it in a proper vehicle, and to qualify the harshness and bitterness of reproof, against which corrupt nature is apt to revolt, by an artful mixture of sweetening and agreeable ingredients. To probe the wound to the bottom, with all the boldness and resolution of a good spiritual surgeon, and yet with all the delicacy and tenderness of a friend, requires a very dexterous and masterly hand. An affable deportment, and a complacency of behaviour, will disarm the most obstinate. Whereas, if instead of pointing out their mistakes, we break out into unseemly sallies of passion, we cease to have any influence.

Friar Bacon's Prophecy.—"Bridges," says he, "unsupported by arches, can be made to span the foaming current; man shall descend to the bottom of the ocean, safely breathing, and treading with firm step on the golden sands never brightened by the light of day. Call but the secret powers of Sol and Luna into action and behold a single steersman, sitting at the helm, guiding the vessel which divides the waves with greater rapidity than if she had been filled with a crew of mariners toiling at their oars. And the loaded chariot, no longer encumbered with the panting steeds, darts on its course with relentless force and rapidity. Let the pure and simple elements do thy labor; bind the eternal elements, and yoke them to the same plough." Here, says a writer in *Blackwood's Magazine*, is poetry and philosophy wound together, making a wondrous chain of prophecy.



PERSPECTIVE VIEW OF THE NEW NORMAL SCHOOL AND EDUCATION OFFICES FOR CANADA WEST.

NEW NORMAL AND MODEL SCHOOLS.

Through the politeness of the Chief Superintendant of Education we are enabled to give our readers a view of the New Normal School in this City, now fast drawing to completion. It will be recollected that the interesting ceremony of laying the corner stone was performed by his Excellency the Governor General, July 2nd, 1851, midst a very large concourse of people; including the principal members of the Government and Legislature, and the most influential friends of academic, as well as popular education. Behind on the right is seen a small portion of the Model School. When the buildings are completed and the grounds laid out and planted, the whole will be highly ornamental to the city, and highly creditable to the good taste and enlightened and patriotic sentiment of the chief promoters of this important undertaking. The following description is taken from our useful cotemporary the *Journal of Education*.

The Normal and Model Schools for Upper Canada now in progress of erection—are situated upon e centre of an open square, bounded on the north Gerrard Street, on the east by Church Street, on e south by Goold Street, and on the west by Victia Street, in the City of Toronto. The distance m the Bay is about three quarters of a mile. The uation is a very beautiful one, being considerably vated above the business parts of the City, and mmanding a fine view of the Bay, Island, and ke. The Square, which contains seven acres and alf of ground, was purchased in August, 1850, m the Hon. Peter McGill, of Montreal, by the uncil of Public Instruction, for £4,500, in cash. e estimated value of the property is about £1,000 acre. The amount of the Legislative Grant for purchase of the site and the erection of the build-s, was £15,000. The amount of the contract for erection and completion of the building, is £8,790, lusive of extras, Architects' commission, warm-, &c. It is estimated that the furniture, &c., for building. will cost about £1,000 or £1,200.

n a building of so great an extent, it appeared to neither desirable nor expedient to adopt a rich or hly finished style of embellishment. The whole been designed with a view rather to utility than effect, care being taken however to maintain that ess of decoration by which the purpose and imtance of the Institution may be characterised and eld.

he principal Normal School Building, as seen in perspective, will be 184 feet 4 inches frontage, by pth on the flanks, east and west, of 85 feet 4 es.

he front will be in the Roman Doric order of ladian character, having for its centre, four pi-ers of the full height of the building, with pedi-t, surrounded by an open doric cupola, of the eme height of 95 feet. The principal entrance he Offices of the Educational Department, &c.) be in this front; those for the male and female ents being placed on the east and west sides ectively. In the centre of the building will be a e central hall, (open to the roof, and lighted by a ern,) with a gallery around it, at the level of the upper floor, approached on each floor by three corridors—south, east and west—and opening on the north to the Theatre or Examination Hall.

On the East side, the accommodation on the ground floor will be as follows:—

School of Art and Design, - -	36′	:	0″	x 28′	: 0″
" " "	36	:	5	x 28	: 0
Male Students' Retiring Room,	36	:	0	x 30	: 0
Council Room, - - - - - - - -	39	:	0	x 22	: 0
Male Students' Staircase, - - -	17	:	6	x 11	: 0

On the West side:—

Waiting Room, - - - - - - - -	22′	:	8″	x 14′	: 8″
Ante-Room, - - - - - - - - -	22	:	0	x 14	: 3
Chief Superintendent's Room, -	28	:	0	x 21	: 0
Depository for Books, Maps, &c.	28	:	0	x 21	: 0
Depository for Apparatus. &c.	22	:	8	x 14	: 8
Female Students' Retiring Room,	36	:	0	x 26	:10
Recording Clerk's Office, with fire proof vault, - - - - - - -	37	:11		x 22	: 0
Second Clerk's Office, - - - - -	22	:	0	x 14	: 3
Female Students' Staircase - -	17	:	0	x 11	: 0.

North of the Central Hall is the Theatre, with Lecturer's entrance in the centre, and side entrances east and west, for male and female students respectively. This portion of the Theatre is designed to accommodate 470 persons, and including the galleries, 620. Around the Theatre, and beneath its gallery, are east and west corridors, by which the students will reach the Model School.

By this arrangement it will be seen, that except when actually in the presence of the Masters, the male and female students will be entirely separated.

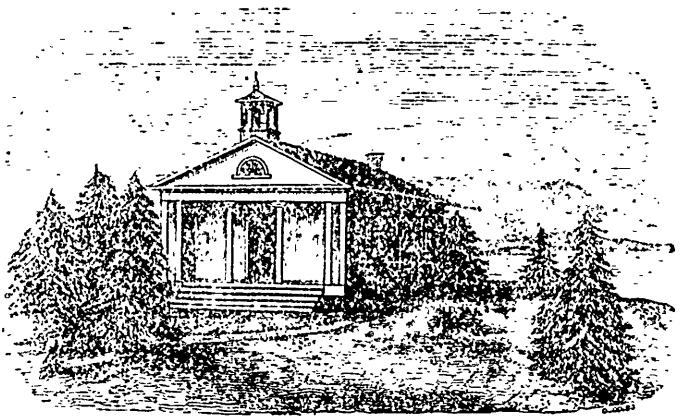
Passing (by the corridors last named) to the Model School, which is 175 feet 6 inches frontage, by 59 feet 6 inches, the students enter the boys and girls' schools by doors to the east and west, each of which has a large school room at its centre, 56 feet 6 inches x 33 feet, capable of accommodating 300 children, with four smaller class rooms adjoining it, about 17 feet x 15 feet 6 inches each. The boys and girls' entrances (like those for the students of the Normal School already described) are at the east and west ends of the building—such entrances having each a hat and cloak room and master's (or mistress') room on either side. These schools therefore will together accommodate 600 children.

Returning to the Normal School, and passing to the upper floor: on the landing of the staircases are entrances to the gallery of the Theatre, which is designed to accommodate 150 persons.

On the upper floor is the Central Hall, with its gallery connecting the east and west corridors, communicating with the following rooms:—

Class Room, - - - - - - -	56′	:	0″	x 36′	: 0″
" - - - - - - - -	56	:	0	x 36	: 0
" - - - - - - - -	45	:	2	x 28	: 0
" - - - - - - - -	32	:	8	x 23	: 0
1st Master's Room, - - - -	22	:	0	x 19	: 5½
2nd Master's Room, - - - -	22	:	0	x 19	: 5½
Museum, - - - - - - - -	42	:	0	x 22	: 0
Library, - - - - - - - -	39	:	5	x 22	: 0
Laboratory, - - - - - -	21	:	6	x 12	: 0

In addition to the accommodation thus enumerated, there are, in the Basement, rooms for the residence of the Janitor, together with furnace rooms, from whence warm air will be served to the whole building. Great attention has been bestowed upon the efficiency of the warming and ventilating, and it is confidently anticipated that the system adopted will be highly successful.

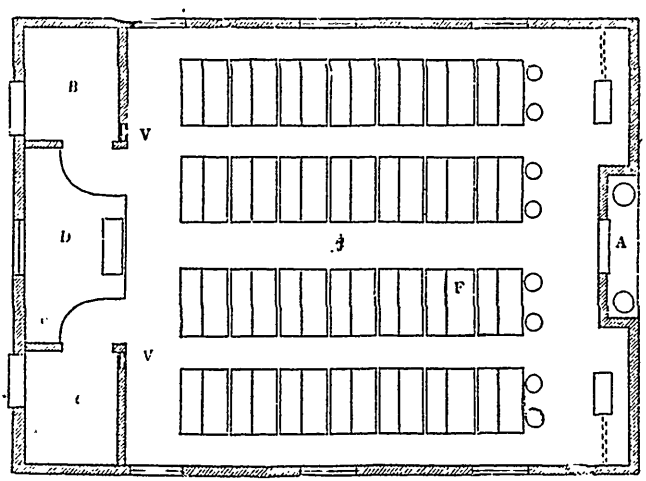


SCHOOL ARCHITECTURE.

We promised in one of our numbers of last year, to present our readers with engravings of a School House suitable to the wants of country school sections. Through some misunderstanding the cuts were not sent us as we had expected, and we were therefore unable to fulfil our promise. The Chief Superintendant of Schools has allowed us the use of two of the cuts which are given in this number. The plan of seats is supplied by our own engraver.

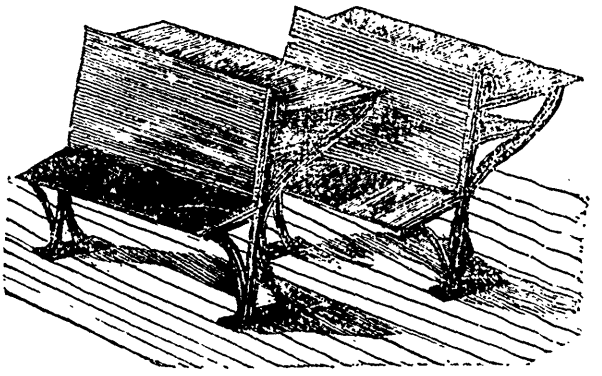
Under the new School Law it is probable that a large number of school houses will be erected every year in Canada for some time to come. is of the first importance that a proper plan sho be adopted, not only for the credit of the neig borhood, but the health and convenience of t children, and the relief and comfort of the teac ers.

The above is the perspective view of a Sch House, which may frequently be seen in N England. It is plain, and yet attractive, neat a convenient. The building is 40 feet long by wide, and 12 feet high in the clear. The Sch room is calculated to accomodate 64 pupils w seats and desks, each for two pupils.



A—Front entrance.
B—Girls' entrance.
C—Boys' do.
D—Teacher's platform.
E—Library.
S—Ventilating stove.
V—Flue for ventilation.
F—Seat and desk, with iron ends. See cut below.

The above is the ground plan showing the interior arrangements. We regard the arrangement of the seats as a most important matt fitting up a School House. Badly constr seats is the prevailing defect of nearly a... C dian School Houses. We never see small c ren perched up on "benches," their feet d ling some inches from the floor, and their b unsupported, without feeling commiseratio



e little sufferers, and regret that parents and chool trustees should prove themselves so cruel, at least so negligent of their children's health nd comfort.

The above is a good plan for seats. Each pil when properly seated can rest his feet on the floor without the muscles of the thigh pressing unduly upon the front edge of the seat, and with a support to the muscles of the back. The end pieces in the cut are of cast iron, but in this country, wood could be cheaply substituted.

EDUCATION OF THE HEART.

It is the vice of the age to substitute learning for isdom—to educate the head, and forget there is a ore important education necessary for the heart. Je reason is cultivated at an age when nature does t furnish the elements necessary to a successful cultation of it; and the child is solicited to reflection, en it is only capable of sensation and emotion. In ancy the attention and the memory are only excited ongly by the senses, and move the heart; and the her may instil more solid and available instructions an hour spent in the fields, where wisdom and good- s are exemplified, seen and felt, than in a month nt in the study, where they are expounded in stireoed aphorisms.

No physician doubts that precocious children, in y cases for one, are much the worse for the discine they have undergone. The mind seems to have n stained, and the foundation for insanity is laid.

When the studies of maturer years are stuffed into head of a child, people do not reflect on the anaical fact, that the brain of an infant is not the brain man; that the one is confirmed; and can bear exons; the other is growing, and requires repose; to force the attention to abstract facts; to load the nory with chronological and historical or scientific il; in short, to expect a child's brain to bear with unity the exertions of a man's, is as irrational as ld be to hazard the same sort of experiment on its cles.

he first eight or ten years of life should be devoted e education of the heart—to the formation of prin- s, rather than to the acquirement of what is usualrmed knowledge. Nature herself points out such rse for the emotions as are the liveliest and most moulded; being as yet unalloyed by passion. It is from this source that the mass of men are hereafter to show their sum of happiness or misery. The actions of the immense majority are, under all circumstances determined much more by feeling than reflection; in truth, life presents an happiness that we should feel rightly; very few instances occur where it is necessary that we should think profoundly.

Up to the seventh year of life, very great changes are going on in the structure of the brain, and demand, therefore, the utmost attention, not to interrupt them by improper or over-excitement. Just that degree of exercise should be given to the brain at this period that is necessary to its health; and the best is moral instruction, exemplified by objects which strike the senses.

It is perhaps unnecessary to add that at this period of life special attention should be given, both by parents and teachers, to the physical development of the child. Pure air and exercise are indispensable; and, wherever they are withheld, the consequences will be certain to extend themselves over the whole future life. The seeds of protracted and hopeless suffering have; in innumerable instances been sown in the constitution of the child; simply through ignorance of this great fundamental physical law; and, the time has come when the united voices of those innocent victims should ascend, "trumpet-tongued," to the ears of every parent and every teacher in the land. Give us fresh air and wholesome exercise; leave our expanding energies to be developed in accordance with the laws of our being, and full scope for the elastic and bounding impulses of nur young blood.—*Quarterly Review.*

It is computed, in a New York paper, that the value of the coal mined, during the year just closed, in the United States, is thirty-five millions of dollars.

SCIENTIFIC.

MR. RUTTAN'S REPLY TO "CARBONIC ACID."

To the Editor of the Canadian Agriculturist.

SIR:—Your correspondent, "*Carbonic Acid,*" thinks, no doubt, that there is wit in the signature he has adopted, and irony in the strictures which he has made upon my communication, in your November number, on the subject of Ventilation. "*Swimming and stilts,*"—*precisely so*; and I strongly recommend your correspondent, if he does not happen to be supplied with pretty long legs, whilst inhabitating his "hot-air" heated house, to procure stilts, upon the same principle that, if he should be an inhabitant of the "Grotto del Cane," and should breathe from the same stratum of air in which his dog breathed, he would be very apt to share the same fate. And so long as we follow the noxious and vicious practice of having cellars, and cellar-kitchens under our houses, *without a proper system of ventilation,* we shall live in precisely the same filthy and dangerous state as if all our cellars were "grottos del Canes," differing in degree only.

With respect to his assumption of a fictitious signature, "*Carbonic Acid*" must recollect that if this device gives him the advantage of attacking me in the dark, it accords to me, by all the rules of warfare, the privilege of not caring to be over fastidious, as to where, or how, or whom I strike, *in my defence*; and should I give him an unlucky *poke,* he is bound to take it with all meekness and humility.

Being a plain, practical man, and unwilling to occupy your valuable space unnecessarily, by intruding at large, upon a discussion of the strict definitions of scientific terms, even were I capable of doing so, your correspondent will excuse me if I at once return to the matter in issue between us.

"*Carbonic Acid*" controverts my assertion, that his name-sake is the cause of disease in families who inhabit dwellings, heated by the "hot-air" machinery, at present in use. He does not, indeed, deny in so many words, that the air taken into these furnaces, from the cellars, and from the surface of the ground, *is injurious to health, when* heated and forced up into the rooms, but the whole of his argument amounts to this; and, especially, does he deny that there is more carbonic acid gas in these localities than in any other, or in the upper or higher strata of the atmosphere. I cannot stand to carp about *words* or names. I have said that it is the carbonic acid gas which causes the illness which we invariably see in such dwellings—as, being heavier than the other constituents of the common air, it is found in larger quantities, at certain times, near the surface of the earth, than in the higher strata.—All this "*Carbonic Acid*" denies, and this I believe is the issue between us.

If I am in error as to the *name* of the substance, I am perfectly willing, being no chemist myself, to stand corrected; but my position is not at a thereby affected. It is enough, so far as regard your correspondent's whole argument and stric tures, that I prove that it is *something*—that it *malaria of some kind,* whose nature keeps it, certain times and under peculiar circumstance near the surface of the earth; and is invariabl *found, more or less, in* "wells, caverns, *mine* between joists, and other places uninfluenced b the motion of the atmosphere." If this delet rious matter be not carbonic acid, I think I no have a right to demand from your correspondei its real name and properties.

I had stated that the usual practice was to tak the air from the cellar, but that in some instanc it was taken from the surface of the ground, ou side of the house; and this latter practice I de nounced as "little better than the other." "*Ca bonic Acid*" *denies that either of these practice* is injurious; and in support of his position, urg his "Law of the diffusion of gases,"—and wit singular consistency he roundly avers, in the sam breath, that "there is a *larger* quantity of ca bonic acid in the upper regions of the atmo sphere!" Now, I submit that, by his own shew ing, this great "law" of his amounts to nothing for, certainly, it is no more unreasonable to sup pose, that if this "law" is not sufficiently un versal and powerful to prevent "a larger quan tity" *accumulating* "*in the upper regions,*" *might* be just as powerless in preventing its a cumulation at "the surface of the earth!" that, unless my logic is at fault, my friend h proved too much.

But let us see how far my view is borne out l evidence. In Chambers' Chemistry it is said "In most buildings the supply of air (for ventil tion) is taken too frequently from the most indi ferent sources, *the higher the source from whic the air is taken, the better it is in general. Great care, however, must be taken not to lead* from the same level as that of chimney tops the vicinity." From the same authority I quo "In old wells and pits it (carbonic acid gas) often so abundant that certain death ensues wh any one incautiously visits those in which it *accumulated.*" Again, "offensive gases, su as are found *at the surface of the earth, have b been considered to produce diseases of vario kinds.*" Having thus far proved my case, let see what *effects* this "hot air" has upon the milies of many intelligent men, who force t material up into every room in their dwellings W. S. Inman, F. I. B. A., says:—"Most hot stoves produce an excess of carbonic acid; he the dry, unpleasant feeling in rooms thus heat for asthmatic or consumptive persons, it increa their sufferings dreadfully."

As to the attempt by "*Carbonic Acid*" bolster up his character by his assertion, he "does not believe that his poisonous quan are so very extraordinary, &c." Charles H F. R. S., says: "Sir Humphrey Davy, Dr. C tison, Dr. Reid and Dr. Paris, think that it bonic acid gas) acts as a strong narcotic pois I think this quite sufficient to blast Mr. Carb Acid's reputation as an agent in the subject u consideration, forever.

But, nothing daunted, your correspondent denies that carbonic acid is heavier than the common air, or which amounts to the same thing, he asserts, that by this great "Law of the diffusion of gases," "*it* goes up," and the lighter air "comes down," and ridicules the idea, in his "stilts and swimming" paragraph, that this constituent of the atmosphere is at times found so dense as to be capable "of being poured out of a tumbler."—Mr. Tredgold gives the weight of a cubic foot of air in grams, (specific gravity being 10.000) to be 527.0—of carbonic acid gas, 803.8. Mr. Pilkington says: "Carbonic acid gas is nearly twice as heavy as atmospheric air, and it may therefore *be poured from one vessel into another*, or retained *in* a cask and drawn off like other liquors."

Being ignorant of chemistry myself, I beg to turn Mr. *Carbonic Acid* over to these gentlemen. It is true that in these times of the rapid advancement of science, there is no knowing what new discoveries your correspondent may have made. He may have some new light far ahead of these old fashioned gentlemen; for a man who has discovered that there is a "larger quantity of carbonic acid in the upper regions of the atmosphere, and about high mountains, which is brought down by the winds," than *in* the lower regions,—and that too in the face of his own "law of the diffusion of gases,"—can discover any thing!

Now, with respect to this great "law of the diffusion of gases," I believe every school-boy knows that the common atmosphere is made up of nothing else; but the real question, here, is, not whether these constituents will become mixed and diffused, so as to form what we call air, but whether they will, under peculiar circumstances, separate and, to a great extent, remain so; and also, whether, being separate, they will, under peculiar circumstances, remain so. If your correspondent means any thing by his argument, it must be that they will not. I want no stronger argument that they will, than the instances to which he himself alluded, viz.,- the "Grotto del Cane" in Italy, and the "Valley of Death" in Java. Both of these places are perfectly open and exposed to the whole atmosphere, yet no "diffusion" takes place; for, whilst in the former, a man breathing from strata, five or six feet above the ground remains unharmed, his dog almost instantly expires; and in the latter, men walk over the plains with impunity, whilst they are whitened by the bones of animals which have perished in accidentally running across them.

We all know, as a matter of fact, that this destructive gas, is *accumulated*,—not in all cases generated,—*in* wells, pits and caverns, in injurious quantities; and why not, pray, in walls, pits or caverns, which *we call cellars?* And if it would endanger the health of families to have this atmosphere in the Grotto del Cane, or on the surface of the ground, in the Valley of Death, forced up by our hot-air machines into their dwellings erected over them, why may it not be injurious in the case of our common cellars?

From your correspondent's assertion, that this destructive gas, at Carlsbad and the Rhine provinces, "is given out from the earth," and that it is "exhaled" from the "bottom of wells," &c., he leaves it to be inferred that it is never found, in "injurious quantities," except whilst it is in transitu *from* the earth *to* the "upper regions," where, he says, it is found in "larger quantities" than near the surface of the earth. This I deny.

The proofs that a deadly malaria sweeps over and covers the ground, especially in calm weather and at night, are so abundant, that the difficulty is to select and confine them within such compass as will not weary you or your readers. Mr. William Hosking, architect, and C. E., observes, (speaking of ventilation,) that "air may thus be drawn from a foul quarter, as in the case of a church surrounded by a burying-ground, &c."—*Chambers' Chemistry*:—"it (carbonic acid) is found during fermentation and putrefaction, and accumulates in old wells, pits and caverns, &c." It "*accumulates*," he says, in these places. I have said nothing more. And being thus accumulated, it is "forced up into every apartment of the dwelling by our hot-air machines." But, says further, the same authority: "Carbonic acid is found in air in every part of the globe, which has an important influence in numerous changes *at the surface of the earth.*" The italics both here and elsewhere are mine.

But I will not encumber your columns in a work so clearly of supererogation. If "Carbonic Acid" does not know that the air at the surface of the earth is less pure than in the "upper regions," and, in fact, that the principal causes of disease are the miasmatic substances arising from the decomposition of animal and vegetable matter, undisturbed by winds, every body else does; and this brings me to the consideration of his last assertion, worthy of notice, which, as it is short, I will give in his own words: "It is scarcely necessary to state that the assumption of cholera, consumption, scrotula and elephantiasis, being caused by exposure to carbonic acid alone, is unfounded,—in fact as are many of the statements to which I have alluded." Charles Hood, F. R. S., in his work on the ventilation of buildings, says: "The subject of ventilation has now, however, attracted more public attention; and we may therefore hope that the important means of improving the public health will henceforth be more fully considered; and that the time may come when architects will consider it as great a defect to neglect providing the means for admission and discharge of the air required for ventilation, as they would to omit the doors and windows of the buildings they are called upon to design and erect. The vast importance of ventilation was most forcibly demonstrated by the evidence taken before the Committee of the House of Commons, on the health of towns. *Scrofulous diseases are stated by the medical witnesses to be the result of bad ventilation;* and that in the case of silk weavers, who pass their lives in a more close and confined air than almost any other class of persons, *their children are frequently subject to scrofula* and softening of the bones. Most of the witnesses stated that *a deterioration of the race, undoubtedly occurs among those classes most exposed to bad ventilation;* and they consider that bad air deadens both the bodily and mental ener-

gies. The statements of some of the diseases produced by bad air, is absolutely sickening; and presents the consequences of violating the physical laws in a point of view which will scarcely find a parallel."

Consumption is but another variety (if I may be allowed to use my own word) of scrofula and elephantiasis;—they are all produced by the same cause,—contamination of the blood; only the one class is by transpiration *outward*, toward the skin; the other *inward*, to the lungs.

I have now only to show the probability of the correctness of my "opinion," "that this gas is the immediate cause of cholera," by referring to the facts stated in my former communication, which, it will be recollected, indicated that carbonic acid was invariably found in precisely the same sort of atmosphere in which I have proved, by the "most eminent physicians examined before a Committee of the House of Commons," the other diseases mentioned, were produced.

If this controversy was upon any less important subject, it might be a matter of doubt, as to whether I should enter the list with any anonymous writer; but this matter is of too much consequence to the public to permit me for one moment to allow any consideration of a personal kind to have weight against the correction of erroneous views, come from what quarter they may; and, therefore, in the words of my antagonist, I feel bound to "assist in a small degree that most important object of periodical literature—the promulgation of correct knowledge." And especially is it necessary when we see hundreds and thousands of heads of families, who are daily dooming to disease and death, their immortal offspring, merely from want of this "correct knowledge." Not that it is not offered to them, but because it is too much trouble to think for themselves, and they allow such men as "Carbonic Acid" to lull them to sleep by such puerile advice as "kicking out stoves, stuffing up windows, placing American ventilators near the ceiling," &c.

The truth is, that books are too often taken for brains, and instead of using them for the purpose of facilitating the operations of the mind upon enquiries into the practical operations of every-day life, and maturing the judgment, by which alone errors are corrected and truth substituted, they are too often allowed to usurp and occupy the whole ground, whence alone originality of thought can be expected.

"Carbonic Acid" is no doubt a practical chemist, what we term a learned man; for so nicely does he weigh and define the constituents of the atmosphere, that his fractioned nicetics are perfectly astounding,—6 2-100ths, 3 7-100ths, 4 15-100ths, 34-100ths, and so on, to the 1-10,100th part of a gram! Now, I advise my friend, when he comes to discuss any matter connected with the practical carrying out of the physical sciences to our every day purposes, to throw away his books, and manfully appeal to his own judgment and his every-day experience. And in order to help him out of the thraldom, in which I see he is held by his books, I must, Mr. Editor, crave your further indulgence for a single extract, and then I have done. "It has been remarked that the salubrity and healthy state of the air depends, in a great measure upon the quantity of oxygen gas it contains, and the quantity appears to exist *in all places exposed to a free atmosphere, and the influence of winds.* But the same uniformity does not prevail in the confined air of dwelling-houses, crowded theatres and hospitals, that are badly ventilated." Mr. Tredgold, referring to these remarks, says:—"Yet the chemist who wrote this remark was not able to detect an appreciable difference between the air of an hospital and that of an open situation; and the same thing is averred by other chemists. Seguin tried the air of an hospital, the odour of which was disagreeable, but it gave him the same result as the external air. The researches of Priestly, DeMarti, Gay Lussac and others, all tend to establish the same result; which is, that the composition of the atmosphere is essentially the same everywhere.—If you allow these experiments to be correct, they only prove that a deadly poison may be diffused through the atmosphere which the art of the chemist cannot detect, but of which we have better evidence"—(hear the practical man) "than is given by the nicest tests of the analytical chemist, in the pale visages and weakly constitution of the inhabitants of confined and crowded cities;—in the inhabitants of particular districts, and in the important alteration which a change of residence often produces in individuals unaccustomed to such changes."

Now, Sir, I think I have *proved* against this mere *assertion* of your correspondent, that there is deadly malaria and miasm of some kind, by whatever name called by chemists, (if indeed they know any thing more about it than I do,) which, from whatever cause, floats near the surface of the earth; and that it is the cause of disease, especially of cutaneous diseases and consumption; and, having in my former communication shewn that these diseases, as a general rule, prevail in precisely the same localities in which cholera has most prevailed, I submit that the inference is a perfectly logical and reasonable one, that this latter disease originates in the same cause. This, then, being the case, am I not correct in my conclusion, that the ventilating air should be taken from the higher strata, your correspondent's assertion to the contrary, notwithstanding?

The farming population are, now that fuel is becoming scarce, even in country places, and very dear in our cities, building hundreds and thousands of new houses, and for economy's sake adopting the stove, and, what is infinitely worse, the hot-air systems; and if I can shew them that they can put up a dwelling without any additional expense, which will insure, at all times a healthy atmosphere within its walls; and this too with additional warmth in cold weather, and a great saving of fuel, I think I can fairly claim to have accomplished what no other man has.

In any thing I have said, I am unwilling to be understood as feeling opposed to the discussion of this subject; on the contrary I court it and feel

obliged to your correspondent for having assisted in drawing public attention to this matter, than which none can be of greater importance generally, but especially to the inhabitants of the colder parts of North America.

Thanking you for the use of your columns, and complimenting you,—which I may fairly do,—upon the great improvement in the *Canadian Agriculturist*.

I remain yours, much obliged,

H. RUTTAN.

Cobourg, January 28, 1852.

ORIGIN OF SPONGE AND FLINT.

Professor Rymer Jones commenced a course of lectures before the members of the Literary and Philosophical Society, at the Music Hall. The lecturer said, his object was to elucidate the contents of the museum—to give some notion of the power, the might, the majesty of the Creator. It was of no consequence where they began the great study. To-night their lecture led them to the bottom of the ocean. Here they found the vast manufactory of nature—a machinery to create new worlds as our own earth was constructed. The progress was quiet, gentle, persevering. He took first the sponge. When alive it was covered with a film of oil—a substance like the white of eggs. The sponge itself was horny, elastic, resilient. It was building, remodelling the world, the film of jelly deriving from the water the substances of its structure. Whether it was animal or vegetable it was difficult to decide. The flint was once a sponge. Examined by the microscope in thin lamina, it was found to contain the fibres of the sponge, and countless millions of the shells of animalcule, which were drawn into the sponge while living, and lodged there when dead. The flint was found in the chalk only, and the tall chalk cliffs were formed in the bottom of the sea. They contained layer after layer of flints, laid as regularly as the bricks in a wall, indicating the series that had been gradually superposed. Paley said that if a man found a stone on the ground, for aught he knew it might have lain there for ever. But he knew not a stone, except the brick made by man, or the volcanic stone, in which all traces of organization were extirpated, that did not speak trumpet-tongued of its origin. The chalk contained tens of thousands of indications of beings that had perished. When the chalk was formed, the water was no less heavy than now; the waves roared as now, and the existing things at the bottom of the sea were ground to powder by the pounding waves, and these heaped up layer upon layer formed the strata of chalk. The sponges overwhelmed in these layers became flints. But the sponge, before it died, spouted out the germs of new sponges. The lecturer went on to speak of the construction of marble rocks, of corals, of limestone rocks, &c. This film of jelly had formed islands in the sea, made land where all was water, and rescued solid ground from the ocean. And this was the work of globules of jelly almost invisible to the human eye. In conclusion, the lecturer referred to the volcanic agency by which the strata formed in the course of ages in the bed of the ocean have been upheaved so as to form our tall cliffs and chains of mountains.—*Sheffield Independent.*

Land and Labour.—It is the grossest fallacy to suppose, that the land-owner can be prosperous, while manufactures decline. Lands, as fertile as those of England, now lie desolate, not by the course of nature, but because there are no populous cities in their vicinage to render their cultivation profitable.—*Ibid.*

COAL AND CIVILIZATION.

Coal was undoubtedly known to Theophrastus and Pliny, and from a very early period amongst the Britons. Nevertheless, for long after it was but little valued or appreciated, turf and wood being the common articles of consumption throughout the country. About the middle of the ninth century, a grant of land was made by the Abbey of Peterboro', under the restriction of certain payments in kind to the monastery, among which are specified sixty carts of wood, and as showing their comparative worth, only twelve carts of pit coal. Towards the end of the thirteenth century, Newcastle is said to have traded in the article, and by a charter of Henry III, of date 1281, a license is granted to the burgesses to dig for the mineral. About this period, coals, for the first time, began to be imported into London, but were made use of only by smiths, brewers, dyers, and other artizans, when, in consequence of the smoke being regarded as very injurious to the public health, parliament petitioned the king, Edward I. to prohibit the burning of coal, on the ground of being an intolerable nuisance. A proclamation was granted, conformable to the prayer of the petition; and the most severe inquisitorial measures were adopted to restrict or altogether abolish the use of the combustible, by fine, imprisonment, and destruction of the furnaces and workshops! They were again brought into common use in the time of Charles I. and have continued to increase steadily with the extension of the arts and manufactures, and the advancing tide of population, till now, in the metropolis and suburbs, coals are annually consumed to the amount of about three millions of tons. The use of coal in Scotland seems to be connected with the rise of the monasteries, institutions which were admirably suited to the times the conservators of learning, and pioneers of art and industry all over Europe, and in whose most rigorous exactions evidences can always be traced of a judicious and enlightened concern for the general improvement of the country. Under the regime of monastic rule at Dunfermline, coals were worked in the year 1291—at Dysart, and other places along the coast, about half a century later—and, generally, in the fourteenth and fifteenth centuries, the inhabitants were assessed in coals to churches and chapels, which, after the Reformation, have still continued to be paid in many parishes. Boethius records that in his time, the inhabitants of Fife and the Lothians dug "a black stone" which, when kindled, gave out a heat sufficient to melt iron. How long will the coal-mines of the British Isles last at the present, or even an increased expenditure of fuel?" So great has been the discrepancy, and so little understood the data on which to form a calculation, that the authorities variously estimate from two hundred to two thousand years. For home consumption the present rate is about thirty-two millions of tons annually. The export is about six millions: and yet such is the enormous mass of this combustible enclosed in one field alone, that no boundary can be fixed, even the most remote, for its exhaustion. The coal trade of Great Britain is nearly in proportion of three to two of that of all the other nations of the world; while in superficial area her coal measures are to those of the United States only as 11,859 square miles to 133,132 square miles. What a vision of the future is hereby disclosed! If rightly employed, if the arts and progressive development of society at all keep pace with the means provided, the human race in the New

World have a destiny to run, and a work of civilization to accomplish, to which the Old in its brightest achievements can furnish but a faint analogy. Scarcely two centuries have elapsed since coal was employed as an article of domestic use, or introduced upon the most limited scale into the manufactures: its now ascertained extent and boundless latent powers were not dreamt of or imagined even but half a century ago; and very recently the lamentation was general, that no coal measures existed in the mighty continent of America. Who now can fancy a limit to the social movement with which that vast hemisphere is heaving all over—the advancing tide of its population spreading in every region—the forests cleared and covered with a network of railways, the rivers bridged from end to end with a navy of steamships—and all vivified and in motion through the agency of this long undiscovered product of the earth? Geological time rolled on, and the surface of our planet was replenished with the hidden treasure and the man of science has no numbers to reckon the years that are past.—*The Course of Creation, by Dr. Anderson.*

WOOD FOR FUEL.

The high price of fire-wood in many of our cities is becoming most sensible to the feelings and pockets of a very large class of the inhabitants; and the return of an old genuine Canadian winter like the present, is well calculated to awaken attention to the important matter of economizing fuel. There is evinced by many people, a negligence in this respect, which it is difficult to account for, upon any principles of common sense. How large a proportion of the fire-wood for which there is now paid a large price, is either green or more or less saturated with moisture, and not uncommonly in an advanced state of decomposition. Now much of this evil admits of an easy remedy, viz :—a little reasonable forethought and attention. Firewood, like hay, should be preserved in as *dry* a state as possible; and any outlay incurred in erecting suitable woodsheds and laying in a timely and ample stock against winter will be abundantly compensated, in the economy and increased comfort thereby secured. The following observations from the *Scientific American*, on this subject, cannot fail to be interesting and useful to our readers:

"Three cords of green or partly seasoned wood will not warm a room for as great a length of time as one cord well dried, and entirely free from moisture. The rationale is simple, and although to be found in books, is nevertheless true; it may be thus understood:

Substances contain heat as latent in proportion to their bulk. Thus if we pour a cubic inch of alcohol on our head and fan it, the one cubic inch assumes the form of vapour and becomes 1,700 cubic inches, capable of receiving a proportionate amount of heat, and therefore takes heat, from the nearest hot object, the head, causing it to keep cool. Water placed on the head and then rapidly evaporated, will cool the head from the same cause. It may now be understood that a single pint of water contained in a piece of wood thrown on the fire, will first become 1,700 pints of vapor, and that this vapor, will increase in size one-five-hundredth part of its bulk for every degree added, so that it travels up the chimney, carrying with it as much heat as would warm all the air in a large room for a considerable space of time.

Many suppose that green wood may be burned in stoves with profit. This is an error, for the vapor will pass up the pipe carrying with it the heat, as preventing its being received by the iron and radiated into the room."

MAGNETISM.—Most extraordinary and inexplicable discoveries have been made, and are making, as experiments irrefragably prove, in regard to magnetism. They have been performed in Brighton, to the entire conviction of persons of the highest science both foreigners and British—and yet altogether so incredible, that we almost fear to allude to them as realities. They will, however, come before the Royal Society at its earliest re assembling, and be stated in all their details. Meanwhile, what will our readers and especially our scientific readers, think of the fact that the magnetic force runs in transverse directions as it may be employed by the male or female sex that is to say, that if in the hands of a male operator it proceeded from west to east, the same current in the hands of a female operator would immediately change to form north to south, or south to north, and cut the former line at about right angles. Thus magnetism is shown to derive different influences from the two sexes! But this is not all. A letter written by a woman weeks before, produces an effect upon the current of a like peculiar nature. And again any part of a dead animal, as the horn of a deer, a bit of ivory, and a dead fly held in the hand of any individual in contact, stops the magnetic action, which silk, the material from living worms, does not interrupt. In fine, there are wonders the most astonishing in store, and it does seem that we are, indeed, on the eve of what has for some time been prophesied, viz: penetrating deeply into the profoundest secrets and mysteries of this pervading agent in the whole economy of the universe, the globe we inhabit, and the human kind.—*London Paper.*

THE SUPPLY OF CARBON.—Carbonic acid is everywhere unceasingly generated, and especially in those regions of the earth where volcanoes are active, or probably were active in a former age. It is generated at the Grotto del Cane, near Naples, at Pyrmont, in Westphalia, and in the neighbourhood of the Lake of Laache, &c, and it oozes in a constant current from various crevices in different parts of the earth, and in all ordinary combustions. In the respiration of men and animals, as may easily be proved by blowing the air coming from the lungs through a glass tube into lime water, carbonate of lime is formed, which renders the clear liquid turbid. It is also generated in the fermentation which occurs in the making of wine, beer, and brandy. In this process the sugar is resolved into alcohol and carbonic acid; the former remains in the liquor, and imparts to it an intoxicating power, while the carbonic acid escapes in the air. It is produced by the decay and putrefaction of all animal and vegetable substances. Carbon is also contained in all organic bodies: during decay it is converted gradually by the oxygen of the air into carbonic acid; hence, wherever plants and animals exist, whether upon the earth, in the sea, or in the air, carbonic acid must be formed. All the carbonic acid thus formed is received into the air. If it should continue there, however, the air would become gradually deteriorated, more especially as in all the processes of breathing, combustion, and decay, free oxygen, or vital air, is taken from it. But this is not the case. The oxygen does not decrease, the carbonic acid does not increase. An unfathomable

wisdom has appointed the vegetable kingdom as the protector of animal life, and with wonderful simplicity has provided that plants should absorb from the air, as their principal means of support, the carbonic acid exhaled as useless by men and animals, and should yield oxygen to them in return.

MISCELLANY.

SPEAK NO ILL.

Nay speak no ill: a kindly word
Can never leave a sting behind;
And, oh! to breathe each talk we've heard,
Is far beneath a noble mind.
Full oft a better seed is sown,
By choosing thus the kinder plan;
For if but little good be known,
Still let us speak the best we can.

Give me the heart that fain would hide—
Would fain another's faults efface.
How can it pleasure human pride
To prove humanity but base?
No; let us reach a higher mood—
A nobler estimate of man;
Be earnest in the search for good,
And speak of all the best we can.

Then speak no ill—but lenient be
To others' failings as your own;
If you're the first a fault to see,
Be not the first to make it known.
For life is but a passing day,
No lip may tell how brief its span;
Then oh! the little time we stay,
Let's speak of all the best we can.

CANINE INTELLIGENCE.

The race of turnspits is almost extinct, as their services have been superseded by machinery, but in some places this has not been of long date. These dogs knew the roasting day most distinctly. At the the Jesuits' college at Fleeche, the cook took one of these dogs out of its turn to put it into the wheel of the spit; but the animal giving him a severe bite ran away, and drove from the yard the dog whose turn it really was. Arago describes something similar: he he saw several dogs at an inn, whose duty it was to turn the spit in regular rotation, one of which skulked away, and obstinately refused to work, because its turn had not come round, but went willingly enough into the wheel after its comrade had turned a few minutes. A dog, which was in the habit of accompanying its master from Paris to Charenton, where he spent the Sunday with a friend, having been locked up on two successive occasions, ran off alone to Charenton on the Saturday evening, and waited there for its master. A gentleman writing from Edinburgh, and speaking of the Scotch shepherd's dog, describes it is as one of the most intelligent of the canine family, as a constant attendant on his master, and never leaving him except in the performance of his duty. In some districts of Scotland these animals always accompany them to church; some of them are even more regular attendants than their masters, for, by an extraordinary computation of time, they never fail resorting thither, unless employed in attending their charge. To a stranger, their appearance is somewhat remarkable in such a spot, and the propriety with which they conduct themselves during the service, is remarkably singular. On one occasion, towards its close, one of the dogs showed an anxiety to get away, when his master, for this unmannerly conduct, very unceremoniously gave him a kick, which caused him to howl, and break the peace of the assembly, and, to add to his distress, some of his fellow-dogs attacked him, as dogs are wont to do, when they hear one of their species howl. The quarrel became so alarming that the precentor was forced to leave his seat, and use his authority in restoring peace, which was done by means of a few kicks. All the time of this disturbance the minister seemed very little discomfitted, continuing his preaching without intermission, which showed that such occurrences were not rare. In one parish great complaints were made against the disturbances occasioned during divine service by the quarrelling and otherwise unmannerly conduct of the dogs, when it was agreed that all those who had dogs should confine them, and not allow them to come to church. This did very well for the first Sunday or so; but the dogs not at all relishing to be locked up on a day when they were wont to enjoy themselves, were never to be found on the Sunday morning to be tied up: they by some instinct knew the Sunday as well as their masters, and set off before them, whither they had been in the habit of going on that day. It was now evident to the members of the congregation that this plan would not do, and another scheme was laid before them, which was, to erect a house close to the church in which they might be confined during divine service. This was adopted, and a kennel was accordingly built, in which the dogs were imprisoned; but the animals, being more accustomed to freedom than to confinement, took this restraint upon their liberty in ill part, and set up a most dreadful howling, to the great annoyance of the people in the church. They, however, persevered in confining them for a considerable time, thinking the animals would get accustomed to their incarceration; but in this they were mistaken, for instead of the howling diminishing, it got worse and worse. So it was agreed they should again be set at liberty, and have freedom of access to the place of public worship; but their manners had been so corrupted that they were with difficulty brought even to their former discipline.—*The Passions of Animals, by E. P. Thompson.*

CAUTION.—At an inquest held in London, the other day, it was proved that a child lost its life in consequence of having its head covered over with the bed clothes whilst sleeping with its parents. Mr. Wakley, the Coroner, said that "human breath was a most deadly poison, and even a man could as effectually kill himself by covering his head with the bed-clothes, and breathing over and over again the same air, as he might by taking prussic acid. In children, death was very easily caused by these means, especially when there was any bronchital affection."—*English Paper.*

POWER OF THE PEOPLE.—Much as a wise government may do, and it ought to do the very utmost that it can, there is no government, whether conservative, reforming, or radical, which can do the hundredth part of what the people can and must do for themselves, if they are to bear up against inevitable burdens, and recover permanent prosperity.—*Edinburgh Review.*

BATHS IN PRIVATE DWELLINGS.—Throughout the vast empire of Russia, through all Finland, Lapland, Sweden, and Norway, there is no cottage so poor, no hut so destitute, but it possesses its vapour bath, in which all its inhabitants every Saturday at least, and every day in cases of sickness, experience comfort and salubrity. It is true with us, now, the first-rate buildings generally have attached to them a private bath; but the use of them amongst the middle class is not so general as might be. In America a bath room is a part of every modern dwelling, and no one will occupy a house without one; the bath itself being provided with hot water from a peculiar and ingenious kind of cooking stove, somewhat like those used in the houses of our nobility, but on a more economical plan. In the suburban districts of London the houses generally erected have not these conveniences supplied, but it is owing to the bad management of the speculating builders; to supply these deficiencies is a moral duty they owe to all. Builders themselves must bear in mind that, during the progress of the building, a bath room might be built at half the cost, when the materials and labour are there on the spot; and that after a house is finished few are willing to incur such an additional trouble and expense. If cement were less used for external effect, which, even in the hands of a skilful architect, is rarely treated successfully, that additional expense would be saved, and the conveniences internally might be more generally attended to; and the saving in this respect might be employed for the erection of a bath room.—*Builder.*

HOW TO GET RID OF COCKROACHES.—Mr. Tewkesbury, of Nottingham, in a letter to the *Manx Sun*, says:—"I forward an easy, clean, and certain method of eradicating these insects from dwelling houses. A few years ago my house was infested with cockroaches (or 'clocks,' as they are called here,) and I was recommended to try cucumber peelings as a remedy. I accordingly, immediately before bedtime, strewed the floor of those parts of the house most infested with the vermin with the green peel, cut not very thin from the cucumber, and sat up half an hour later than usual to watch the effect. Before the expiration of that time the floor where the peel lay was completely covered with cockroaches, so much so, that the vegetable could not be seen, so voraciously were they engaged in sucking the poisonous moisture from it. I adopted the same plan the following night, but my visitors were not near so numerous—I should think not more than a fourth of the previous night. On the third night I did not discover one; but anxious to ascertain whether the house was quite clear of them, I examined the peel after I had laid it down about half an hour, and perceived that it was covered with myriads of minute cockroaches about the size of a flea. I therefore allowed the peel to lie till morning, and from that moment I have not seen a cockroach in the house. It is a very old building; and I am certain that the above remedy only requires to be persevered in for three or four nights, to completely eradicate the pest. Of course it should be fresh cucumber peel every night.—*Builder.*

PROPERTY IN GREAT BRITAIN.—The Committee of the House of Commons, in their report on the law of partnership, which has, with the evidence, just been printed, state that in round numbers, in thirty-three years since the peace, whilst lands in Great Britain have increased only 8,500,000 in annual value, or a little more than 5 per cent., messuages (being chiefly houses and manufactories and warehouses in and near towns, and inhabited by persons depending greatly on trade and commerce) have augmented above £26,000,000 in annual value, or about 30 per cent., in the same period. The value of railways, gas works, and other property chiefly held in shares as personal property, had increased about twelvefold in the period.

A CASE OF CONSCIENCE.—A Christian who found himself in want of money, wished to borrow money from a heathen, and gave him a pledge for it. He drew up a note in the form desired by the heathen, in which he bound himself by a heathen oath to repay the money lent in a given time. But he considered himself as not bound by his word, because he regarded an oath taken in the name of the gods as a nullity, and thought himself guilty of no idolatry, because he had only written down words dictated to him by another, and because in doing so, he had shown that he regarded an oath taken in the name of the gods as absolutely null and void. It might be, that the Christian at first, when necessity led him to seek for a loan, intended to repay it at the right time; and that he at first justified himself in that sophistical manner only in reference to the acknowledgment of the gods, but afterwards when he could not repay the money, added a second self-deception to the first, when he asserted the nullity of an oath taken in the name of the gods, and then made use of this assertion, in order to clear his conscience from the charge of taking a part in the worship of the gods. Tertullian lays open the sophistry of this twofold self-deception. He says that when one person writes what another dictates to him, as if it proceeded from himself, he thereby makes it his own, equally whether he expresses his sentiments by word of mouth or in writing.—*Neander's Planting of Christianity: Bohn's Standard Library.*

TENACITY OF LIFE IN THE POLYPI.—Among the lower animals this faculty is the more remarkable in the polypi: they may be pounded into a mortar, split up, turned inside out like a glove, and divided into parts, without injury to life; fire alone is fatal to them. It is now about a hundred years since Tremblev made us acquainted with these animals, and first discovered their indestructibility. It has subsequently been taken up by other natural historians, who have followed up these experiments, and have even gone so far as to produce monsters by grafting. If they be turned inside out, they attempt to replace themselves, and if unsuccessfully, the outer surface assumes the properties, and powers of the inner, and the reverse. If the effort be partially successfully only, the part turned back disappears in twenty-four hours in that part of the body it embraces, in such a manner that the arms which projected behind, are now fixed in the centre of the body; the original opening also disappears, and in the room of feelers a new mouth is formed, to which new feelers attach themselves; and this new mouth feeds immediately. The healed extremity elongates itself into a tail, of which the animal has now two. If two polypi be passed into another like tubes, and pierced through with a bristle, the inner one works its way through the other, and comes forth again in a few days; in some instances, however, they grow together, and then a double row of feelers surround the mouth. If they be mutilated, the divided parts grow together again, and even pieces of two separate individuals will unite into one.—*Thomson's Passions of Animals.*

THE EAR OF ANIMALS.—Among mammalia the formation the ear varies in very many cases, according to the habits and peculiar nature of the animal. The portion of the ear of the mole assigned for the cognizance of sounds passing in the air, is less perfect than those which, deeper seated, receive the impression of any

sound or vibration proceeding from the earth. The beaver has the power, when diving, to fold its ears backwards on its head; and the water-shrew, for the same purpose, has three distinct flaps, which close the orifice, in the same manner that any diving or burrowing animals are furnished with flaps to the nose, by which they close the entrance to all injurious bodies.

The hippopotamus, which remains for lengthened periods beneath the surface of the water, is also provided with a valve-like apparatus.—Hares and rabbits, which squat close on the ground, and which might be more readily discovered where any projecting point of their bodies to be visible, fold their ears flat backward. In all, this sense is remarkably keen; and with horses it is only exceeded by that of the smell; they hear sounds and are restless long before the rider can perceive an animal or a human being in the distance.—The carrier-horses in Switzerland hear the fall of an avalanche, and warn masters of danger by their terror, and by refusing to advance, and even by turning in an opposite direction. The acute sensibility of this organ is somewhat obstructed by the bushy hairs which grow in the outer sheath; and thus horse-dealers cut them out from horses they have for sale, in order that sounds, striking on the nerves with greater force, may, by exciting the animals, give them a more lively appearance. The flight of the bat, like that of the owl, is perfectly noiseless; and its ear equally acute detects the slightest humming of an insect, at a distance of several feet, and while it catches such as are in flight, it touches none which have settled or are silent.—*Ibid.*

Habits of Insects.—The assertion is altogether groundless that insects experience no sensations of pain, although transfixed with a pin, around which even a slight deposit of verdigris collects, and left till they perish from hunger; for, although in all probability they do not suffer pain during the latter period, there is no doubt but they feel acutely at the moment of the transfixion. It is only necessary to watch the effect when a needle is thrust through the back of an insect, and it will be obvious that it makes many powerful and convulsive movements, indicative of pain, and not of struggle for escape. Butterflies, pierced with a common pin exhibit these symptoms, and the spasms are repeated if a heated pin be afterwards introduced. But still, as said before, much depends on the perfection of the organization; and, besides, the formation of insects is so peculiar to themselves, that we have no parallel in any of the other classes. Some of the animals in the class Vermes may be cut and divided *ad infinitum*, and each part will eventually become a perfect animal. Some insects without this reproductive power will bear dividing, and still continue to live, and perform most of the various functions with which they are endowed. The common dragon-fly (*Libellula varia*) will live for days without its head; and if, instead of the head, the abdomen be taken away, the animal seems to feel no material injury.—This insect is of a most voracious nature, and has been known to feed under the following extraordinary circumstances. A gentleman being engaged in collecting insects, caught a specimen of the common dragon-fly, which he fastened down in his collecting box, with a large pin thrust through its thorax; when, to his astonishment, he observed the dragon-fly hold in its forceps a fly, which was still struggling for liberty. This it soon devoured, without exhibiting any signs of pain, seeming wholly unconscious of its own unpleasant situation, being still secured by the pin before named to a piece of cork. When the fly was devoured the insect began to flutter, and made several attempts to regain its liberty. The gentleman, greatly surprised at this incident, and willing to improve the experiment still further, caught another fly, which he offered to it. This was eagerly seized by the rapacious insect, and devoured with greediness; and when its meal was finished, it began to flutter again as before. It certainly is not derogating from the benevolence so conspicuous in all the works of Providence, to conceive it probable that it has, with infinite wisdom, withheld from some of the lower classes of animals, that degree of sensation so abundantly dispensed to others filling the higher ranks of creation, as, from the habits necessarily entailed upon them, they are more likely to encounter accidents that tend to mutilate, than other individuals of higher powers of sensation.—*Ibid.*

Sagacity of the Donkey.—The ass is always esteemed the stupidest of animals, yet if one be shut up in the same enclosure with half-a-dozen horses of the finest blood, and the party escape, it is infallibly the poor donkey that has led the way. It is he alone that penetrates the secret of the bolt and latch; and he may be often seen snuffing over a piece of work, to which all other animals are incompetent.—*Thomson's Passions of Animals.*

RECIPES.

To Milk Cows.—A cow should be milked *clean*. Not a drop, if it can be avoided, should be left in the udder. It has been proved that the half-pint that comes out *last*, has *twelve times*, I think it is, as much butter in it as the half-pint that comes out *first*. The udder would seem to be a sort of milk-pan in which the cream is uppermost, and, of course, comes out last, seeing that the outlet is at the bottom. But, besides this, if you do not milk clean, the cow will give less and less milk, and will become dry much sooner than she ought.—Cobbett.

Things to be found out.—Nature is not exhausted. Within her fertile bosom there may be thousands of substances yet unknown, as precious as the only recently found gutta percha. To doubt this, would be to repudiate the most logical inference afforded by the whole history of the earth. Corn and the grape excepted, nearly all our staples in vegetable food are of comparatively modern discovery. Society had a long existence without tea, coffee, cotton, cocoa, sugar and potatoes. Who shall say there is not a more nutritious plant than the sugar-cane, a finer root than the potato, a more useful tree than the cotton. Buried wealth lies everywhere in the bowels of the earth, which needs but the true divining rod of organized action for its discovery.—Athenæum.

Economy in Candles.—If you are without a rush-light, and would burn a candle all night, unless you use the following precaution it is ten to one an ordinary candle will gutter away in an hour or two, sometimes to the endangering the safety of the house. This may be avoided by placing as much common salt, finely powdered, as will reach from the tallow to the bottom of the black part of the wick of a partly-burnt candle, when, if the same be lit, it will burn very slowly, yielding a sufficient light for a bed-chamber; the salt will gradually sink as the tallow is consumed, the melted tallow being drawn through the salt, and consumed in the wick.—*Family Economist.*

Tea Cakes.—Take, of white flour, two pounds; bi-carbonate of soda, quarter of an ounce; sugar, two ounces; butter, two ounces; sour buttermilk, twenty ounces, or one pint. Rub the soda, sugar, and butter well into the flour, and mix with the buttermilk; roll out and make into cakes of any convenient size, and bake in a moderate oven twenty minutes.

RECIPES.

BUTTERMILK.—It is not generally known that buttermilk can be used for many purposes in domestic affairs; and in consequence it is often thrown away or given to pigs. New buttermilk, as a drink, is cooling and moist, the best remedy for a hot thirsty stomach, good for hoarseness, excellent in consumptions and fevers, and also for constipation of the bowels. When stale and sour, it may be used in combination with bi-carbonate of soda for the making of bread, pastry, &c. The bread, buns and rolls made with it are excellent, keeping moist and good much longer than those made with yeast.

SCOTCH BUNS.—Take, of white flour, two pounds; bi-carbonate of soda, two drachms; salt, quarter of an ounce; sour buttermilk, one pint or twenty ounces. Mix and bake the same as for tea-cakes.

COMPOSITION FOR RESTORING SCORCHED LINEN.—It sometimes happens that linen is scorched from either being placed too near the fire to air, or from being ironed with an iron too much heated. There has hitherto been no remedy offered to restore the colour of the linen when the action of the fire has only browned it, without destroying the tissue. It is almost needless to add that if the tissue of linen is so much burnt that no strength is left, it is useless to apply this composition: for nothing could prevent a hole from being formed, although the composition would by no means tend to hasten that consummation. But if the scorching is not quite through, and the threads not actually consumed, then the application of this composition, followed by two or three good washings, will restore the linen to its pristine colour; the marks of the scorching will be so totally effaced as to be imperceptible, and the place will seem as white and as perfect as any other part of the linen.

Mix well together two ounces of fuller's earth reduced to powder, one ounce of hen's dung, half an ounce of cake soap scraped, and the juice of two large onions, obtained by the onions being cut up, beaten in a mortar and pressed. Boil this mass in half a pint of strong vinegar, stirring it from time to time, until it form a thick liquid compound. Spread this composition thickly over the entire surface of the scorched part, and let it remain on twenty-four hours. If the scorching was slight, this will prove sufficient, with the assistance of two subsequent washings, to eradicate the stain. If, however, the scorching was strong, a second coating of the composition should be put on after removing the first; and this should also remain on for twenty-four hours. If, after the linen has been washed twice or thrice, the stains have not wholly disappeared, the composition may be used again, in proportion to the intensity of the discolouration remaining, when a complete cure will seldom fail to be effected. It has scarcely ever happened that a third application was found necessary. The remainder of the composition should be kept for use in a gallipot tied over with bladder.—*Hand Book of the Laundry.*

LEICESTERSHIRE PORK PIES.—To thirteen pounds of meat, add half-a-pound of salt, two ounces of white pepper, and as much cayenne as will lie upon a shilling. For the above quantity of meat, you will require nine pounds of flour for the crust; to which add two and a-half pounds of lard, three pints of water, and a little salt. The above will make eight good sized pies. The lard should be boiled in the water, and poured in that state upon the flour, *well kneaded*, and made into raised pies while warm. Bake about three hours in a moderately heated baker's oven.

APPOINTMENT.

The Canada *Gazette* of the 31st ult. contains the following:—

SECRETARY'S OFFICE,
QUEBEC, Jan. 31st, 1852.

His Excellency The GOVERNOR GENERAL has been pleased to appoint GEORGE BUCKLAND, Esquire, to be Professor of Agriculture in the University of Toronto.

MARKETS.

It would appear that the British markets have at length reached the lowest point of the scale of diminished prices, and we may reasonably look forward to a progressive rise, although the day of high prices is no doubt gone for ever. The latest advices from Europe indicate an upward tendency in most kinds of grain, and we hope our farmers will yet receive more remunerating prices than we at one time anticipated. Rye and potatoes have in a great measure failed in several parts of continental Europe, and the exports to England are consequently diminishing. The grain crops of 1851, in the British Islands, have proved upon the whole abundant, and potatoes were in a sounder condition than for several years past. The weather, although rather severe at the commencement of winter, had become dry and mild, sheep were doing well on pasture, and roots and hay abundant and cheap. Butcher's meat is selling at somewhat improved rates. The winter in Canada has been by far one of the severest experienced for a great many years.

TO CORRESPONDENTS.

INQUIRER, Thorold.—Your communication in our next. with the best answers we can give.

A NORTHUMBERLAND FARMER'S communication received—with thanks.

ARTESIAN WELLS. The information requested by a subscriber we hope to be able to give in our next.

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