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**CANADIAN QUARTERLY**

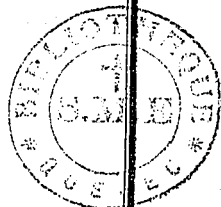
**AGRICULTURAL & INDUSTRIAL**

**MAGAZINE.**

DEDICATED TO THE FARMERS OF CANADA.

By WILLIAM EVANS,  
AUTHOR OF THE TREATISE ON "AGRICULTURE," &c.

[MAY, 1838.—Vol. I.—No. 1.]



**MONTREAL:**  
PRINTED BY CAMPBELL & BECKET,  
MUIR'S BUILDINGS, PLACE D'ARMES.

1838.

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VOL. I.

INTRODUCTORY ADDRESS

TO THE

FARMERS OF UPPER AND LOWER CANADA.

I BEG leave respectfully to submit to your judgment, the first number of "THE CANADIAN QUARTERLY AGRICULTURAL AND INDUSTRIAL MAGAZINE."

This number was prepared for the press with very little time for consideration, and I hope you will receive it with indulgence. I expect that the coming numbers will be more worthy of your approval.

I have ventured to commence this publication, because I thought a work conducted on the plan which I propose to follow was wanted, and would be likely to prove beneficial to the agricultural and industrial classes in Canada. I would willingly have left the task in more competent hands, had any one undertaken it. As I have taken it upon myself, I shall use every exertion in my power to give useful information on all subjects in any way connected with agriculture and industry. To enable me to do this, I have made arrangements to have a constant and ample supply of

the latest and most approved publications on these subjects, from which I propose to make suitable selections. The original matter shall be delivered in a plain unornamented style, without any pretension to flourish.

It is my intention to give a general summary of proceedings in the Imperial or Colonial Legislatures that will be interesting to Canadian farmers. I shall also give statistical information of other countries, the progress of education, &c. Regular reports of the state of the crops and of the markets, both in Britain, and in Upper and Lower Canada. In fact, it shall be my ambition to render the Magazine conducive to your interest and entertainment, and to the general prosperity of our common country.

I would entreat those conversant with rural affairs, and with our domestic manufactures and industry, to aid my endeavours, by useful and interesting communications.

For this year, the Agricultural and Industrial Magazine will be published

quarterly:—in May, August, November, and February, each number about the size of the present.

Perhaps you will consider this an unsuitable time to offer to your notice a publication on the peaceable subject of Agriculture, when a considerable portion of the inhabitants of the Canadas are armed for self-defence. God forbid that our safety should be in so much danger from our foes, even were they much more formidable than they are, that we should be prevented from giving the requisite attention to agriculture and useful industry.

The whole population of the Canadas are now perfectly peaceable, and certainly have no temptation to be otherwise. Agriculture cannot be neglected with us, without incurring the risk of a famine next year. In the spring we shall have a sufficient military force here that will relieve farmers from the necessity of being constantly armed, and enable them to give due attention to the business of husbandry, so necessary for our very existence, and that of the whole community. The number of persons usually employed in agriculture are not sufficient for the judicious management of the soil already in cultivation; consequently it must be extremely injurious to withdraw any of them from that employment in the seasons of spring, summer, and harvest, if it were possible to avoid it. If you can in the spring safely lay aside your arms for a season, you will not be less ready and willing to resume them again at a moment's warning, should enemies threaten you from any quarter. It is so much the interest and the duty of the inhabitants of these Provinces, of all parties and origin, to support the Queen's Government in Canada, and our connection with Britain; that we must maintain it at all risks; and at whatever sacrifice. But I trust this can be done without injuriously interfer-

ing with the business of husbandry or of useful industry. We would be giving too much consequence to the enemies of the peace and prosperity of Canada, were we to be constantly occupied in preparation to resist their foolish and wicked designs. We can carefully observe their proceedings—be prepared against any surprise—and at the same time plough, sow, and plant, and with the blessing of Providence, gather in the harvest—and eat the fruits thereof—notwithstanding all that our enemies would or could do to prevent us.

It is not intended that politics shall occupy many pages in the future numbers of this work; but on the present occasion I hope you will not think it improper that I should submit for your consideration a few remarks on matters in which you are deeply interested. Your class forms the great majority of the permanent inhabitants of Canada; and, consequently, you must be more interested than any other portion of this community in the good government, peace, and prosperity of this country. In Lower Canada our political affairs have been too long in the hands of representatives who were generally unconnected with Agriculture, and unacquainted with the means that were necessary to be adopted to promote its prosperity. We will feel the loss of the privileges which the Constitution conferred upon us the less now; because, when we did possess them; some of us could not, and others, who were the majority, did not, exercise them much for our advantage, as the results have fully proved. It will be impossible to submit a fair and candid statement of the political difficulties that have distracted this Province for some time past, without giving offence in some quarter. It is, however, due to ourselves that such a statement should be made, who ever may take offence at it. For several years the public atten-

tion in Canada has been so much occupied with politics, that the people had not time to think of more useful subjects. We have suffered in consequence. Our interests have been sacrificed to party views and purposes. Improvements have been neglected,—and, instead of advancing in wealth and prosperity, in proportion to our opportunities, we have been retrograding fast. It is our duty to endeavour to understand perfectly what has been the cause of all this, and who are to blame for it.

We may have had grievances and abuses to complain of,—and what people are exempt from them?—but those who were most loud in their complaints here might have remedied many of them, had they been so disposed. But instead of doing so, they have, by their conduct, inflicted new grievances, that are more injurious to us than any we were subject to previously. And what shall we say of those men, who would have involved us in revolution and civil war as a remedy for our grievances? Truly, the cure proposed would have been infinitely worse for us than the disease it was intended to remedy; and the men who, on such a pretense, would bring the desolating effects of war upon this country, could not have understood our true interests, or must have been indifferent about our welfare, and only anxious for their own aggrandizement.

Late events should be a warning to Agriculturalists to be more than ever cautious how they give confidence to, or suffer themselves to be led by, men who are unconnected and unacquainted with agriculture. It is very natural to suppose that such men will not give much thought to a subject which they do not feel themselves directly interested in. Merchants and professional gentlemen are generally sufficiently occupied with their own affairs, without study-

ing yours; and I need not tell you that they cannot, therefore, know much about the interests of farmers. We may rest assured that our interests will be best taken care of by ourselves, and the more fully we make ourselves acquainted with what they are, the better it will be for us, and the more certainly will our prosperity be advanced.

In as few words as possible, and without fear or partiality, the nature of the principal grievances complained of in Lower Canada, both by the French Canadian, and the English parties, shall be candidly explained, in order that our friends, as well as ourselves, may be able to determine how far these grievances would justify the whole or any part of the population of this Province in taking up arms against their lawful Sovereign, with a view of severing the connection between England and Canada.

I shall not confine myself to any regular order in introducing the several topics to notice, but will allude to them as they occur to my recollection. My object is usefulness, and I beg you to excuse any defects you may perceive in my method, and any want of other qualifications that you may consider essential for an author to possess.

It is a great mistake to suppose that it is only the French origin part of our people who have any grievance to complain of, when in fact the only one which they did exclusively suffer under, was that of their not being appointed to a due proportion of places of trust and emolument. There certainly was grounds for this complaint formerly, but within the last few years, and particularly during the administration of Earl Gosford, many Canadian gentlemen were appointed whenever there was an opportunity, to places of honour, trust, and emolument. For example, one was appointed Sheriff of the District of Montreal, considered to be the most

lucrative place at the disposal of the Government in this Province. Another was appointed joint Commissioner of Crown Lands. In fact, most of the appointments to place, made by Lord Gosford, was to French Canadians. And when it is considered that the French Canadian party had, with very few exceptions, the nomination of the members of the House of Assembly at their command, and exercised this power to the uttermost, they could not reasonably complain of their share of influence in the political affairs of the Province. All other grievances that in reality existed in Canada, were equally felt by the inhabitants of English as well as of French origin, as will appear when the nature of them is described.

1. The first grievance that I shall allude to, is one about which there can be no difference of opinion, namely, the defalcation in the revenue to a large amount by the late Receiver General. This officer was appointed by the British Government, without sufficient security, it appears, and therefore it is difficult to acquit the Imperial Government of all blame in this transaction. There is one consolation for us, however, that the property given up by Sir John Caldwell in liquidation of this debt will, if properly managed, pay the greater part, if not the whole. The property is well situated, and of great value, and if bought in for the Province it will, in a very few years, amply satisfy the debt, and perhaps all the interest. The defalcation in the revenue has been greatly magnified, and made use of as one of the principal engines to excite the people against the Government in Lower Canada.

2. The revenue derived from the confiscated estates of the Jesuits has not been devoted to the purposes for which it was originally designed, namely, general education. This is a grievance that affects the whole

Canadian community of all origins, and is undoubtedly one that ought to be redressed with as little delay as possible. These estates should not be appropriated to the benefit of one party, but to the general education of the youth of Canada, without distinction.

3. It is complained that the Jesuit's estates, and other public property, have been let at rents that were less than the value, to persons unjustly favoured by the Government. If this complaint be made on just grounds, it is both necessary and easy to remedy it.

4. Pluralism, or more than one office under Government held by an individual, was loudly and justly complained of. It has been in a great measure remedied by Lord Gosford while in the Government.

5. Monopoly of offices in the same family, was a great injustice towards the people generally. It could only be justified by proving that only particular families were qualified for offices of honour, trust, and emolument under Government. This is an abuse that cannot, perhaps, be remedied immediately, or during the lives of the present incumbents.— There is not much probability that future appointments will be made in the same way: three or four in one family.

6. The composition of the Legislative and Executive Councils were complained of, and it is generally admitted with very just cause. There have been reforms in both lately, but whether they were such as ought to have given satisfaction, I will not take upon me to say, as the functions of both Councils are now suspended.

7. The independence of the Judges. Every man that wishes to see justice fairly and impartially administered in our Courts of law, and the British Constitution established in Canada in all its purity, will admit the necessity of providing for the independence of



the Judges, as in England, during good behaviour. As we are at so great a distance from the seat of the Imperial Government, perhaps it would be indispensable to constitute at the same time a competent tribunal for the trial of impeachments against the Judges and other public officers. We need not doubt, however, that this matter will be attended to by those who will have the authority to provide for the independance of the Judges.

8. Feudal Laws. The abrogation of these laws, and a fair and equitable arrangement of seigniorial claims and privileges, is about the first reform that should be introduced into Lower Canada, for the general advantage of all the inhabitants. The Provincial Legislature has not attempted this reform, though it was in their power to have effected it. It is in vain to say as an excuse, that the French Canadians were averse to any change in these laws. They are, on the contrary, most anxious for the change, and it would be most extraordinary if they were not so, when they must be aware how great an influence it would have on their future prosperity. I have already in the Supplement to my Treatise on Agriculture, published my views on this subject; and therefore it would be superfluous to repeat now the many objections I have urged before to the Feudal Laws, and to seigniorial claims and privileges. An equitable arrangement of them cannot too soon be effected, as they are the most injurious grievance that the people of Canada are subject to. The English Government are not to blame for this grievance.

9. The Canadian Tenures Act of 1825 was complained of by the House of Assembly, but unquestionably without any sufficient cause. It does not unjustly interfere with the rights or privileges of Canadians of French origin. And if the latter wish to retain the laws that they are accus-

tom'd to, it is very excusable in British settlers in the English Townships to have the same inclination for their own laws. The latter have full as good a right to this privilege as the former have to retain their own. The other provisions of the Act are unobjectionable.

10. The establishment of Offices of Registry are required to secure the free circulation of capital and property that must be necessary to the improvement and prosperity of this country, and no reasonable objection has ever yet been advanced against their establishment. This matter was altogether in the power of the Provincial Legislature, and no other authority could have well interfered in it. It is a subject that is so well understood, that it cannot require any further discussion to recommend it.

11. The Land Company. Though I never did think the Land Company the best means by which the wild lands could be settled, yet I admit it would be better they should be settled by that means, rather than remain waste. But this is not the question to be considered, but whether there is any cause that the Land Company should be deprived of their Charter.

It never has been disputed that the British Crown possessed the right to dispose of the waste lands of the Colonies to British subjects. The British Crown and Parliament must, therefore, be perfectly competent to dispose of some of these lands to the Land Company, as they have done; and whether the measure was expedient or not, the Land Company have got as good a title to their lands as any proprietor in Canada can have to his lands; and it would be an unqualified act of injustice to deprive them of their just rights, without giving them a full equivalent.

If it was found that the grant to the Land Company would give them a monopoly in land that was very

injurious to the country, it might be prudent to purchase their rights at the full value. But when there is so much wild lands yet unoccupied, the quantity granted to the Land Company cannot be very injurious to the public interest, provided that in future the waste lands of the Crown will be disposed of only to actual settlers. All the injury which the Land Company can produce, if they are not allowed to get any more of the waste lands of the Crown into their possession, is very trifling indeed, compared with what the Feudal Laws, and seignorial claims and privileges must inflict upon the country, considering that the seignorial lands are the most conveniently situated for occupation and improvement, and that all our cities and most of our towns and villages are built upon seignorial property. When we hear men cry out violently against little matters, while they neglect to redress great evils that are in their power to remedy, it is no wonder we should doubt the sincerity of their desire for real and necessary reforms that would produce general good.

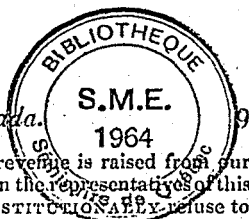
The most injurious of the grievances which the inhabitants of Canada, of all origins, complained of, have now been slightly adverted to; and it will be perceived that the British Government was not to blame for them all. It will also be seen that the French Canadians were not more oppressed, in any respect, than their fellow-subjects of British origin. Other minor abuses may have existed in the administration of the Colonial Government; but when we know that there is nothing perfect on earth, either in man or in laws, we could not expect to have more perfection in our government and institutions, than any other people on earth, and perhaps no people had less cause to complain in this respect than ourselves. As to the Agricultural class, they were never made acquainted

with the existence of a government here, by tax collectors, or by any direct oppression. Had they been under any other government on earth, they would not have enjoyed the same freedom from taxation; and from every kind and degree of oppression. It is almost incredible that, perfectly acquainted with all these circumstances, the leaders of the late insurrection in both Provinces could for a moment suppose that sensible men, who had any British feelings, or even a regard for self-interest, would join them in their foolish and treasonable designs, however sincerely they might be disposed to make, by all lawful means, really necessary reforms.

It is perfectly plain that were Canada an independent state, or a state of the adjoining Union, the pecuniary burdens of her people must, as a matter of necessity, (unnecessary to explain here) be increased twenty fold what they ever have been hitherto. We would find this to be a more certain consequence of a successful revolution and change of government, than any benefit to proceed from it to the agricultural class.

Previous to the arrival of Lord Gosford in Canada, the proceedings of the House of Assembly will not be noticed. But from that period their proceeding has had a very great influence in producing the late unfortunate events that have occurred in this Province, and it is due to their constituents that their conduct should be impartially examined.

We may regret that the reforms that were required in the Executive Council, were not introduced at an earlier period. In the Legislative Council, lately, the Judges, with the exception of the Chief Justice, were very properly excluded, and other members to whom objections were urged, received a friendly intimation that their attendance would be dispensed with. Lord Gosford in



his speech to the Legislature at the commencement of the Session in 1835, promised that every reasonable reform would be gradually introduced; and in fact he pledged himself to pursue such a liberal course in the Government as ought to have insured for him a fair trial; and there is no doubt these promises were made with sincerity on his part. Had the House of Assembly met these advances with a sincere disposition to endeavour to arrange finally the differences that had so long distracted the Province, there was not a Governor in Canada for many years, that would more certainly have granted all reforms that would be consistent with our continued connection with Britain.

The Provincial Legislature concluded their session in March, 1836, without making any appropriation to the payment of the arrears due for the support of the Civil Government, and declared they would not make any provision for that purpose until their demands for reform, and a change in the Constitution, would be complied with.

No one will question the right of the representatives of the people to have the full controul over the provincial revenue—the power of appropriating it—of seeing that every item of the expenditure was correct—that no public officer receives a larger salary than would fairly remunerate him for the duties he had to perform—and we may add, that they should prevent any officer from receiving the emolument of more than one place or employment.

When we acknowledge that the representatives of the people should exercise all this controul *for the people's good*, it by no means follows that they should exercise a controul to the injury of the people.

It will be admitted that no society can be kept in a state of peace and prosperity, without some kind of government. It is for the support of a *necessary* civil government *first of*

*all*, that a revenue is raised from our people. Can the representatives of this people consent to *voluntarily* refuse to appropriate so much of this revenue, as would be actually required to support this Civil Government, which every individual in the Province is interested in supporting? It is not the British Sovereign, Parliament, or people, who would suffer most by the dissolution of our Civil Government for the want of support, but it would be the people of Canada who would feel the evil; therefore it is unjust to inflict punishment on our community, because the demands of the House of Assembly are not complied with by the Imperial Government.

What would be the consequences to our society, were all the officers of Government to have refused to execute their several duties for the last three years, when they would not be paid their salaries. The Judges might have retired from the Bench—the criminals might have been discharged from the Gaols—the whole country might have been in such a state of anarchy and confusion, that neither life nor property would have been in security for an hour? It was possible that all this might have happened, from the House of Assembly refusing to grant supplies for the support of the Civil Government, had not the Imperial Government advanced money for the purpose. There is not on record any precedent for such proceedings in the British dominions for the last 150 years.

At the accession of William the III. to the British throne, Belsiam tells us that:—By a just and wise regulation, they (Parliament) established a distinction between the ordinary and extraordinary expenditure of the Nation; settling by a provisional act the sum of £600,000 upon the Crown, to defray the necessary demands of the Civil Government, under the appellation of the Civil List; and leaving all the remaining supplies to be voted upon

estimate, and appropriated to special services, stated by the ministers, and approved by the Parliament. At the commencement of every subsequent reign up to this time, a Civil List has been granted to the Sovereign for life, without any opposition as to the principle, though there might be some to the items and the gross amount.

It has never been proposed to the House of Assembly to grant an expensive Civil List here; and had they granted one, with due attention to economy, they would still possess ample influence, in having full controul over the remainder of the revenue.

But the principal charge against the House of Assembly, is, their refusing for the last three years to appropriate the money in the chest for the payment of the arrears due to the officers of the Civil Government, when at the same time they helped themselves to no less a sum than about £20,000, on their own simple vote, to pay themselves, their expenses, agents, &c. This proceeding is certainly difficult to justify satisfactorily to men of common understanding.

If any officers of the Government were guilty of crimes against the laws, or had not performed their duties properly, it would be perfectly fair to withhold their salaries, and put them on their trial. If there was no competent tribunal in Canada for their trial, the British Government and Parliament might be safely appealed to. It is a well known fact, that in consequence of the representations of the Assembly, several officers have been dismissed by the British Government; and there is no reason to suppose that any officer would be kept in office here who would be proved to be unworthy to fill it.

It is not because men may *want* places that a community institutes a Civil Government to *make* places for them, but to promote the peace, order,

and happiness of society; and faithful and competent men are wanted to fill the several offices of a Government, execute the laws, &c., and for their services they have a right to be fairly remunerated. It is utterly inconsistent with the spirit of the British, or even our own Constitution, for the representatives of the people to refuse to provide for the support of their Civil Government, the administration of justice, &c. &c. In all the other British Provinces there has been scarcely any objection offered, and a permanent Civil List has been granted in each of them, and we certainly have not many more grievances to complain of than they have.

It has been a very great injury to Lower Canada that the revenue collected from her people for the last five years has been kept under lock, and no part of it distributed or put into circulation. In such a country as this, where capital is so much wanted, and would be very productive if judiciously employed; were our revenue to have been regularly distributed as it was collected, it might perhaps by this time have been the means of creating a new capital, equal in amount to the whole revenue. This certainly would be a greater benefit to the people generally than any advantage they will gain by the House of Assembly withholding the supplies, and refusing to appropriate the revenue.

The House of Assembly of Lower Canada have lately made a demand that the Legislative Council shall in future be rendered elective. They should be perfectly satisfied of the reasonableness of this demand before they would insist upon its being conceded to them, as the only condition on which they would proceed in the business of legislation. It should not be forgotten that the people of Lower Canada form but a very inconsiderable numerical portion of the population of the British Empire.

They had a Constitution as similar in its principles to that of Britain, as it was possible to make it. If the people were now to be unanimous in wishing to introduce a fundamental change in this Constitution, that would make it most materially different from that of Britain and of the other British Provinces. And that this proposed change was considered by the other inhabitants of the British Empire to be a bad precedent—a dangerous innovation, and likely to prove detrimental to the general interests of the British nation—could we reasonably complain that our wishes would not be complied with? Certainly we could not. How much less could a trifling minority of the Canadian people (and they were nothing more) expect to obtain such a change in the Constitution.

We must acknowledge that the agricultural population of Lower Canada are generally uneducated, and therefore cannot be very competent to form the most correct opinion of the merits and defects of the British Constitution. They may be told that there are defects; and many of them believe this report, and suppose that their condition would be improved, were the proposed change in the Constitution to be adopted. Indeed it is by such representations that many of the innocent Canadian people have been led into the most fatal errors; and to this hour ill-disposed and designing men are doing all they can to deceive the uneducated population, in order to make them dissatisfied and disloyal.

It is in vain to pretend that the great majority of the Canadian electors could understand perfectly all the consequences to the British nation and to themselves, of introducing the elective principle in the appointment of the Legislative Council. And if they did, they could not expect that Lower Canada alone, of

all the countries and Provinces of the extensive empire of Britain, should be granted this change in their Constitution. A change that is not even asked for in any other Province. If it should ever be introduced in other countries or provinces of the empire, Lower Canada may expect it, but undoubtedly it would not be the most proper place to make the experiment first.

The House of Assembly have complained that many useful bills passed by them were rejected and lost in the Legislative Council, and particularly the School or Education Bill, in 1826. This may have been the case in some instances. But if the Council were not allowed to have an opinion of their own, on bills brought before them, and the free exercise of their privilege as a branch of the Legislature, their services might as well be dispensed with altogether, and allow the House of Assembly to take the whole business of legislation into their own hands. Had the House of Assembly provided first for the payment of the arrears due for the support of the Civil Government, they would not, in all probability, have met with any unreasonable opposition from the other branches of the Legislature in appropriating the remainder of the revenue (which was nearly two-thirds of the whole) to such useful purposes as they might think proper. Had a good understanding and friendly intercourse been established and maintained between the several branches of the Legislature, concessions would have been made by all parties, and many bills would have passed that were rejected and lost. It is the country that has suffered, through the uncompromising disposition of her legislators. Indeed it would be impossible to expect useful legislation from a Parliament divided against themselves, and where one branch had denounced the other, and sought to accomplish their destruction, or dissolution.

There can be no doubt that many members of the House of Assembly, who usually voted with the majority, would never have thought of countenancing any revolt against the Government. They wished for reforms, but not for revolution and a change of Government. Unfortunately, they did not perceive in time the real object of those who only sought the overthrow of the Queen's authority in Canada, or they might have prevented much of the evil that has occurred, by seceding from them two or three years ago.

In modern times the objects of revolutions, in all civilized countries, was to relieve the people from grievous oppression, from bad laws, or from usurped authority over them. When such were the real motives, and the people unanimous, revolutions could not be condemned. But even where all these justifying causes existed, we know that in many cases the advantages that have been ultimately obtained were very dearly purchased, by the sacrifice of life, of property, and the various sufferings brought upon the people by a war.

All party views aside, will any sensible man, who is thoroughly acquainted with the circumstances, religious, civil, and political, of the people of Canada, pretend to say that the grievances and abuses that may have existed in the administration of the Government were of such a nature, that the people would be justified in raising the standard of rebellion, with a view to effect a change of Government and the severance of the connection between this country and Britain? It is not on light grounds of complaint that such an attempt should be made; and it may safely be affirmed that the late insurrection in Canada was the most causeless and unjustifiable that ever was attempted in any country. This assertion is not made without due consideration.

It is not to be denied that grievances

and abuses did exist in Canada, but within the last few years several of them were redressed, and there was every reason to expect that all further necessary reforms that could only be introduced by the British Government, would be very soon granted by respectfully persevering in applying for them. But supposing there was no certainty that they would be granted immediately, that uncertainty would not justify a trifling portion of the population in their attempt to overthrow the Queen's authority in Canada, contrary to the wishes of a vast majority of the people, and the true interests of all of them. The men who would have inflicted civil war upon us (and they must have been aware that they could not have accomplished their designs without it) as a remedy for any existing abuses in our government, would unquestionably have brought evils upon us a thousand fold more grievous than any which the people of Canada had to submit to from the Government since the period of its becoming a British Colony. And every inhabitant of these Provinces, *without distinction of origin*, owe unbounded thanks to a Good Providence that the futile attempt to involve the country in civil war has completely failed.

Men who would take upon them to effect a change in our long established Constitution and Government, and propose to give us one of their own manufacture in their stead, ought to have given some proof that they possessed superior talents, and a sufficient share of useful knowledge and good sense to enable them to understand perfectly how the prosperity of our country and her people could be most certainly promoted. We have every reason to suppose that the leaders or actors in the late insurrection were deficient in those most essential qualifications. It would appear incredible, if we had not positive

proof of the fact, that in Lower Canada these men, with few exceptions, openly declared that emigration to this country was injurious to our people, ought to be discouraged, and prevented if possible; and it is distressing to know that this opinion is generally entertained by the uneducated part of the population, in consequence of these representations. When we are convinced that additional labour and capital are the grand requisites to ensure the wealth and prosperity of Canada, and that emigration is the only means by which we can obtain both, it is difficult to account for the delusion of those who would oppose it. We may, however, be perfectly satisfied that such men were utterly unfit to give us improved institutions, or to have the management of our affairs committed to their charge, though we should have no other glaring proofs of their incapacity to lead us to peace, prosperity, and happiness.

It cannot now be a matter of doubt that the object of the late insurrection in the Canadas was to effect a revolution, and the separation of the country from the dominions of Britain. It is equally certain that a change of Constitution and Government was not generally desired by the people of either of the Canadian Provinces. If there is any faith to be placed in men, we must believe that even in Lower Canada a vast majority of the people did not wish any change; and much less would they consent to risk their lives and properties in fighting for it. In the Upper Province, it was only a mere fraction of the people who would consent to any change in the Constitution or Government. To speculate now, upon what may have been the secret disposition of many of those who did not take any active part in the insurrection, is not necessary: It is very probable that most of those who might have been inclined to dis-

loyalty, have long ago discovered the folly and madness of any attempt to overthrow our present Government, and will in future hold firm their allegiance to their lawful Sovereign.

The standard of rebellion was raised in Canada by men who certainly did not suffer under any oppression that their fellow-subjects were exempt from. Was it because they were more enlightened—understood better the principles of good government—were more attached to free institutions—and to perfect civil, political, and religious liberty, than the loyal inhabitants of Canada, that they presumed to attempt to effect a revolution, and the severance of these Provinces from the Mother Country, contrary to the wishes of their fellow-subjects, who formed a great majority of the inhabitants? Unquestionably it was not; and were the real motives of these revolutionists known, they would not be entitled to much credit for patriotism, or their love of good government and equitable laws.

It would be the duty of all good citizens, that would have any pretensions to real patriotism, to submit to the established Constitution and Government, under which they were borne, *and from which they never suffered any oppression*, rather than attempt to force a change that would be unsupported by a large majority of the Canadian community. How much more like sensible men, and good Christians they would act, were they to say:—Though we are perfectly well convinced that the change we are anxious to introduce in the Constitution and Government, would inevitably prove beneficial to the whole people of the Canadas, advance their prosperity, and insure their happiness; yet, as we find that we are not supported generally by the people whom we wish to serve, but on the contrary, are opposed by most of them; and as we see that if we persevere in our designs, we must

bring all the horrors of civil war upon our country, and her people; we will forbear and strive to reconcile ourselves to a state of things that we find we cannot alter, without incurring the risk of bringing death and suffering upon our fellow-subjects. This would be the conclusion that all *real* patriots would have come to, and they would not have madly and wickedly engaged in a contest that they were well aware must bring death and ruin on the unsuccessful party. Unfortunately for themselves the Canadian revolutionists of both Provinces did not perceive the strong probability that existed, that the unsuccessful party would be their own. And while they expected that the evils of revolution and civil war would be inflicted chiefly upon their opponents, they were indifferent about the matter. To succeed in their own ambitious designs, they cared not what amount of life and property must be sacrificed, or whether or not the surviving inhabitants of Canada would ultimately benefit by their success.

The planners of the late insurrection must have greatly miscalculated the amount of opposition they were likely to meet with, or have some promise of effectual aid from without, or they never could have been guilty of such folly as to think of rebellion. In Lower Canada, were the French Canadian population disloyal to a man, their situation was so scattered over an immense territory, that it would be impossible to concentrate a sufficient force of them, to overcome the Queen's troops and loyal volunteers in Montreal, Quebec, and other principal stations in the country. All that part of the population below Quebec, comprising about a fourth of the whole, were completely cut off from giving any assistance, without insuring their destruction in the next spring. The remainder of the inhabitants, settled over a country of greater extent than the British Isles,

it would indeed be a difficult matter to collect together from their farms and families, to take up arms and fight in a cause in which they certainly could not well understand how they were interested. It is useless to talk of oppression to men who never felt any. And when we know that this is the case of the people of Canada, we can scarcely believe that men would risk their lives and properties to engage in so dangerous a game as that of fighting with the British nation for the possession of Canada. What means were there to procure arms, munitions of war, provisions, and all other necessaries to support an army? They could not expect that the English people would tamely submit to see their loyal fellow-subjects ruined, and a fine country wrested from them by violence, without making any effort to prevent it. When we think of all these circumstances, we must come to the conclusion, that the planners of the late attempted rebellion were totally destitute of the sound judgment, good sense, and good feeling, that was necessary for men to possess, who would pretend to form a new Constitution, Government, and Laws, for us, that would be preferable to those we already enjoy.

At the conquest of Canada by England, the French inhabitants were few in number, (only about 60,000 souls.) They were treated in the most generous manner by the English. Their property, religion, laws, and language, were guaranteed to them, and this guarantee has been most religiously observed by England. These concessions, however, did not give them any exclusive right to the country, further than the extent of their properties. If the late rebellion had been successful, God only knows whether equally generous terms would have been granted to those who would have opposed it. The people of Canada could not form



a connection with any other nation on earth, that would afford them the same perfect protection without taxation and other advantages that they enjoy from British connection; and the men who would lead us into a rebellion, with a view to sever this country from Britain, could not be our true friends, whatever were their pretensions.

There will be many opportunities in the progress of this work to point out the advantages that British connection affords us, and all of them would be lost were a separation to take place, and without any strong probability that we would be compensated for this loss by any new connection we could form.

As British subjects, we must feel sensibly the insult that has been offered to ourselves and to our nation, when foreigners would presume to enter armed into Canada, under the pretence of giving us liberty and better laws. As Britons, we do not want to learn from others what government and laws are the best for us. If we find changes and reforms necessary in our Constitution and laws, we can obtain them without the meddling interference of strangers; and all true Britons will ever reject with indignation any, the slightest, interference of foreigners between them and their own Government, on whatever pretence. Notwithstanding all that may be asserted to the contrary, there is a vast majority of the people of Canada who would not change their own Government and laws for any other that they are acquainted with, were it left to their own free choice to do so, AND THEY WOULD BE RIGHT.

Indeed there is a very strong presumption that no insurrection would have been attempted in Canada, were not secret encouragement given, and aid promised, by foreigners to the disaffected in these Provinces. And viewing all the events that have

occurred, this presumption is almost confirmed. They will have the less of the guilt of blood upon them whose own minds acquit them of the imputation. The disaffected in Canada could never dream of success, knowing the materials they had to work with and the opposition they had to expect, unless they had hope of foreign aid. It is not intended to question the good faith of the General Government of the United States, but certainly the citizens of that country, who have entered armed into Canada in time of profound peace between their nation and our own, never can be excused.

And what are we to think of our own countrymen, who would be so lost to all patriotism as to sanction or invite the invasion of their native country by armed foreigners? Let them consider well the following lines, by a distinguished authority:—

“When a nation is divided into parties, and the party that has the disadvantage calls in some neighbour to its aid, it is the most miserable fate that can befall a country; and no punishment is sufficiently severe for the men, who have so far lost every sentiment of patriotism as to have recourse to such a step.”

It is impossible that a greater insult could be afforded to a powerful nation, and a free people, than for strangers to come armed into their territory to force a change of government upon them with rifles, powder, and ball. It is perfectly manifest that the men who invaded Canada lately under such a pretence, must have despised all government and laws, even those of their own country, or they would not have passed their own boundaries. Those citizens of the United States, who were so very anxious to give us liberty and a new form of Government, when we do not require it of them, should rather turn their faces southward, and give liberty to the millions of human beings that are kept in complete and abject slavery within their own territories, a slavery a thousand fold more

degrading than any one has to endure within the boundaries of British America. We have no desire to meddle with them, their government, or institutions, and we only wish that they would act in the same friendly way to us, and leave us to ourselves. Sensible people will not trouble themselves with the politics of other nations, so long as they are not likely to suffer by them.

When the whole population of the Canadas may think the time arrived that it would be proper for them to separate from Britain, it is to be hoped that the separation may be effected by mutual consent, and without the sacrifice of either life or property, but in the same way that a grown up family would separate from their parents to provide for themselves. God forbid that we should ever think of doing so until this country is able to secure her own independence without any assistance from our neighbours, who appear so anxious to afford it now unsolicited. It would be unreasonable to expect we could prosper, were we to sever violently the connection between Britain and this country, without first securing to the inhabitants of Britain the capital and property that belong to them in Canada, and which they have invested in it in good faith. It would be an atrocious act of robbery and spoliation to deprive them of it, without giving them full compensation. This country can never be severed from British connection by violence, without the unjust sacrifice of life and much property. We cannot hide from ourselves the certainty, that had the late insurrection been successful, a large proportion of the property of the loyal inhabitants would have been confiscated to reward both foreigners and natives who would have fought in the cause. It would be the natural

consequence that must inevitably result in all such cases. Thank God, the enemies of peace and order have been disappointed, and every friend to the prosperity and happiness of the people of Canada should rejoice at it.

Dimond, in one of his Political Essays, tells us :—

“ There are no evils which make violence politically expedient. The right way of effecting amendments is by enlightening the national mind,—by enabling the public to think justly and temperately of political affairs. If to this temperate and just judgment, any part of the practice or of the form of our government should appear unquestionably adverse to the general good, it needs not to be feared that the corresponding alteration will be made,—made by that best of all political agents,—the power of deliberate public opinion.”

Paley says :—

“ The will of the people, when it is determined, permanent, and general, almost always at length prevails.”

And if it should appear to the lover of his country that the prevalence of his will is too long delayed, let him take comfort in the recollection that less is lost by the postponement of reformation, than would be lost in the struggle consequent upon intemperate measures. We have numerous examples in history of the dreadful evils that has been brought upon countries by revolutions, when the people were not nearly unanimous in supporting the change of government, proposed to be introduced. Hundreds of millions of the people have found their death in such contests.

However unwilling we may be to acknowledge it, it is nevertheless true, that national origin prejudices and hostile party feeling have produced much evil in Lower Canada. It is no less true that it would be the interest of this community that all such prejudices should now cease ;— that hostile party feelings should be no longer entertained ;—but that all

loyal subjects should cordially unite in the good cause of promoting the improvement and prosperity of our common country. It is not to be expected that any friendly feelings can exist for the present between loyal subjects and those who have manifested in a way that cannot be misunderstood, a disposition to overthrow our Government by violence and force of arms. It is not necessary, however, that hostile feelings and national origin antipathies should continue between those who did not and who will not take any part in rebellion against their lawful Sovereign. It is certainly our duty towards each other not to impute disloyalty to any who conduct themselves peaceably, in public and in private. Indeed, every inhabitant of the Canadas are so deeply interested in supporting our connection with Britain, that it is difficult to believe that any sensible man can be disloyal.

The people of Canada are nearly all British born subjects, and have cause to rejoice that they are so. Their condition would not be improved were they the subjects or citizens of any other nation on earth. The sooner that all our people become in reality, as well as in name, attached members of the great British family, and feel proud of their privilege of being so, the sooner they will be prosperous and happy, and see nothing to envy in the situation or circumstances of any other people in the world.

However all wise and moderate men may regret the peculiar circumstances which made it prudent to arm one portion of our people to maintain, with the Queen's troops, Her Majesty's authority in this Province, every loyal man in the Canadas ought to rejoice that there was a sufficient armed force to put down at once a foolish insurrection, and to protect us subse-

quently from all hostile attempts that have been made by pirates who have invaded our territories at various points on our frontiers. It is not to offer any offence or violence to the unarmed inhabitants, while they continue peaceable and loyal, that arms have been put into the hands of Volunteers, but to maintain the connection of the Canadas with Britain against all attempts of those who would wish to sever that connection. From the time the insurrection was put down to the present moment, not one act of violence has been committed by the armed Volunteers upon the unarmed inhabitants, and this is highly creditable indeed to His Excellency, the present Administrator of the Government, and to the Volunteers. When there is sufficient troops in the country, there may be no longer a necessity for armed Volunteers; and I sincerely hope there will not.

It is greatly to be lamented that up to this day, secret attempts are being made to keep up excitement, by circulating false reports among the people. The authors of these false representations are the worst enemies to the French Canadian inhabitants, and to the peace and prosperity of this country. All true patriots will recommend to their countrymen to maintain peace and order, and support the established Government. If they would act in this way, the unfortunate excitement and bad feeling, which at present exists between parties, would soon subside, and our community would become more united, prosperous, and contented.

As to the Agricultural class, the judicious improvement and cultivation of their farms would fully occupy all their time, and it would be a much more innocent, pleasing, and profitable employment for them, than politics or civil war.

It should be a very urgent necessity indeed that would withdraw the agriculturist from his useful and peaceable occupation, to arm himself with implements for inflicting death on his neighbours and fellow-subjects, unless it was to resist such an unnatural rebellion as that lately attempted in Canada. He will find, in the practice of husbandry, and in the study of the beautiful works of nature, with which he is surrounded, much more pleasing and solid happiness, than he could expect from being engaged in strife and bloodshed, however victoriously the strife might terminate for him or his party.

The Constitution granted in 1791 to Lower Canada, is now suspended. It is the natural consequence of the House of Assembly refusing to legislate for the country, until they would obtain a change in the Constitution that would make the Legislative Council elective, and would in reality give the entire government of Canada into the power of one party. There could be no doubt on this point, from the experience we have already of the election of members to the House of Assembly. While we continue a British Colony, a Constitution modelled as nearly as circumstances will admit, after that of Britain, will be the most suitable and expedient for us.

Men will pretend to tell us that we cannot possess political liberty, unless both or all the branches of the Legislature are elective. We know, however, by what has occurred in other countries, that if we even did possess the privilege of electing all the branches of the Legislature, we might be enslaved after all. The most simple republicanism, were it established in Canada, might prove to be a most oppressive tyranny to a large proportion of our inhabitants, and there is almost a certainty that it would prove to be so.

I did think at one time that there was no reasonable objection to have the Legislative Council elective. I have, however, on a more mature consideration of the probable consequences of such a change, and the manner of its working, a different opinion now, and for more than three years past, on the subject. Until there is more unity between our people, and all national origin distinctions at an end, I am firmly persuaded that it would be a dangerous experiment to introduce in Lower Canada, and by no means necessary to the good government and prosperity of the country.

A British Nobleman, of high rank, large fortune, splendid talents, and liberal principles, is now on his way to Canada, possessed of the most ample powers which his Sovereign and the British Parliament could confer on him, to govern this country. Though the Constitution is suspended, and our class is in reality unrepresented, we need not apprehend any oppression from him. All loyal subjects, of whatever origin, may rest perfectly confident that they will not have any cause to complain of the measures that will be adopted. If it is not our own fault, our condition will very soon be made equal to that of the other British Provinces. It was impossible that we could be put into a much worse state than we have been for the last few years, though we should never get a new Constitution. As to the ultimate decision which the British Parliament may come to on our affairs, we may rest satisfied that it will be wise, liberal, and just towards all parties here. That great assembly of Legislators will not be influenced by our party strifes and foolish prejudices, but will act in that manner towards us that ought to satisfy all reasonable men among ourselves, and will ensure the approval of the great

bulk of their own countrymen, and of the world.

I have, at much greater length than I first intended, submitted for your consideration a plain and candid statement of our political affairs, so far as I thought them particularly interesting to you. More might be written on the subject, but I fear I have already tired your patience. I can say truly, that I have not "set down aught in malice;" and if I should give offence in any quarter, I will regret it. It is right, that here, and elsewhere, it should be well understood, that the great majority of the Canadian community, in both Provinces, however they might wish for those reforms that are necessary for their good government and prosperity, they never did think of introducing them by any other than peaceable and lawful means. As Agriculturists we ought to be men of peace, and not be led into any wild schemes of aggression, by men, who might in the end leave us to pay the penalty. It is our duty and interest to maintain peace and order, and not allow it to be disturbed. Let us leave it to others who are not bound to the soil, to try their experiments in troubled and dangerous waters. The implements of husbandry are much more suitable and profitable for us, than the implements of war, while we are allowed to remain unmolested by enemies from within or without.

That you may find this year to be one of peace, and every way favourable to your prosperity and happiness, is the sincere wish of your ever faithful friend,

WM. EVANS.

Cote St. Paul, }  
April 29, 1835. }

PRESENT STATE OF  
AGRICULTURE IN THE CANADAS.

There is no statistical information that can be relied upon, of the annual produce of agriculture in the Canadas. It is only by making a tour through the country, at the proper seasons of the year, that the real state of her husbandry can be known. Any man, however, who will make such a tour, cannot fail to discover the generally defective system of management, and the consequent scanty crops, and unprofitable flocks and herds. Fortunately for the credit of the country, there is abundant proof that the soil and climate are not the cause of scanty crops, or unprofitable stock, because there are many farms that, from judicious management alone, not from any superior quality of soil, or other favourable circumstances over other farms, produce good crops, and have good stock. With the exception of wheat, that in parts of Lower Canada has been greatly injured by the wheat-fly for the last three or four years, crops of barley, oats, rye, peas, vetches, potatoes, carrots, parsnips, beets, mangel wurtzel, turnips, on new land, clover, and other excellent meadow grasses, flax, hemp, and hops can be raised with less risk of failing, and not much inferior in quantity or quality to the same species of crops raised in the British Isles. The stock of neat cattle, horses, sheep, and swine, might also be so managed as to do credit to the country, and be profitable to the farmer. Hence, it must be manifestly in the power of the farmers, if they are not prevented by the want of capital, or other accidental causes, to improve their crops and stock, at any time they choose to adopt the proper means.

Canada is an agricultural country, and her inhabitants must depend

chiefly upon the produce of her agriculture for the supply of all their wants, directly or indirectly. It should, therefore, be the principal object of her people to augment this produce as much as possible, as the first means to secure their prosperity.

The farmers of Canada are generally proprietors of the land they cultivate. However large the produce, it is their own. Neither landlord, or tax collector, have any claims upon it. Under such circumstances would not the farmer and his family be able to obtain more of the comforts and conveniences that are prized by man, from a large than from a scanty produce?

Does her agriculture now produce sufficient to furnish those occupied in Husbandry with all the advantages they could reasonably expect from the favourable circumstances they are placed in? Unquestionably it does not!

It is true that existence may be supported at little cost; but a beautiful world, and a fertile soil, was not bestowed upon man by a BOUNTIFUL CREATOR, that he might only enjoy as much of the fruits and beauties of it, as would thereby keep life in the body.

Men will talk of the wants of our nature being easily supplied; but we seldom find those who do talk so, inclined to practice such doctrines in their own persons. Extravagance or dissipation in any shape, are extremely hurtful, particularly in such a community as that of British America. But certainly farmers should be able to enjoy a reasonable share of the good things, and the rational pleasures that other members of the community think necessary for their own comfort and happiness; be able to educate their own children, and when of suitable age, supply them with means to provide for themselves. The farmer who will

not endeavour to obtain as many of these advantages as possible, does not perform his duty to his family or to society. He cannot properly excuse himself by saying that he has acted as his father did, and that he will leave his children as his father left him, to shift for themselves with all the world before them. To stand acquitted to his Creator, to his family, and to the community to which he belongs, it is necessary that he should have done all that was in his power, in proportion to his opportunities, to improve his condition, educate his children, and provide suitably for them. There is not much danger that a farmer, with all his exertions, will be able to leave his children so much worldly goods, as thereby to endanger their safety and usefulness, if they are properly brought up.

It is an opinion generally entertained, that men can do as they please with what is their own; and by this argument, that a farmer would be justified, if he chooses to cultivate his farm in the most imperfect and slovenly manner, allow useless and hurtful weeds to occupy the place of useful plants, to the great injury, not only of himself, but of his neighbours. It was the opinion of many *great* men that, on the contrary, it is our *DUTY* to extract as much useful produce out of our estates as they are capable of yielding, and that it is *sinful* in us to neglect doing so. The latter opinion is certainly the most rational, and it would greatly increase the means of human happiness in Canada, were every occupier of land in it to conform to this rule, and augment the produce of his lands, to the utmost possible amount that it could be brought to, by a judicious application of labour and good management.

Any competent farmer who is generally acquainted with the agri-

culture of the Canadas, must be convinced that the annual produce of the country might be increased to *double* what it is, at an expenditure that would leave ample profit to the farmer. It shall be the principal object of this publication to afford the most interesting information of the practice and results of the agriculture of other countries, and suggest such plans for the improvement of Canadian husbandry, as shall appear to be reasonable and practicable.

It is not necessary to occupy the reader's time with any further detail of the present state of Canadian agriculture. It is sufficient to know that it is such as to be capable of great and profitable improvement, and that there is ample encouragement to effect this improvement.

How much more beautiful would be the appearance of this country, when every field was well cultivated, bearing ample crops of useful grain and vegetables—no useless or hurtful weeds to be seen—our flocks and herds judiciously chosen, and well managed—our meadows producing abundance of hay—and our pastures covered with excellent herbage—and all around us affording the most convincing proof of the industry, intelligence, comfort, and happiness of the rural population. We might realize this pleasing picture. The country is naturally one of the finest on earth, and offers to her inhabitants advantages that are not to be met with elsewhere, if they would be content, and make a proper use of them.

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#### APPLICATION OF CAPITAL TO AGRICULTURAL PRODUCTION.

“The portion of capital embarked in domestic agriculture, is employed best for the interests of a nation; it enhances the productive power of the land and of the labour of a country. It augments at once the profits of

industry and those of real property.”—*Say's Political Economy.*

In a preceding article, the present state of agriculture in the Canadas has been described, perhaps, with as much accuracy as it was possible to do so. If the reader thinks the description a fair one, it will not require any further argument to prove to him the necessity which exists for the improvement of Husbandry, and the increase of the stock of cattle and sheep. How this is to be effected, is the next enquiry.

The want of sufficient capital, and in many cases the want of a practical knowledge of good husbandry, are the great checks to the due improvement of agriculture in Canada. As far as possible, to provide a remedy for both wants, ought to occupy the most serious attention of all true friends of this country.

With the French Canadian farmers the want of a practical knowledge of good husbandry, is more injurious than the want of capital. Many of them who have ample means will not employ labour, or adopt improvements that would repay them the outlay, with interest, and will not keep a sufficient stock of cattle to manure their land. This must proceed from their being unacquainted with good husbandry and its results—because few men would be so indifferent to their own personal interests as to forego the opportunities of promoting it, if they knew it to be fairly in their power to do so.

Mr. Thomson, in his Lectures on Botany, in speaking of English agriculture, has made use of the following language, which may be very properly applied to Canadian Agriculture also:—

“But so blind are men often to their true interests, that agriculture in this country has, till within a few years past, been regarded as an employment fit only for the most uninformed part of society. Following stupidly in the footsteps of his predecessors, and guided

by a few rules, which had been handed down to him from the rudest ages, the agriculturist was ignorant that a knowledge of the theory of his operations was necessary for enabling him to overcome unexpected obstacles; to guard against the uncertainty of seasons, and to employ the means of supplying the wants of the community and enriching himself."

The only remedy in this case will be the judicious education of the rural population. Until this is effected, improvement will not make much progress with the French Canadian farmers.

Emigrants from the British Isles, of the agricultural class, seldom leave their own country with much capital. They generally maintain their ground in the country of their birth, while any hope remains that they will be able to succeed there. The consequence is, that many of them come here, and have to work in a new country, under the disadvantages of insufficient means; and when this is the case, it will take many years to acquire adequate capital to carry on their business successfully and profitably, however industrious and skilful they may be.

It is very probable that capital would be very freely embarked in agriculture, had not farming lost credit in Canada, through men dabbling in it who were totally ignorant of improved practical husbandry. Some of these men had more money than experience of the business they embarked in. Others did not possess either. The latter could not succeed. The former, from their wanting the necessary practical experience of agriculture, did not apply their money in the most judicious manner, and the consequence was, that in many cases it was very much wasted, or altogether lost.

Capital may be very soon squandered in farming by those who are unacquainted with the practice of good husbandry and its results. If money

is freely expended in improvements that may not give quick or adequate returns, and often perhaps give no returns; and if there is more attention given to show than to utility and profit, capital will soon waste. Expending money on untried and doubtful experiments, expensive improvements, and on various matters that are more showy than useful, must be hurtful to the credit of farming. That expenditure of capital, that will produce the most valuable returns, in proportion to the amount expended, will always be the best in Canada.

Fortunately for the credit of farming in the Canadas, there are many examples where capital and property have been acquired by the practice of agriculture, even under the disadvantage of having to commence in a new country of strangers with scarcely any capital, or with an amount that was very insufficient. The ill success, however, of others, arising from the causes that have been stated, have greatly discouraged the investing of capital in agricultural improvement and production, to the very great prejudice of the whole community.

Canada is not a manufacturing country to any great extent; and for ages to come her manufactures will not, perhaps, supply her own people with the most necessary articles of common use. Her geographical situation will preclude her from possessing a large fleet of merchant ships, either to carry her own produce, or that of other nations. Her people must, therefore, depend chiefly upon their lands to supply directly or indirectly all their wants. And were skill and sufficient capital employed in their cultivation and management, the inhabitants of Canada might be as well provided for from their own resources, as any other people on earth, notwithstanding



ing that our waters are covered with ice, and our fields with snow, for four or five months of the year.

The working seasons are short in Canada; and in consequence of this circumstance, it requires that farmers should use great exertion to have each work executed in the proper time, almost to an hour. Without a practical knowledge of agriculture, he is not likely to do this. In the British Isles, farmers had the whole year generally for out-door work; and although they might not have each work executed in due time to a day, it was possible for them to make up for lost time. Here it cannot be done. Nevertheless, the author of this article, after twenty years experience in Canada, will take upon him to say, that on all farms that are judiciously drained and properly managed, the farmer who understands his business will very rarely fail to have ample opportunity to execute all his work in due time, if it is not his own fault. Want of skill, industry and capital, are more to blame for deficient crops in Canada, than the inclemency of the seasons.

It is stated that Mahomet Bay, King of Tunis, was dethroned by his subjects for having the reputation of possessing the philosophers' stone. He was restored by the Dey of Algiers, upon promising to communicate to him the secret. Mahomet sent a plough, with great pomp and ceremony, intimating that agriculture is the strength of a nation; and that the only philosophers' stone is a good crop, which may be easily converted into gold.

It has been the opinion of many, that a large production might be injurious, and not find consumption at a price that would pay the cost of production. There is not much danger of such a result, provided the industry of all classes are properly directed. The following selections

are made from notes by the translator of "*Say's Political Economy*," and refer to production:—

"All material products whatever, as soon as produced, become items of individual and national capital. Why? Because they may be so consumed, as to concur in the bringing into existence of some produce not then in existence. Every addition to the productive power of a nation is a positive good; and there is no possibility of production outrunning consumption, so long as the consumption is free. If native products be superabundant, they will be exchanged for foreign products; if material products be over plentiful, they will be bartered for immaterial ones; and the relative advantage of engaging in these several departments of production, will determine the choice of individual industry. \* \* \* It is utterly impossible for the national power of production to become excessive, except by the limitation of national consumption. By this expedient alone can willing industry be deprived of occupation, and active production of its reward. \* \* \* In a community, city, province, or nation, that produces abundantly, and adds every moment to the sum of its products, almost all the branches of commerce, manufacture, and generally of industry, yield handsome profits, because the demand is great, and because there is always a large quantity of produce in the market, ready to bid for new productive services."

These extracts are given from an authority, whose opinion may have more influence than that of the writer of this article would have.

If it is not safe to employ capital here on cleared lands that are of excellent quality, provided they are properly managed, and free from all rent and taxes; it is difficult to believe how it is possible to pay all the charges that lands are subject to in England, and farmers, after all, able to make a respectable living. Capital judiciously expended on stock, and preparing the soil for crops, does not become annihilated, it is all safe. The stock may be yielding a constant product in milk, butter, &c. or be gaining flesh and more value. The labour and seed expended in preparing and sowing, will be refunded by the produce of

## 24 Application of Capital to Agricultural Production.

the crops. Indeed it is hard to conceive that if an *estate* of sufficient extent should be managed with order, economy, and intelligence, that the profits of the cultivator would not enable him to lay by a surplus, after replacing the entire value of his capital, and defraying the expenses of himself and family. Capital applied in this way, though expended on stock, and consumed on labour, is yet not destroyed, and may reproduce itself with a profit. This re-production will enable the farmer to repay the advance; and, if very fortunate, he may have realized a profit that will enable him to employ more labour, and make it unnecessary for him to require any further advance of capital. But if he should still require a loan, it will every year be of less amount, as his own profits gradually accumulate.

It is by showing the comparative advantages of the usual modes of employing capital, that it will be seen, which is most useful to this community. And first, let us suppose that £1000, or any other sum, is expended in erecting a house in the city of Montreal—this house is an improvement to the city. The capital expended upon it is safely invested—and so far profitable that it may be let for a rent, that one year with another will be equal to the interest of the money laid out. The money paid away for the materials, and to the various persons employed in building the house, goes into circulation in the most useful channels. So far, all is very well. The man who expends his capital, receives a fair annuity from it, but the capital is no longer at his disposal to be applied to reproduction, or to productive consumption; it remains fixed in the walls of a house, &c., and cannot be set free again for his use, except by a sale. Suppose further, that the money, or part of it,

was borrowed to build the house, and, subsequently, payment is demanded. It cannot be paid unless the house is sold, and possibly at a large sacrifice.

Were the same amount of capital to be employed on landed property, that was real estate; in the judicious improvement of land—the raising of crops—and keeping of cattle,—the capital, and a profit, proportioned to the skill and good management adopted, would be returned in a year, and be again free to be expended in extended improvements; and thus it might continue, year after year, and the expenditure each year producing all the advantages that a new money capital brought into the country could do.

“All products whatever, whether of unassisted nature, or of nature aided by human industry, which are available in any way for the purposes of future production, are in fact capital. Why? Because they may be, not because they are, so employed. Previously to such employment, they are dead or inactive, during such employment, they are active capital. This is the natural and simple arrangement. Wherefore, the returns of capital, when actually in hand, are themselves capital. If those returns be larger than the outlay, capital is on the increase, and *vice versa*.”—(Note by the Translator of Say's Political Economy.)

The capital that was expended on land, finds circulation among the industrial classes, where it, is most required. Part of it finds its way from them to the merchant, manufacturer, &c., and may be circulated without end. Thus the *first* capital expended, produces full as much benefit as that applied to building the house in the city. Each goes into extensive circulation. But that expended on the house is only once circulated, while that on the land is *reproduced*, augmented, and again circulated every year, with the same advantage to the community as at the first. It creates new funds constantly for the employment of labour,

and greatly augments the active capital of the country. The house in the city will never much increase the disposable capital, because it does not bring into existence any new produce,—the capital expended upon it being fixed. And if it do happen to be released or set free by a sale, the money is likely to be invested again in the same description of property.

The Manufacturer—the Tailor—the Shoemaker—the Blacksmith—and the Carpenter, may all be said to have a part in agricultural production. They provide the farmers with articles of indispensable necessity to them, and for which they give in exchange a part of their produce, or the money price which they receive for it from other customers. The farmers find it convenient and profitable to be furnished in this way, and the manufacturers and tradesmen are equally benefitted by the arrangement, because all are employed in the business they understand, and in the manner that their labour will produce most profit to them.

If the manufacturer is useful to the farmer, the merchant is equally so, as the agent for transacting business between them. For this agency, he is entitled to profits proportioned to the extent of the business he transacts. The greater the quantity he sells the larger ought to be his profits. The agricultural class form the great majority of the people of Canada, and should be the principal customers of the merchant. It is the abundance of native products that can alone give them the means to purchase what they may require of foreign commodities. It is worthy of remark, however, that the importation of goods cannot be of any use to the farmer, unless he has a produce to give in exchange for them, or to sell to others customers, and

with the proceeds, buy from the merchant. While the goods remain in the merchant's store, they cannot assist production. If the farmer, for want of capital, can only raise a scanty produce, perhaps barely sufficient to support existence, he never can purchase much from the merchant or the tradesman. Hence the necessity that capital should be applied to production before any thing else.—The mere circumstance of the creation of one product, opens a vent for other products. For this reason, a good harvest is favourable, not only to the agriculturist, but likewise to the dealers in all commodities generally. The greater the crop, the larger the purchases of the growers. A bad harvest, on the contrary, hurts the sale of commodities at large. The merchant is deeply interested in the abundant produce of husbandry. So is the tradesman, who only manufactures for home consumption. And by the same rule, Bankers, and professional men, who derive their profits and income from Canadian transactions, and practice, must also be interested. Indeed, the total annual income and expenditure of all the settled inhabitants of Canada, cannot greatly exceed the gross amount annually created by our agriculture, whatever that may be.

The expenditure of the British Government in Canada, and the capital brought by emigrants, must be extremely beneficial to the country. But in order to give the country the full advantage of it, the agriculturists should be able to supply the British troops, and emigrants, with all they would require of farming produce; and if they allow any part of this supply to be procured out of Canada, they lose so much capital, that might be their own, had proper means been adopted by them.

Timber is a native product, and if

the agricultural class were to supply the labour and all the provisions that are expended in preparing it for exportation, they would derive a very considerable benefit from this branch of traffic. All these advantages, and many others, depend on the abundance and excellence of agricultural produce.

Capital expended on railroads, canals, bridges, and other public improvements, may greatly assist production, by lessening the expenses of transport, &c. The money expended in their construction, finds circulation in the most useful channels, and must produce great benefit to the community. Nevertheless, this expenditure is not likely to be refunded in a very short time to be again applied to production, as capital would be, that was employed in agriculture. However, when judiciously applied, it will be more productive of good, to the agricultural class in particular, than any other fixed capital.

The total amount of importation from foreign countries to Canada, may be considered as a part of her production, so long as an equivalent in money or produce is found in Canada to pay for imported commodities. It is giving to our people the advantage of purchasing what they want, by disposing of what they do not want, and it must ever be their interest to do so. There are native products, that cannot be readily or advantageously disposed of, and these should by all means be manufactured in this country for our own use, and for sale; and capital employed in such manufactures, will be the next most useful to that employed in agriculture; but this shall be discussed under another head. To discourage the importation of foreign commodities that are necessary for our people, or they would not be imported, and that must be

paid for chiefly by native products, or what has been received in exchange for native product, must clearly be against the best interests of the Canadian community.

It may be replied to what has been advanced, that the classes not agricultural, who reside in our cities and towns, require houses for their accommodation, and therefore the money expended in their erection, is a necessary application of capital. Certainly it is; and the object of writing this article is not by any means to discourage the building of houses, and the forwarding of other improvements in our cities and towns, but to show that there are other modes of employing capital that are equally necessary—that will yield larger returns—will be productive of more certain benefit to the community, and would be perfectly safe; and it is left to the reader's judgment to decide. Were we to have registry offices, and some reforms in our laws, there is not a country on earth where capital might be more safely employed in agricultural improvement and production, than in Lower Canada.

The present state of our agriculture has been already explained. To effect the necessary amelioration, skill and capital are required. Capital will not make up the want of agricultural skill to those who have it not, nor will this skill compensate to those who possess it the want of sufficient capital to carry on this business.

If money is borrowed by the farmer, which he is bound to repay within the year, it is essentially necessary that it be applied in such a way that it will yield quick and sure returns, or the accommodation may prove an injury both to the person who grants it, and he who receives it. But if the money is judiciously expended on the purchase of stock for the dairy, or the

shambles, or in the improvement of arable land, that will give a return within the year, the farmer is sure to be able to repay the loan he receives; and, perhaps, realize such a profit as will give him a good rent for his land, and pay him for his own time. Indeed, it is almost impossible that any disappointment can occur under ordinary circumstances, if the farmer acts with prudence, and remembers that the money is not his own, but belongs to a partner who has advanced it, and will expect it to be returned with an equitable proportion of the gain that will be acquired by its employment, as the interest.

It has been a very general opinion that banking accommodation was unsuitable for the agricultural class. It might be so in the British Isles, where there are so many claimants for the farmers' produce that must be paid before bank debts. In Canada the case is widely different. There is scarcely any claims of rent, tithes, or taxes upon the lands. Whether banking accommodation is, or is not, suitable for Canadian Agriculturists, there can be no doubt whatever that in no way can capital be more usefully employed or produce more general prosperity, than in the judicious improvement of husbandry, so as to augment its produce in every way. Agriculture must be the foundation of the wealth and resources of Canada, and it is impossible to build up the prosperity of her people on any other basis.

It would be instructive to know what effect it would produce on manufactures and commerce, were they to be deprived for a short time of all banking accommodation. It would probably give some idea what injury the want of such accommodation is to the prosperity of agriculture. The discounting of mercantile bills has scarcely any effect in assisting agricultural product, be-

cause the product must first be in existence before the farmer can receive any bank notes. If, for want of a small sum of money to purchase cattle, manure, or labour, he is unable to raise more than a scanty product that is barely able to give him the means of supporting existence, he never can have much spare produce to exchange for bank notes; and poverty is his lot through life. It is a mistake to suppose that no more encouragement is required for the prosperity of agriculture in a new country like this, where capital is not abundant, than to be sure of a market for our produce when it is raised and ready for sale. But what is the man to do who may have land, but not the means to cultivate or stock it? He cannot have produce to sell, however good and convenient the market.

It is considered that if a manufacturer has sufficient capital of his own to erect his building and purchase his machinery, an advance may safely be made to him that will be sufficient to procure him the raw materials, and employ labour to carry on his business. If he could not obtain this advance, a most useful manufactory might never be at work, and many people might be unemployed. The agriculturist who has all his capital in land, and the necessary buildings upon it, but has not sufficient capital to procure a stock of cattle or employ labour, is exactly in a similar situation with the manufacturer; and has the same necessity for accommodation, in order to set him fairly at work. Without this accommodation, notwithstanding all his other advantages, he may never be anything but a poor man, and contribute very little during his life towards the good of the community. The manufacturer and the farmer, may each repay the capital advanced to them, by a product brought into

existence by means of this advance. What are the circumstances, in these cases, that would make it imprudent to grant accommodation in one case, that might be safely granted in another? If there are circumstances in favour of our case, more than the other, it is unquestionably that of the farmer. If an agricultural produce is not first created, there can be no manufacturer. It is only with the produce of agriculture that manufactures can be purchased.

Hitherto banking in Lower Canada has been in the hands of merchants; and their discounts have been almost exclusively confined to mercantile bills. No objection can be offered to this course, nor can any fault be found to it; but it would be the object of the writer to prove that banking accommodation might be usefully and profitably extended to the agricultural class also.

The Scotch banking system is the only one that would be suitable to afford accommodation to agriculturists, by granting a credit on cash accounts. The Bank of British America is the only one in Lower Canada who propose to adopt this system, and they deserve to meet with every success if they introduce it.

A Bank that commences business with £100,000 capital lodged in their vaults in specie, might very safely issue their own notes to the amount of £300,000. Any bank that would be entitled to public confidence, would not apprehend any run upon them; and a bank that was not entitled to the public confidence, could not be put down too soon. It is necessary to the prosperity of banking in Canada, that a good feeling should be established and maintained between them, and this would be perfectly possible without injury to any one of them. If banks are necessary, it never can be for the

good of this community that any attempts should be made to put down any one of them that is considered safe, and transacts business upon a fair principle—by unfair or ungenerous means. It would be for the public interest that banks should rather support each other, and it would certainly be for the general interest of banking, because that in case of the stoppage of a bank in the country, it is sure to have a very unfavourable influence on the public confidence in other banks. It is the jealousy of banks towards each other that has generally been the cause of their ruin, and not the want of public confidence in them. When there is reason to doubt their solvency, it is right to put a stop to their issues, but not on other grounds.

Nothing but capital and labourers can be wanted in a country such as Canada, that possesses an immense territory of highly fertile land. But as capital is indispensable, it might be supplied in part by banks, and a paper circulation based on sound principles. The following extract is from an article in the August number of Blackwood's Magazine, on "The Late Commercial Crisis;" and there cannot be any doubt that the extraordinary advancement of improvement in the United States is chiefly owing to the establishment of banks and paper circulation; but it is equally certain that a large amount of worthless paper got into circulation, and that the public sustained considerable loss by it.

"Banks are the great instrument by which integrity and talent supply the want of capital; by which prudence and industry, setting out on the basis of paper credit, attain at length to the solid advantage of substantial capital. Such a system quadruples at once the active capital of the country, by producing a paper capital based on credit, which, as long as that capital remains unbroken, answers all the purposes of encouraging industry, just as well as the metallic treasures of Mexico and Peru. It prevents a large portion of

the national wealth from being absorbed in the unprofitable and unproductive form of a metallic currency, and provides for the necessary circulation at a fifth part of the cost. Old states, in which capital is redundant, and all home employments nearly filled up, may dispense with a paper currency, just as the finished scholar may discard the rudiments, or the accomplished equestrian forget the lessons of the manège; but till that stage has arrived, it is the greatest act of national insanity to destroy or restrain, except within those limits which the public safety requires, the invaluable ally of a paper circulation. It has quadrupled in the last half century the wealth of Scotland, and multiplied ten-fold that of the United States. But for the powerful impulse given by the advance of bankers, and the enlarged capital which they put in motion, the industry of the United States, instead of having long ago crossed the Alleghany Mountains, and given birth to 4,000,000 of men in the valley of the Mississippi, would have been still slowly advancing along the shores of the Atlantic, and not yet have pierced the profound solitudes of the Ohio or the Missouri. Accordingly, from a very early period banking establishments, as will be the case in all free, intelligent, and advancing communities, have been established with extraordinary benefit to the United States. The advantages, however, with which they are attended, have not been unmix'd with evil; there, as elsewhere, fraudulent insolvency too often usurped the King's Prerogative, and issued its own worthless paper as the current coin of the realm."

(To be continued.)

Provinces.	Area in Square Miles.	Population.	LAND.		
			Occupied Acres.	Cultivated Acres.	Waste fit for Cultiv. Acres.
Canada—Lower.....	250,000	600,000	8,000,000	2,400,000	110,000,000
Canada—Upper.....	120,000	400,000	4,000,000	1,000,000	60,000,000
New Brunswick.....	27,704	120,000	3,000,000	500,000	12,000,000
New Spain and ? .....	15,617	220,000	2,000,000	600,000	10,000,000
Cape Breton.....	3,126	40,000	400,000	100,000	1,000,000
Prince Edward's Island.	2,131				
Total.....	318,578	1,380,000	17,400,000	4,600,000	192,000,000

EMIGRATION TO BRITISH NORTH AMERICA BENEFICIAL TO THE PARENT STATE AS WELL AS TO THE PROVINCES.

In the author's Supplement to his Treatise on Agriculture, he has stated that in the British American Provinces not over a fiftieth part of the cultivatable land has yet been brought into cultivation, and that nearly all the remainder is covered with immense forests of trees, and only occupied by wild animals. The following extract from one of the tables in the Supplement, may be interesting to the reader:—

From the above table it may be seen how greatly men and capital are wanted in British America to bring her dreary wastes into cultivation, and make them productive of all that is useful to men. Those who would consider the climate unfavourable, must be very well aware that it could not be less favourable for a full population, than it is for the few inhabitants that are now scattered over its immense surface. On the contrary, when the country would be settled, the forests cut down, and the lands properly drained, there is not a doubt that the climate would be ameliorated, and be more

favourable for man, for cattle, and for the production of profitable crops.

All the uncultivated lands of British America do not now yield any valuable product, except the trees that grow upon them, and they are of little value in the forest until labour is expended upon them, to prepare them for exportation. This waste land might be made to produce all that would be necessary to provide directly and indirectly for a population from twenty to thirty times as numerous as we have in British America at present.

Can those men who would oppose emigration to Canada explain in what manner it would be hurtful to the interests of our present population? Would it lessen the value of the property in cities and towns? Would the value of the lands already settled in the most favourable situations in the Provinces, as regards markets and the best means of land and water communication, be of less value to their owners? The cities and towns would increase in extent and population, in proportion to the increase of trade and commerce, and trade and commerce would increase in proportion to the augmentation of a produce that will give employment to trade and commerce. Therefore, whatever augments our population and the amount of the annual produce of our lands, must be advantageous to trade, and commerce, and to all those who derive their income in any way from Canadian resources; and again the market for the sale of agricultural produce, must extend in proportion to the increased number and enlarged means of those who have to buy it constantly.

In the Supplement to the Treatise on Agriculture before referred to, pages 72 and 73, it has been endeavoured to shew that the annual product created by each full grown person employed in agriculture, after

allowing interest of capital in land and stock, is about £37 10s. Without bringing any new land into cultivation, there is no doubt that an additional man could be usefully employed on every farm on an average, in this Province. And supposing the number of farms to be 60,000, were that number of men judiciously employed in agriculture, in addition to those already engaged in that occupation, their labour would certainly produce an amount for each fully equal to the above estimate, £37 10s. annually; and this alone would increase the annual produce created by agriculture from the lands already in cultivation, about £2,300,000. Two-thirds of this amount might be consumed by the labourers, and one-third be at the disposal of the farmers, which would be adding about fifty dollars, on an average, to the annual income of each proprietor of a farm. This is a very low estimate of the profits that might reasonably be expected from the employment of more labourers in the judicious management of husbandry. Every one acquainted with Canadian farming must be aware how much it is required to employ more labour on almost every farm to make them profitably productive to their owners.

Suppose that an emigrant, who has capital, gets possession of a lot of forest land; he begins to clear it, and prepare it for cultivation; he must work for a year upon it, before he is able to obtain any produce from it for his subsistence, or that of his family. For all that time, he is a customer to the Canadian farmer for his produce, and pays him cash for it. He is in no other way injurious to the farmer settled here before him, unless it is considered an injury to increase the number of his customers, and the demand for his produce. It is by his industry and capital, the



settler raises a product, from that which was before unproductive. How, then, does he injure those who are settled here before him? Whatever he is able to sell from this product, goes to increase the capital of this country, and the means of giving employment to others in productive industry.—What injury could it be to us that the wild forest of British America, that yields us no profit in its present state, should be converted into cultivated fields, producing corn and cattle, for the support of our fellow-men, and fellow-subjects, who would at their own charge, and labour, bring them into that useful state? We can have no just pretensions to exclude British subjects from settling in Canada; and if we did possess the right to do so, it would not be our interest to exercise it. On the contrary, we should cheerfully allow our fellow-subjects to take possession of a share of the boundless wastes that surround us, even though these wastes did of right belong to us, which they do not, and never did. There is abundance of land in British America for all the emigrants that will come to it for many centuries; and, therefore, we need not be so anxious to keep land waste, that our posterity, for very many generations, will not be able to occupy or cultivate.

It is a perverse and blind policy indeed, that would offer any opposition to emigrants coming to this country, either with capital, or with strength and inclination to labour. Every able-bodied man settling among us, might properly be considered equal to a capital of £50. Hence, were 1000 or 10,000 men, able to work, to come to us in a year, it would be equal to an increase of our capital to the amount of £50,000, or £500,000 currency. Men, and the means to employ them, is what is required in British America. The capital that would

be wanted to set them to work, would not be lost. The produce from their labour, applied to the cultivation of good lands, free of rents and taxes, could not fail to refund amply the capital first employed.

In the British Isles, they have a great many unemployed labourers that are a burden to the wealthy and employed portion of the population. It must be the interest of the latter, if they could fairly accomplish it, to get rid of this burden, and enable unemployed labourers to provide for themselves. This can be accomplished by adopting a proper system of emigration under judicious superintendance. The poor emigrants are not to be landed upon our shores without any further care of them. By proper management they would fully repay all that would be expended upon them; and instead of their being burdensome to the wealthy and employed inhabitants of the British Isles, they would in a very few years be able to become purchasers of British manufactures, and thus they would be contributors to the wealth and prosperity of British industry and enterprise.

The following extract from Dr. Paley, on Colonization, may be interesting to the reader, who has not seen it before:—

“The only view under which our subject will permit us to consider *colonization*, is in its tendency to augment the population of the parent state. Suppose a fertile, but empty island, to lie within the reach of a country in which arts and manufactures are already established; suppose a colony sent out from such a country, to take possession of the island, and to live there under the protection and authority of the native Government; the new settlers will naturally convert their labour to the cultivation of the vacant soil, will draw a supply of manufactures from their countrymen at home. Whilst the inhabitants continue few, the lands cheap and fresh, the colonists will find it easier and more profitable to raise corn, or rear cattle, and with corn and cattle to purchase woollen cloth, for instance, or linen; than to spin or

weave these articles for themselves. The Mother Country, meanwhile, derives from this connection an increase both of provision and employment. It promotes at once the two great requisites upon which the facility of subsistence, and by consequence the state of population depends,—*production and distribution*; and this in a manner the most direct and beneficial. No situation can be imagined more favourable to population than that of a country which works up goods for others; whilst these others are cultivating new tracts of land for them; for as, in a genial climate, and from a fresh soil, the labour of one man will raise provisions enough for ten, it is manifest where all are employed in agriculture, much the greater part of the produce will be spared from the consumption; and that three out of four, at least, of those who are maintained by it, will reside in the country which receives the redundancy. When the new country does not remit *provisions* to the old one, the advantage is less; but still the exportation of wrought goods, by whatever return they are paid for, advances population in that secondary way, in which those trades promote it that are not employed in the production of provision. Whatever prejudice, therefore, some late events have excited against schemes of colonization, the system itself is founded on apparent national utility; and what is more, upon principles favourable to the common interests of human nature; for, it does not appear by what other method newly discovered and un-frequented countries can be peopled, or during the infancy of their establishment be protected or supplied."

From what has been submitted, it must be manifest that emigration to the British Isles, to British America, cannot fail to prove highly beneficial to both countries, as well as to the emigrants. What remains to be considered is,—how emigration could be most judiciously and successfully encouraged and promoted, with the greatest advantage to all parties concerned. This shall be discussed in a future number, and the whole subject more particularly considered. It is one that is of much consequence to us, as well as to the wealthy and industrial classes of the British Isles. These provinces have abundance of fine land, to afford means of settlement, employment and subsistence to the redundant popu-

lation of the mother country; and both countries will receive all the advantages of a new produce brought into existence by their labour applied to what is now waste and unproductive.

EXTRACT FROM THOMSON'S LECTURES ON BOTANY, ON SOILS, MANURES, &c.

It is a wise provision of nature, that as plants are not endued with volition and extensive locomotion, nor guided by instinct nor reason, they are subject to more regular and unalterable laws than the animal creation, at least than that portion of it which possesses those functions which have been enumerated. Their food is always placed within their reach, and they enjoy good health, and arrive at perfection in their growth, independent of external accidents, to which animals are equally liable, when they are situated where the soil contains those principles which are best adapted for the various purposes of their economy. The consideration of this question suggests the questions—What is the composition of soils? What part of soils are taken up as food by the roots of plants? To answer them has long employed the attention of the philosophical observer, and many and various opinions have been given to the public; but it is only since modern chemistry made those discoveries which may justly be regarded as the most splendid triumphs of experimental science, that any thing rational and satisfactory has been advanced. \* \* \* \* \*

The fact cannot be too often repeated and impressed on your minds, that plants are living beings, possessed of powers which enable them to convert into their own material substance, matters of a nature apparently very different from it,

without keeping this in view, we should be forced to look for all the different productions of plants ready formed in the soil where they grow, and to suppose that these are simply taken up by their roots, and deposited in the different parts of the plant; an idea too incongruous to be admitted. On the contrary, they do not even take up those principles which are most abundant in the soil where they grow; but select particular parts of them, although these are not found, in general, forming in their uncombined state any part of the vegetable frame. \* \* \* \*

The ultimate components of all the various substances produced by vegetables have been found the same, differing only in the quantity and the mode of their combination; and the parts of the soil which supply these have been found to be much fewer than was previously supposed. \* \* \* \* \*

Every soil fit for yielding nutriment to vegetables may be supposed to consist of earth, water, air, a small proportion of metallic oxyds, and decomposed vegetable and animal matters, in which are included salts, gases, and vegetable extracts.

Earth, which is the essential basis of all soils, is, as it is commonly spoken of, a compound of different earths; the most general of which are *Calcareous earth*, *Argillaceous earth*, *Silicious earth*, *Magnesian earth*, and *Ferruginous earth*.

1. **CALCARIOUS EARTH** comprehends lime, usually combined with carbonic acid, in a state of limestone, chalk, shells, and marl, which is a mixture of carbonate of lime with clayey and sandy matters; but lime is sometimes, also, found in combination with sulphuric acid, forming a substance called gypsum; and more rarely with phosphoric acid. When too much calcareous matter is contained in a soil, it is unfruitful,

owing to its absorbing moisture, and consequently remaining too dry. But the case is different when the calcareous matter is mixed with silica, for then the moisture absorbed remains in a free state, and not so united with the chalky matter as to disappear and be useless to plants. But the absorbing properties of all calcareous soils are not alike; and a great difference depends on the degree of comminution of the calcareous matter. Thus 100 parts of calcareous sand retain, according to Professor Schübler's experiments, 29 parts only of water, whilst 100 parts of the same matter in the state of fine powder retains 85 per cent. In the first case, when calcareous earth and silica predominate in an arable field, they produce a hot and dry soil; when in the second, a moist and cold soil.

2. **ARGILLACEOUS EARTH** comprehends clay, which is generally mixed with silicious sand and mineral substances, and is very retentive of moisture.

3. **SILICIOUS EARTH** is almost entirely composed of sand. The water passes so readily through it, that very little is retained for the purposes of vegetation; and soils which contain much of this earth are, therefore, barren and unprofitable. In the form of sand it retains 25 per cent. only of water; while 100 parts of it, as it occurs with clay in an arable field, retains 280 per cent. of water.

4. **MAGNESIAN EARTH** is not so commonly found as the earths we have already noticed. The magnesia it contains is combined with carbonic acid, and mixed with silicious particles. It approaches nearest to the nature of clayed earths in its power of retaining moisture; that power enabling it to retain  $4\frac{1}{2}$  times its own weight of water. This renders it, when it predominates, very prejudicial to vegetation; while it

increases, when added in moderate proportions, the fertility of a dry sandy soil.

5. FERRUGINOUS EARTH consists of those oxyds of iron, known by the names of ochres and pyrites, mixed with silicious matter. These oxyds, in particular the pyrites, when in considerable quantity in a soil, if it contains little calcareous matter, are extremely injurious to vegetation. The pyrites is a compound of sulphur and iron, and is converted by exposure to air and moisture into sulphate of iron, which destroys plants by over-stimulating them.

Vegetable earths have the least specific gravity, and sandy soils the greatest, whether they be dry or moist; the vegetable earths contain, besides vegetables in a state of decay, animal matter and a large proportion of salts, which are chiefly common salt, sulphates of magnesia and of potash, nitrates of lime, and carbonates of potash and of soda.

Such are the earths generally contained in soils; when any one of them abounds, the compound earth is named after the component; as for instance, a calcareous soil, an argillaceous soil, &c.

The principal difference which characterises the various kinds of earths, is their power of retaining the next component of soils, WATER. Water, as forming a part of soils, is either chemically combined with the earth, or merely mechanically mixed with it, and retained in combination by cohesive attraction. In the former, it is of no use to vegetables; in the latter, it is essentially necessary for their support. If the soil be not sufficiently retentive, the plant is starved, for nothing can be taken up from the earth that is insoluble; and as we shall show afterwards, water itself is a principal part of the food of plants. If the soil be too stiff and retentive, the water re-

mains upon its surface, and does not percolate to a sufficient depth to be applied to the roots; and if the vegetable be of a succulent kind, the herbaceous part remaining constantly surrounded with moisture has its vegetative powers weakened, and rots. This is particularly the case in winter; for, as the vital energy of the plant is then much lowered by cold, a disease of the vegetable takes place, similar to what happens in a leucophlegmatic state of the animal body, from which the plant rarely recovers. The most efficient soil, as far as winter is concerned, is that which contains a due mixture of carbonate of lime, sand, and pulverized clay, with some vegetable or animal matters; and in which the materials are so mingled as to remain loose and permeable to the air. This soil is calculated not only to retain the water in proper quantity; but also to absorb it from the atmosphere, which is one great source of the supply that vegetables require; for water, as has been already remarked, is requisite for rendering the other matters in soils sufficiently soluble to be taken up by the roots of plants. All the earths are more or less soluble in water; thus lime is taken up readily in its pure state; and also if the water contains much carbonic acid in solution, when the lime is in the form of chalk, or a carbonate, in the proportion of about 1-680 part of its weight. Clay is soluble in a minute proportion in rain water; silica even may be retained in solution by the aid of carbonate of potash; and in the minute state of division in which it is precipitated from an alkaline solution, it is soluble in 1000 parts of water: 2000 parts of pure water hold one of magnesia in solution.

Air is, also, a necessary component of soils. Atmospheric air is absolutely necessary, as we know, for

carrying on the process of germination; the more pulverulent, therefore, the soil is, the more air it is capable of containing, and consequently is the better adapted for supporting vegetation. But a soil which is too sandy, the water not being retained, although it appears to be loose, yet does not contain so much air enveloped in it as is required; for the small particles of which it is composed apply more closely to each other, and lie in a smaller compass than the aggregated masses of a better soil, which touch at a few points only, and, therefore, have more and larger interstices between them. When the soil is too retentive, the water which remains on its surface evaporates in summer, and deposits the clayed particles which it had suspended, a kind of paste is left, which hardening, by being baked, as it were, in the heat of the sun, no air can penetrate to the parts beneath it; nor can that which has been already used in the vegetative process, and which is unfit to carry it further on, escape; and we know that as atmospheric air is vitiated by the roots of growing plants, and during the germination of seeds, a constant renewal of it is requisite for supporting the vigour of vegetables. It is the oxygenous portion of the atmospherical air contained in the soil which is vitiated by the functions of the roots of plants.

\* \* \* The lest component of soils which we have to mention, has always been regarded as the most important of the whole. We allude to animal and vegetable matter in a state of decomposition, from which the black mould which constitutes the richness of soils is almost altogether formed. But the analysis of some of the most fertile soils has proved, that their fertility does not depend on the presence of a large proportion of those substances. Thus

Sir H. Davy found in the soil of a very fertile field in East Lothian, contained nine parts only in the hundred of decomposed animal and vegetable matter; and a soil from the low parts of Somersetshire, long celebrated for yielding large crops of wheat and beans without manure, contained five parts of these principles only in the hundred. It is indeed true, that the carbonaceous matter contained in plants can be derived most easily from decomposing animal and vegetable substances; but these also yield salts, which prove highly stimulating to growing plants; and although plants seem to attain great bulk and vigour when much manure is applied, yet they are over stimulated, and their growth is connected with disease, in the same manner as in an overfed and pampered animal. The natural state of both is altered; premature age succeeds, and death arrives long before the period when he should be naturally expected. Those plants also, which are intended for food for man and animals, when reared upon soil of the kind we are now noticing, yield less nutriment in the same bulk, than that which more healthy plants yield; and it is also of an unwholesome kind. Upon the whole, we may truly assert, that more harm is done by loading soils artificially with much animal and vegetable matter, than the natural deficiency of it in soils can occasion.

When a Botanist examines a space of ground, he forms an estimate of the nature of the soil, by observing the kind of plants, or weeds, as they are termed, which it naturally produces, and draws his conclusions from the knowledge he possesses of the relation which always subsists between the plant and the soil. If the plants are those which have divided roots, he concludes that the soil is pulverulent and easily penetrated;

but if the roots are thick and fleshy, that, as they require a humed soil, it is probable that it is damp and retentive. Some kinds of plants grow on one soil, but are never found on another; some require a large supply of carbonaceous matter, or a rich fertile soil; others, he knows, glean the little they require in the most barren, and soon die in richer spots. But the knowledge of the Botanist, although it is an accurate guide to a certain degree, in directing his judgment as to the value of uncultivated soils, and is valuable in preventing him from making bad speculations by introducing new objects of culture into a place which cannot admit of them; yet it is of little avail in examining soils under the immediate influence of cultivation. The experienced eye of the farmer supplies much of this defect. On too loose and poor soils the roots of barley and other grains are long, but the stems small and weak; but in a richer and more tenacious soil the roots are short, thick, and very closely set with fibrils. The reason of these circumstances is, that the root shooting out towards the spots where the stimulus of nutriment is in greater quantity, exhausts the little nourishment it can obtain in adding to its length, and, therefore, an insufficient supply is left for the stem and leaves; but in richer soils the whole of the fibrils being surrounded by nutritious matter, a greater quantity is actually taken up by a much smaller surface of roots, and supplies more freely the herbaceous parts of the plants.

To ascertain the real nature of soils, chemistry must lend its assistance; and this mode of examination is undoubtedly the most certain. Sir H. Davy has, however, justly remarked, "that the results of analysis, considered as affording indications of fertility, must necessarily differ ac-

ording to the variations of climate, situation, and other circumstances. Thus, the power of soils to absorb moisture ought to be greater in warm and dry countries, than in cold and moist ones; and when the quantity of argillaceous earth they contain is larger. Soils, likewise, which are situated on declivities, ought to be more absorbent than those in the same climate situated in plains and valleys. The productiveness of soils must likewise be influenced by the nature of the subsoil, or the earthy and stony strata on which they rest. Thus, a sandy soil may sometimes owe its fertility to the power of the subsoil to retain water; and an absorbent clayey soil may occasionally be prevented from being barren, in a moist climate, by the influence of a substratum of sand or gravel." [Here follows the mode of examining soils, which will be given in a future number.]

Every farmer knows the fact, that many plants will grow only in certain soils; and his art consists in supplying to the natural soils that part which is most essentially necessary for their support. As we have proved that the components of all vegetable matter are carbon, hydrogen, and oxygen, we must look for the supply of these ingredients in the soil; and it is from water and decayed organic matter that they are undoubtedly obtained. From this matter, then, the carbon is supplied; and as water only, and those substances which it can hold in solution, can be absorbed by the mouths of the roots of plants, the carbon, which is contained in the soil, separated from vegetable and animal matters by decomposition, must be dissolved in the water in order to be taken into the system of the plant; and it thus becomes their proper food.

If this view of the subject be correct, the art of the husbandman and

horticulturist must consist in applying those substances to the soil which will promote the growth of plants without over stimulating them. The different matters known under the title of manures, which are employed for this purpose, must act in four ways to produce the effect required. 1. They must render the soil of the consistence which will enable it to retain a sufficiency of water; but not too much. 2. They must render it pulverulent to admit the roots of the plants to permeate, and spread freely in it. 3. They must enable it to admit and retain air in its interstices; and, 4, fit it to form carbon, and afford healthy stimuli to the vegetable irritability. The importance of a finely pulverized soil was first pointed out by Jethro Tull, in 1733; but although his ideas on this subject extended to an absurd degree, and led him to form a theory of vegetation altogether mechanical, yet the direction of the agriculturist to the importance of pulverization, has been productive of most beneficial results. It allows of the easy extension of the roots of plants, admits a necessary supply of air during the process of germination, and assists those decompositions which are requisite for rendering manure useful.

The first place among the substances fit to answer the purposes already specified, is certainly due to lime. This substance acts upon soils either mechanically or chemically; and on the plants it acts physiologically. When in the state of carbonate, or united with carbonic acid, it is added to clayed soils, it acts mechanically by rendering them more free, loose, and pervious both to air, moisture, and the roots of plants; it acts chemically when it is deprived of carbonic acid, or is in the caustic state, by destroying worms and other insects hurtful to young

vegetables; and, by quickening the decomposition of their dead bodies, render them useful to vegetation. In either state it neutralizes acids, and decomposes salt of iron and other injurious saline matters often contained in soils; and by the healthy stimulus it affords when in the state of quicklime, it invigorates vegetation both in young and mature plants. Lime also hastens the decomposition and solution of vegetable matter; and has been long known as a most useful manure when applied where half-decomposed vegetable matter abounds, as for example, in peat soils. The best corrective, therefore, for ground that has been too much dunged, is lime; and peat mosses, which consist of vegetable substances, the decay of which has been suspended by the formation of a peculiar acid in them, are rendered arable and highly fertile by a proper use of lime. In this operation the lime is combined with the acid contained in the moss, and also with carbonic acid, and remains as a component of the newly formed soil. Every kind of quicklime, however, does not answer for manure, and particularly that which abounds with magnesia; for although magnesia, when united with carbonic acid, is a useful ingredient in a soil, yet in its uncombined state, or as calcined magnesia, when united with carbonic acid, is a useful ingredient in a soil, yet in its uncombined state, or as calcined magnesia, which is that in which it must be, when magnesian limestone is burnt into quicklime, it is injurious to plants: as proved by the experiments of Mr. Tennant. When, however, even the best quicklime is too freely used, it becomes hurtful by over stimulating the growing plants; and, therefore, the more frequent and small application of it is preferable.

The object of all manures is either

to alter the retentive quality of the soil, or immediately to supply carbonaceous matter to the plants. For these purposes, as occasion has required, clay, brick, rubbish, limestone, marl, chalk, sand, gravel, has been employed as mechanical means; salts of various kinds as stimulants; and soot, ashes, and dung, as affording the proper nutriment of plants. That salts are taken up ready formed from the soil by vegetables is pretty certain; Drs. Hamel and Cadet having established the fact, that, if the marine plants, which yield soda when they grow near the sea, be removed to inland situations, they gradually cease to yield soda, and at length potash only is obtained from the ashes. We shall merely notice, with regard to dung, that when it is completely rotten it does not afford much soluble carbon, owing to its becoming as it were oxydized, and the carbon being converted into real charcoal; other principals also, such as carbonic acid and ammonia, useful both as stimula and nutriment to plants, are dissipated during the violent fermentation which is requisite to reduce dung into this state. Fresh dung, or that which is not completely rotten, on the contrary, benefits not only the present crop but several subsequent ones, as its good effect continues as long as the process of decomposition goes on.

*(To be continued.)*

A notice has appeared in a late number of the Dumfries and Galloway Courier, of a new process for obtaining cheap and valuable ma-

Magnesian limestone is generally of a fawn colour, but it may be known by its being ten times as long in dissolving in nitric acid as common limestone.

According to Kervan, gypsum is composed of 30 parts of sulphuric acid, 32 earth, and 38 water.

In Thomson's Lectures on Botany, the following rule is given:

100 parts of gypsum contains 48 of acid, 34 of lime, and 18 of water.

100 parts of epsom salts 33 of do. 19 of do. 48 of do.

nure without aid of cattle, said to be invented by Mr. Jauffret, of Aix, in France. Unfortunately, the ingredients of which the wash or lye is made, and which is said to convert any common clay into good manure, is not mentioned, but it may be interesting to farmers to know what is said of this new invention, which would certainly prove of incalculable advantage to agriculture, if the representations made of it are correct. The following is a copy of the notice:—

“A method has been discovered in France of making manure as it may be wanted, without cattle, in twelve days, and with great economy, as appears from a report made to the Committee of the Academy of Agriculture at Paris, by M. Chaielain, its Secretary, who, with Mr. Cailleau, President of that Committee, M. de la Gerandiere, President of the Academy of Agriculture of Blois, and the Marquis de Saint Croix, were appointed to examine into the merits of Mr. Jauffret's invention.

“These gentlemen report, that by a cheap wash or lye, the ingredients of which are to be found in all places, and which every cultivator can make on his own land, all sorts of herbaceous and ligneous substances, such as heather, furze, brambles, and even the living dogstooth, can be put into a state of rapid fermentation, and not only these substances, but even earth itself, be its nature what it may, be converted into a valuable manure.

“That the manure produced by this new system is quite as valuable as the best horse litter; its effects are visible upon several successive crops; and it can be obtained with perfect facility at pleasure.

That M. Jauffret supplied the Committee with numerous and undeniable proofs of experiments, ranging over a period of nine years, in five communes of the department



of the Bouches-du-Rhone, which trials were made upon an extensive scale, on different kinds of soils, and on various seeds, plants, and trees. The success of these trials surpassed the most sanguine expectations, as has been attested, 1st, by the Academy of Aix, (annual public session 1835, at 36 and following pages of the report); 2d, by the circular of the Prefect of the Bouches-du-Rhone; 3d, by 38 certificates from most respectable inhabitants and farmers of that department, founded upon repeated experiments made by themselves; and 4th, by the declarations of well informed proprietors of the department of Vaucluse, who for years have attentively watched the trials of the Jauffret manure.

“That in order to convince themselves more thoroughly on the subject, the Committee wrote, unknown to Mr. Jauffret, to some individuals who were most distinguished by their agricultural science, and who had given certificates to the inventor, and that their replies, which are annexed to the report, are of so satisfactory a nature, as to leave no doubt on the minds of the Committee of the importance of the discovery.

“By means of a cutting machine, the cost of which is about £15, and which, after a careful examination, appeared well adapted for the purpose, three men and a horse can prepare 180 quintals, or 700 kilograms (about 7 tons English) of manure per day, and the machine is easy erected. Ten quintals of straw produce 40 quintals of manure; this is effected by the addition of the lye or the fermentation, by the fermentation dilating the material operated on.

“The Jauffret process admits of greater economy as to labour; for the wooden cistern, and the ingredients of which the lye is made, may be carried to the field which is to be

manured, and the compost to be prepared on the spot; and thus the carriage of the vegetable matter from the field to the yard and back again from the yard to the field, is saved; the escape also of carbonic acid gas, out of the most valuable component parts of manure, which takes place during the removal, is thus prevented. The inventor asserts, moreover, that he can vary the degree of fermentation to suit the effects or qualities of different soils: and as he can raise the heat caused by the fermentation as high as 169 deg. of Fahrenheit, his process has the additional advantage of destroying the germ of all noxious herbs, which might foul the land.

“That in considering this process, the Committee were struck with the advantage that might arise from establishing manufactories, not only on large farms, but near towns and villages, to which every cultivator might bring his refuse vegetable matter to be converted into manure. The cutting machine might be worked either by horse, water, or steam power.

The Jauffret process will be advantageous, not only to large proprietors, by whom an expence of £15 will scarcely be felt; but it will be of more importance to small farmers, who may cut their weeds by hand, and prepare a quantity as perfectly as any made by the machine. As to the conversion of earth into manure, any one can make it without the help of the machine invented by M. Jauffret; and the manure made from the earth by this process, is not less valuable than the compost. Thus those who may have no cattle to feed, may employ all their fodder for manure; others can render available weeds, briars, dogstooth, thistles, &c.; and those who have neither straw, fodder, nor weeds, can convert earth into manure, so

that no discovery was ever more capable of easy or general application. The Jauffret process tends to supply agriculturists with new and powerful means of increasing their wealth, especially in the case of poor land-farmers, who usually find a difficulty of finding a sufficient supply of manure."

If this invention is entitled to the recommendation given of it, agricultural improvement might be readily advanced in Lower Canada, as the want of manure is severely felt in many situations.

A Bill has been lately introduced in the present session of the Imperial Parliament to incorporate a joint stock company—"*The Thames Improvement Company and Drainage Manure Association.*"—The preamble of the bill states, that it is expedient and desirable to preserve and render available for agricultural purposes, the deposits created by the drainage that now falls into the river Thames from the public sewers of London, Southwark, Lambeth, Westminster, and the vicinity. And that the objects aforesaid may be effected by making tanks and connecting sewers at certain places in or near the margin of the said river.

The act empowers them to purchase land, to erect tanks, receptacles and other works, upon and near the margin of the river Thames. They are further empowered to convert, widen, alter, divert, open and stop up such sewers, drains, pipes, water courses, channels, and passages for discharging the drainage into such tanks, and securing it from polluting the river.

The company are empowered to raise a capital of £500,000, in shares of £50 each, with power to increase their capital if necessary.

This plan will immensely increase the quantity of manure in London and that neighbourhood, for agricultural purposes. How desirable that

some such measures would be adopted in the city of Montreal to preserve the manure from being cast into the River St. Lawrence, when it is so much wanted on the lands within a compass of ten miles of the city. It might very well be collected in tanks, until it could be carried away. There are many thousand loads of useful manure lost annually in Montreal, and it would certainly materially improve the appearance, cleanliness, comfort, and, I believe, the healthfulness of the city, to have it collected and carried away, and applied to the production of useful plants for men and cattle.

#### BONE MANURE.

The following article is from the Penny Cyclopaedia:—

Bones have been of late years very extensively used as manure, especially on poor and dry sands and gravels. Many cargoes from abroad have been imported for this purpose into the eastern parts of Britain. Bones have thus become a considerable article of commerce with Germany, Belgium, and Holland; so much so that the governments of some of these countries have it in contemplation to subject them to an export duty.

Experiments on bones as a manure were made long before their use was extensively adopted; and these, in general, were not attended with very favourable results, in consequence of the bones not being broken into sufficiently small pieces, or being put upon the land in too fresh a state. But since mills have been erected to crush them to a small size, and the proper use of them has been ascertained, the advantage of this manure, in distant and uncultivated spots, where the carriage of common stable or yard manure would have been too expensive, and where it could not be

made for want of food for cattle, is incalculable. By means of bones large tracts of barren sands and heaths have been converted into fertile fields.

The bruising and grinding of bones has become a distinct business in London and at the principal ports, ready to put upon the land. They are broken into different sizes, and accordingly called *inch bones, half inch bones, and dust*. Most of the bones procured from London and the manufacturing towns, have undergone the process of boiling, by which the oil, and a great part of the gelatin which they contain, have been extracted.

At first sight we should be led to imagine, that having lost much of the rich animal matter which they contained, they would be proportionably less effective in the soil. This, however, does not seem to be the case from the comparative experiments made with bones which have been subjected to boiling, and those which were quite fresh. All those who have used bones extensively report, that little difference can be observed between them; some men give the preference to those from which the oil and glue have been extracted. But oil and glue form excellent manures. How is this to be explained? It appears, from the results of many experiments, that bones do not furnish much nourishment to the roots of plants, until they have undergone a certain degree of decomposition. The fat and the gelatin, being intimately blended with the boney matter, and contained in cavities or cells, may remain a long time in the earth without decomposition. As a proof of this, it has been found that bones which have lain in the earth for many centuries, on spots where ancient battles were fought, afforded, on analysis, nearly as much gelatinous matter, by the

abstraction of the earthy parts, as fresh bones would have done. Bones analysed by Fourcroy and Vauquelin were found to consist of

	<i>Parts.</i>
Solid cartilage, gelatine, and oil. . . . .	51
Phosphate of lime. . . . .	37 7
Carbonate of lime. . . . .	10
Phosphate of magnesia. . . . .	1 3

It would seem, then, that the great effect of bones, as a manure, must depend on the phosphate of lime; and the effect of bone ashes seems to strengthen this opinion. But a close examination of the fields manured with bones, has led us to surmise, that much of their importance depends upon the mechanical texture of the bone, and on its power of absorbing and retaining moisture; for if a plant, which vegetates with peculiar vigour in a field manured with bones be pulled up, it will be almost invariably found that small pieces of bone are attached to the roots; and when they are minutely examined, the smaller fibres of the roots will be found to have grasped them, and to pervade their cavities, which will always be found more or less moist. The moisture, then, and a small portion of the remaining gelatine dissolved in it, forms the food on which the plant has thriven. The more the bones have undergone fermentation, the more soluble the gelatine will be. In its fresh state, it is only soluble in warm water, and the oil repels moisture. This accounts for the seeming anomaly of the superiority of boiled bones. They have undergone fermentation. The residue, although not deprived of all its animal matter, is much more porous, and will imbibe and retain moisture in its pores. The food of the plant is here ready prepared and dissolved, and kept in store without being in danger of being washed through a porous soil or evaporated by the heat. The solid substance, which is

chiefly phosphate of lime, has a stimulating effect, and assists that of the more soluble parts. But phosphate of lime is not soluble in water, and does not decompose readily in the earth; its effect, therefore, is not so great as to account for the general result. The universal experience of all those who have used bones as a manure, proves that they are of little or no use in stiff or wet soils. In stiff clays the pieces of bone are bedded in a tough substance, which prevents their decomposition; and in very wet soils the advantage of these small but numerous reservoirs of moisture is lost. Hence it is easily seen, why bones are of less use in such soils.

But it is ascertained that the effect of bones on the crop is much increased when they have been previously mixed in heaps with ashes, burnt clay, or light loam, or made into a compost with the dung of animals, and with vegetable substances. In this case the fresh bones will evidently be much more advantageous than those which have been boiled; for the fermentation will extract and decompose the oil, and a great part of the gelatine, which, mixed with the other ingredients of the compost, will much enrich them; while the bony residue will be in the same state as it would have been, if the bones had come from the boiling-house. By comparing all these facts we naturally come to the conclusion, that the most economical use of bones is to extract from them the oil and gelatine, which, if not of sufficient value for the manufacturer of glue or of ammonia, may be used as a supplementary food for pigs, in the form of a broth, or pot liquor, which, mixed with meal, will greatly accelerate their growth, or increase their fat. For this purpose the bones should be broken in a mill to a moderate size, like those called *inch*

bones; they should then be boiled or steamed for several hours, and the liquor strained; this, in cooling, will be found to form an animal jelly of more or less strength, which may be thickened by boiling, and finally dried into a glue or portable soup, which will keep for a considerable time.

The price of fuel, and attendance being calculated, it will be seen whether this operation is a real economy or not; if not, the bones may be allowed to ferment in a heap, being mixed with sand or coal-ashes. In this case, they may be ground at once to the size called *half-inch*; in the other, they may be passed again through the mill after having them boiled.

The mode of applying bone manure to the land is by sowing from twenty to forty bushels of them per acre, by the hand broad cast, as is done with corn, and harrowing them in with the seed. About twenty-five bushels per acre is sufficient to produce a good crop on poor light sands, and it does not appear that beyond this quantity they have a proportionate effect. It is better, therefore, to repeat the dressing, than to put on much at once. When used as top-dressing for grass land, they have, in some instances, produced a great and very durable improvement, when the quantity was large; but in most other cases it has been found much more advantageous to reserve them for turnips or corn. Bones have been drilled with wheat, at the rate of thirty bushels of bones, and two and a half of wheat per acre, and a good crop (twenty-four bushels per acre) has been obtained on very poor soil: while portions of the same field sown without any bones, in order to ascertain the effect, did not produce sufficient plants to cover the ground or return the seed.

On very dry gravelly soils, and in

dry summers, bones produce the best crops. Many large tracts of waste land have been brought into cultivation by means of bones, as the only manure which could be procured, and without which they must have remained in a barren state. A great advantage of manuring land with bones is that they introduce no weeds, which farm yard dung inevitably does. At present they cost in London 2s. per bushel coarsely ground, and 2s. 6d. to 2s. when in a finer state. The mill which is used to break and grind bones consists of two iron or steel cylinders, with groves running round their circumference, the projections being cut so as to form strong teeth. These turn upon one another by means of machinery, so that the teeth of one run in the groove between the teeth of the other. There is a plan of the machine and mill given in the Cyclopædia.

#### ROTATION AND DISTRIBUTION OF CROPS.

*Mirbel*, A lecturer at one of the Colleges of Paris, makes the following excellent remarks respecting the well known fact in rural economy, of the necessity of changing crops—or of not requiring the same land to do the same thing twice in succession:—

“Every farmer knows that he is obliged to vary his crops, nor does he ever think of exacting corn for two successive years from the same piece of land; but few are probably aware of the many explanations which have been proposed, to explain this apparent caprice in the earth. When it has been ascertained that any pivoting plant (as turnips for example) flourishing upon the soil where the year before the *loetoe segetes* had waved their yellow corn, this was supposed by some writers on agriculture, to result from the radicles of this class of plants having a power to make their way through the already impoverished superficial layers, and striking deeper into a virgin soil where the power of sustentation was yet unimpaired. To this hypothesis it may be objected, that were the elements of nutrition and growth contained in the earth, and these all that plants required for their

support, then it would be sufficient to manure the corn-field of the year preceding, to make it capable of a second year's crop. This, however, is contradicted by experience. Pile's account is not more satisfactory. This writer supposed that the circumstance of turnips succeeding corn (or of the succession of crops to each other generally) was probably owing to different plants requiring and withdrawing, not the same but different elements, the supply of any of which being limited, the earth is amended of some new and sustaining principle by every succeeding crop. This explanation, however, assumes that plants have a power of selecting their nutritive materials, an assumption not only hypothetical, but wholly contradicted by experience; for plants are observed to take up indifferently all substances soluble in water. The speculation of Decaudolle is a third unsuccessful attempt, viz; that the excretions from plants during their growth may act as poisons of the earth, and after a certain time, so injure it, as to prevent the further growth of a plant that may have recently flourished there. Such excretions he supposes to be emanations from the root, the remains of those juices which the earth and air conjointly supply, and upon which in reality, the plant exists. But against even the very fact mentioned by Decaudolle, in confirmation of his opinion, that opium strewed upon the ground kills plants, and renders the soil henceforth unproductive, we may quote the much more opposite fact, that trees (and why not therefore, a *fortiori*, corn, and grasses) grow and flourish for entire centuries, in the midst of excretions from their roots. *Mirbel's* own explanation is simple, and we think satisfactory. Plants require other elements for their support, besides the elements of assimilation, and never thrive without them—for instance, there is silex in the cane, and there is lime in certain plants, whose organization could not be complete without it. The quantity of any such foreign ingredients in a plant is generally very small; but the necessity for it may be presumed absolute. Plants cannot be constituted, unless all the materials they require be furnished to them; and indeed the same observation will apply to animals: deprive a hen of lime, her eggs will have no shell; deprive animals generally of salt, and you ruin their power of digestion; deprive the earth then of its soda, and you must supply its place by potash; for salts are the excitants of the growth of plants, and of the clovers in a very remarkable manner. The smallest quantity of sea-salt has frequently been found to effect wonders in vegetation. But the spontaneous formation of any of these salts is the result of very slow chemical changes, which have been at work for centuries; and

when the natural and very limited supply is exhausted (as it soon will be, if the earth be forced to give her increase,) the corn of every succeeding year deteriorates, the field looks shabby, becomes chlorotic, and pines away; but allow the corn to fall where it grew, and the earth will re-assume the salts extracted from it during such growth, and the same grain will continue to flourish indefinitely.— In short, a peck of salt is worth a tun of manure; and it is to the understanding of this fact that we may attribute the luxuriance of the environs of Paris, where the soil is naturally of the poorest kind, but is made by this simple addition to yield its unequalled produce, and to fill its flower and its fruit markets with plenteousness."

Every experienced farmer must be aware of the utility of a judicious rotation of crops, particularly on lands that have been some years in cultivation. Arable land, may, by proper management, be kept in a state of profitable production for many years, provided green and grain crops of various kinds are cultivated upon it, in regular succession. The arable lands of Canada have been exhausted and injured in consequence of growing the same species of grain upon them year after year, without introducing summer fallow, green crops, manure, or lime.

Rotations must be suited to the different kinds of soils. The rotation that would be proper for clays would not be suitable for light and sandy soils. The cultivation of turnips can never be extensively introduced in our rotation in Canada. We will therefore have to summer fallow to a much greater extent than we have hitherto done, in order to clean our lands, and give a better opportunity of ploughing them into the proper sort of ridges, which can be better executed after fallow than when ploughed after grass or any kind of crop, except, perhaps, a drilled crop.

The strong clay soils of Lower Canada require to be judiciously managed, or they will not be profitable. Unless they are thoroughly drained, and ploughed into well formed ridges, they must, at all times, be

either too wet, or too dry, to be profitably worked. It is when land is fallowed, that it may receive the most perfect culture, and be brought into such a state that it will produce several profitable crops afterwards. By a judicious fallowing, and manuring if necessary, the exhausted soils may be fully restored to the highest degree of fertility.

Every experienced farmer must know that all kinds of soils are not fit to produce a good crop of wheat, without imparting to it some qualities that are wanted, and that are necessary for soils to possess in order to their producing a profitable crop of wheat. Almost all the lands of Canada, if properly drained and manured, may produce the other kinds of grain that are usually cultivated in perfection. Heavy clay soils are not the most suitable or profitable for potatoes or other root crops, and these kind of soils will do better to be fallowed and manured, and thus kept constantly clean and in good order, while in tillage. When laid down for meadow, they will generally produce abundant crops of hay.

Moory soils, if properly drained, and dressed with lime, clay, or sand, will produce good crops of either grain or vegetables, but unless they are perfectly drained, and dressed with lime, clay, or sand, they will not yield profitable crops. Good crops of wheat have been obtained in England on moss land, when well limed. It is very essential that the farmer should understand the nature of the soils he has to manage, and distribute his crops accordingly. A good crop of oats may be obtained on land that would not be in a fit state for either wheat or barley, and a good crop of barley may be grown on land that would not produce a profitable crop of wheat. Rye may also be grown on lands that are not fit for wheat. Sowing lands with wheat that is not

fit to yield much over the seed, has been the cause of great injury to Canadian farmers.

The following remarks on "*The Succession of Crops, or Rotations,*" is from the "*Penny Cyclopædia*":—

"It has been found by experience, that besides the general exhaustion of humus produced by vegetation, especially by those plants which bear oily or farinaceous seeds, each kind of crop has a specific effect on the soil, so that no care, or manure, can make the same ground produce equal crops, of the same kind of grain, for any length of time, without the intervention of other crops. Whether this be owing to any peculiar nourishment necessary to each particular kind of plants, or because plants not indigenous degenerate in a foreign soil, the fact is certain with respect to most crops usually raised, and particularly red clover. This points out the advantage of varying the crops, according as they are found to succeed best after each other. In general, all kinds of grain succeed best after a crop which has been cut before the seed has ripened, or the stem is dried up. Those plants which have a naked stem with few leaves, thrive best after leguminous plants, which have more succulent stems and more leaves, and which bear their seeds in pods, as peas, beans, tares or vetches; or after esculent roots, which strike deep into the ground, as carrots, parsnips, beet-roots, and turnips.—From this circumstance, confirmed by universal experience, the different systems of rotation have had their origin, taking the nature of the soil into consideration.

The simplest rotation, and one which can only be adapted to the richest strong alluvial soils, is that of wheat and beans, alternately, and without any intermission. It is in use in some parts of Kent and Essex, and in a few places in Germany. The

land is well prepared and manured for the beans, which are set or drilled in rows, so as to admit of horse-hoeing between, till the beans get to a considerable height; besides this, careful hand-hoeing and weeding are practiced, by which the land is cleaned and stirred as in a regular fallow. The beans being cut, the ground is ploughed once, and the wheat sown.

The oldest rotation known, and which was almost universal in Europe, from the time of the Romans, wherever any regular system of agriculture prevailed, is the triennial rotation of fallow, winter corn, and summer, or lent, or spring corn; that is, wheat or rye sown in autumn, and barley or oats sown in spring. This was called the three field system; and on every farm, the arable land was divided into three parts, one of which was in fallow, one in winter corn, and one in summer corn. \* \* \* \*

This rotation had its advantages, or it could never have been so long in use. When a sufficient quantity of manure could be collected by means of cattle fed on pastures and commons in summer, and in the strawyard in winter, to give a regular dressing to the fallows every third year, good crops were produced, and fertility kept up. The labour was very equally divided throughout the year, and such was the regularity of every operation, that a large quantity of land might be cultivated by a proprietor at a considerable distance, with only occasional inspection, without any overseer or bailiff, provided he had honest servants. But, when pastures came to be broken up, and converted into arable land, and cattle consequently diminished, the land could not be manured on every fallow; the crops suffered, less being grown, the quantity of manure was diminished, and the land became gradually less and less productive, till from necessity, a portion was left uncultivated, and returned to natural

and inferior pasture; this gave the idea of laying the land down regularly to grass by sowing seeds, and gradually introducing the alternate and convertible system. \* \* \*

A long fallow from after harvest until the second spring, including two winters, prepares the land, if strong clay, admirably for barley, so that it can be sown without any manure, which may be reserved as a top-dressing for the young clover after the barley, or after one crop of clover. [This is a very excellent method].

\* \* \* \* \*

A very common rotation in Scotland is fallow, wheat, clover, or grass, fed one, two or three years, then oats, peas, or beans, and wheat, again, if the land is clean and in good heart; for there is no rule better established, than that of never allowing the soil to be exhausted beyond a certain point, where manure and tillage can readily recruit it. The greedy cultivator, is sure to pay dearly in the end for every crop forced from the land unreasonably. \* \* \*

A proprietor with skill and experience, cultivating his own land, need only consider the state and quality of his fields, and what will most likely grow well in them; what is most in request, both for his own use and in the market; what will keep his men and cattle in most regular work, without confusion or hurry. If he allows his land to be impoverished for want of manure, or to run wild with weeds, for want of hoeing or fallowing, he has not the experience and judgment which are necessary for his pursuits.

The Flemish husbandry proceeds upon this principle. The greatest attention is paid to manuring and weeding. Much more manual labour is bestowed than with us, and the crops seem more certain, varied, and abundant. That it is not unprofitable we may conclude from the wealth of

the peasants, the comfort of the labourers, and the sleek appearance of the cattle. From the very interesting account of Flemish agriculture in the work of Mr. Van Aelbroeck, of Ghent, written in Flemish, translated into French, and published in Paris in 1830, we hear with what great care the soil is cultivated in Flanders. After ploughing into lands as we do, every intervening furrow is deepened and cleaned with the spade, the earth being thrown over the bed sown. Liquid manure (which is sadly thrown away in this country), chiefly the urine of animals and drainings of dunghills, is carefully collected, and is carried on and distributed over the poor light soils, by means of water-carts, before sowing, and again when the crop is come up. By this means, such lands are made to yield crops of rape seed, clover, lucern, flax and corn, equal in luxuriance to those in the richest soils. Fallows are rendered unnecessary by the careful destruction of weeds. In short, it is a garden culture on an extended scale.

This system is said to be also followed in Switzerland, which, considering its soil and climate, is, perhaps, one of the best cultivated countries in Europe."

The extract that is given from the Penny Cyclopædia is well worthy the attention of Canadian agriculturists; and what follows, from the same work, is not less so; though it refers only to English farming, where lands are subject to rent and taxes.

"We have now given a brief outline of the manner in which arable land may be cultivated and improved. If we should be asked, whether so much attention and labour upon land of a proper quality will be repaid by the value of the produce, after deducting the portion due to the landlord, or to the state? we shall answer, without any hesitation, in the affirm-



ative, provided the cultivator is possessed of knowledge, judgment, and experience, and devotes all his time to the superintendance of his farm. The calculations on which this opinion is founded cannot be introduced here; some idea of them will be given in the article FARM. Agriculture is so healthy, so agreeable and so moral an occupation, that it can never be extremely profitable; the competition for land will always prevent this. The butcher and the cattle dealer will always, if successful, make far greater profits than the farmer; and a decent livelihood, with a moderate interest on the capital laid out, is the most that a farmer can expect, even with the greatest assiduity. If he neglects his business, and leaves it to others less interested in the result, he must be a loser. Gentlemen who cultivate for pleasure, and employ bailiffs, are fortunate if they get a moderate rent after paying expenses. For careless farmers, the simplest system alone can prevent great loss; and grass land may be profitable in the hands of a proprietor, who would probably be ruined if his land were all arable and in his own hands."

In a future number this subject will be again referred to, and various rotations proposed. Also, an article will be given on the "Absorption of Nutriment by Plants."

#### SPRING SOWING, AND PLANTING.

Up to this day, May the first, the weather has been so cold and unfavourable, scarcely has the spring work been commenced. The sowing of wheat is purposely put off by farmers till about the middle of May, as the only means to save the crop from the ravages of the wheat fly. There is considerable risk in sowing wheat late, that in unfavourable seasons it will be subject to be injured or totally destroyed by rust or mildew; but

the danger to be apprehended from the fly is still greater, and the only chance of safety in a great part of the district of Montreal, is by late sowing, so that the wheat may not come into ear before the middle of July *at the soonest*, and by that time there is less danger of injury by the fly, though it may not escape altogether. This insect has rendered wheat a very uncertain crop in some sections of Lower Canada; and perhaps the only means to get rid of the plague would be to desist from sowing wheat for a few years.

Perhaps it would lessen the risk in wheat when sown late, not to sow clover or any grass seed with it. When the season happens to be moist, the young clover growing luxuriantly among the wheat is very subject to produce mildew in the crop. In the month of July, if the weather is moist and warm, a crop of wheat that has clover, grass, or weeds, growing among it, is almost sure to be injured by mildew. The green herbage about the wheat stalks retains the moisture constantly in close damp weather; and when that is the case, the crop has no chance of escape from disease.

Fern wheat is a spring wheat, and said to be very productive, and early ripe. The following report of it, and other spring wheats, will show their comparative value:—

"When sown along with *common white*, and *red Essex wheats*, on the 26th of March, 1833, the fern was cut on the 27th August, and the others on the 30th of September, making a difference in favor of the fern wheat of thirty-four days.

	Produce per acre.	Weight per bushel.
Fern wheat.....	36 bushels	63½ lbs.
Red Essex.....	30 do.	62½ lbs.
Common white...27½ do.		60½ lbs.

This difference, both in quantity and quality, in favor of the fern wheat, was supposed to arise entirely from its early ripening; the weather having set in dull and wet for two weeks previous to the other sorts being cut, and continuing so the greater part of

the time they were in stock. When sown in the last week of March in England, it is found to ripen as early as any of the fall wheats sown in October or November previous.

The spike is very long (about six inches), compressed, of a light reddish colour, spikelets and awns spreading, the former very remote, and often containing four grains, and the latter considerably shorter than the spike; grains elongated, and of a bright light reddish colour, rather flinty.

It requires to be pickled before sowing, being liable to smut, and should not be allowed to stand till over ripe, being very apt to shake.

CONE RIVET, ANTIETY, or GERMAN THICKSET WHEAT, is, I believe, a fall wheat, and of inferior sample. It is said to be very little injured by the fly, and is the only wheat that resists the ravages of that insect.

BARLEY is, of all the cultivated grains, that which comes to perfection in the greatest variety of climates. It bears the heat and drought of tropical regions, and ripens in the short summers of those which verge on the frigid zone. It is certainly the most suitable grain that can be cultivated in those districts of Canada, where the wheat crop has been subject lately to the ravages of the wheat-fly. Both the soil and climate are favourable to its production in perfection, and if the consumption of this grain could be increased in the same proportion that its production is capable of being augmented, it would be the most profitable crop that we could cultivate in this country.

In Scotland, Germany, Holland, and many other countries, barley is prepared in various ways, and used as food by the labouring classes.

In the above article the author has introduced some extracts from the Penny Cyclopaedia, now being published, and he takes pleasure in acknowledging that he is greatly indebted to that work for most useful information on many subjects, and has, on several occasions, taken the liberty to copy interesting matter from it.

When properly manufactured, excellent flour may be made of barley; also, what is known as pot and pearl barley, used in broths, stews, and puddings, as a substitute for rice. The bran is good for feeding cattle and swine; and if steeped in water, and allowed to ferment till it becomes acid; what is called *sorcens* may be made from it, which is a sort of food very much relished in the old countries. It would be better that our farmers should cultivate this grain, and accustom themselves to use some of it as food, than to incur the risk of sowing wheat while we are subject to have it destroyed by the wheat-fly.

All kinds of barley require the same soil; and whatever time they are sown, the ground must be well prepared, and the soil pulverized by repeated ploughings and harrowings, if necessary; in order that the fibres of the roots, which are very minute and delicate, may penetrate the soil easily in search of nourishment. If the soil be heavy and tenacious, and not in a sufficiently divided state to receive the seed with advantage, it should be worked and stirred until a proper tilth is produced. It is an irretrievable error to sow barley on land not properly pulverized. It is considered in England, that the soil can scarcely be too dry on the surface at the time of sowing, and, provided a few showers supply the moisture, necessary to make it vegetate and spring up, there is no great danger to be apprehended from too dry weather. Barley has been known to grow and ripen, when not a single shower refreshed the soil from the day it was sown to that in which it was reaped. Land that has been properly summer fallowed is the very best for growing barley. Barley is now frequently sown in England with the drilling machine, and it is considered the best mode of sowing. The land that is too rough to allow of drilling, is supposed to be unfit to sow barley in,

and only fit for oats. With the drilling machine, from two to three bushels of seed is sown in England, and if not drilled, about one bushel more. Two bushels are amply sufficient in Canada.

The proper time for sowing in this country will be the *first day* that the land will be in a proper state to receive the seed. The early-sown will be the best, provided the soil is well prepared, and dry when sowing. It will have more time to tiller before the hot weather draws up the stems, and the crop will generally be heavier than the late sown.

The depth at which these seed should be deposited, depends on the nature of the soil and of the season. As a general rule, a depth of from one and a half to three inches, according to the nature of the soil, is most likely to enable the seed to sprout well, and give a sufficient hold of the land by the roots to avoid the danger of lodging. In very light soils, and dry seasons, when the seed is deposited sufficiently deep, the roots, springing immediately from the seed, are less exposed to be dried up. But in stiff soils the seed, buried deep, may have much difficulty in germinating, the air not having sufficient access, and the first shoot not being able to pierce the compact soil above it. It is of consequence that all the seeds be deposited at a uniform depth, to ensure their shoots rising at the same time; for when some rise earlier and some later, it is impossible to reap the whole in good order; some of the ears will be too green, while others are shedding; the seed from being too ripe. This is one reason why the drilled crops are in England much more regular in their growth than the brood cast.

The practice of sowing clover and other grass seeds with the barley, is considered in the British Isles, as one of the great modern improvements in agriculture. It is also very gene-

rally practiced in Canada by farmers from Europe. Indeed, lands cannot be laid down for grass in good condition, unless this practice is adopted. In England, when the season is wet, clover is often found to injure materially the barley crop by its luxuriance; but in Canada there is not so much danger from this cause, as the barley is earlier ripe, and the seasons generally drier.

In Flanders, clover is seldom sown with barley, but chiefly with rye; but they sow a species of white carrot instead, in the sandy soils. These push out very little of the green top, but shoot their fibres downwards, which form the rudiments of the carrot. After harvest, the ground is well harrowed, and watered with liquid manure. The carrots, which could scarcely be observed above-ground, soon spring up, and a good crop is secured before winter, that is extremely useful for feeding cattle and swine.

The same practice might be adopted on a small scale in some situations in Canada. It is certainly worth a trial.

The produce of barley in England on soils properly prepared, is from 30 to 50 bushels, and sometimes more, per statute acre, weighing from 45 to 55 lbs. per bushel, according to the quality. According to Sir H. Davy, the whole quantity of soluble or nutritive matter in 1000 parts of wheat was 955, in 1000 parts of Norfolk barley was 920, and in 1000 parts of oats 743. In the article on barley in the Penny Cyclopædia, a different estimate is given. Wheat is said to contain 78 per cent of nutriment, and barley 65 per cent. A bushel of barley weighing 50 lbs. will contain about 32 lbs. of nutriment, wheat weighing 60 contains 47 lbs.—and oats weighing 40 lbs will contain 24 lbs of nutritive substance; so that the comparative value of wheat, barley, and oats, in feeding cattle, may

be represented by 47, 32, and 24, the measure being the same. It is remarkable that, allowing some addition to wheat, as more generally used for human food, these numbers very nearly give the usual proportions between the prices of these grains. The experiments on which this calculation is founded, were carefully made by Einhof, and confirmed on a large scale, by Thear, at his establishment at M<sup>o</sup>g<sup>e</sup>lin, the accounts of the results being accurately kept.

On all good loamy soils properly prepared, barley is a more profitable crop than oats, and exhausts the soil less. On stiff clay soils it will not thrive so well, and on them oats should be sown. In some districts in England where the best barley is grown, the farmers seldom sow oats, but prefer buying them for their own use, even with the additional expense of market and carriage.

Oats can be raised in great perfection in Canada by proper culture, and early sowing. We may see bad samples of oats in our market, but it is certainly the farmer's fault that they are so. We cannot expect a large produce and good sample, from imperfect cultivation, and late sowing, which is the usual practice here. Oats, above all other grain, requires early sowing, to insure its being a profitable crop. When sown late, unless the season is very favourable, it will not ripen perfectly, or be of much value. Ploughing for oats is generally put off until the spring, and with the other work that has then to be executed, the sowing of oats is sometimes continued to the 1st of July, when it ought to be nearly fit to harvest. The same quantity of land that is usually in Oat crop in Canada, might, by judicious management, produce **CERTAINLY** double what it does now both in straw and grain, and without much additional expense, except for better draining. This is a great sacrifice, for which

there is not much excuse for the farmer, under ordinary circumstances.

Oat meal is coming into use in Canada, within the last few years, particularly since wheat has failed so much in some sections of the province.

POTATOES have been subject to the disease of dry rot in Lower Canada for the last three or four years; and it is a disease very difficult to account for or to understand. Early planting is the most effectual remedy against it. This year, early planting will not be practicable unless on farms that are well drained, and that are of a light loamy soil. While the seed is subject to dry rot, potatoes ought not to be planted later than the end of May; and when it is not possible to have them planted before that time, it would be well to plant them whole. Potatoes that are planted whole, if sound when planted, will not be destroyed by dry rot. It would be necessary that farmers should raise new seed of potatoes from the apples. It may be readily done, by preserving the apples that are produced upon the potatoe vines. The proper method of doing so shall be explained in the next number.

New varieties of potatoes might be introduced from the British Isles; and though they would not succeed in perfection the first year or two, they might be inured to our climate, in a few years, and be brought to the greatest perfection.

In Lawson's "Agriculturist's Manual" there are 146 varieties of the potatoe described. The name is given—height of stem, habit of growth, foliage, flower, shape of tubers, colour and other peculiarities of the skin, fold of increase, general remarks, and the quantity of starch in the pound of tubers. It may be useful to give a description of a few of the varieties that are not known in Canada.

Of the early sorts adapted for forcing, on account of their dwarf habit of growth, are the following:—

*Fox's Early Delight* is described to be mealy, superior flavour, and healthy; shape of tubers, slightly hollowed at the ends; colour white, skin rough, and netted-like. Fold of increase 13—starch in 1 lb. of tubers, 619 grains.

*Fox's John Bull*, or *Early Kidney*, is of a whitish colour, the skin smooth; shape of tubers, long, and of nearly uniform thickness. Excellent quality. Fold of increase 15—starch 543.

*Taylor's Forty-fold*, shape of tubers, oval, much flattened, colour dull reddish, mealy, superior flavour, and healthy. Fold of increase 20—starch 502.

Of the early field sorts, *The Old Flat White* is described as a good variety. The shape of the tubers is much flattened, and slightly oblong; very white and smooth. Fold of increase 16—starch 830.

*Walls of Great Britain*, are of a broad shape, slightly flattened near the point, and smooth. A very good sort. Fold of increase 15; starch 648.

*Douglas's Irish Kidney*, shape of tubers, long, and thickest towards the point; colour dark blueish purple; mealy, good flavour, and healthy. Fold of increase 16—starch 560.

*Red Nosed Kidney*, shape of tubers, long, often slightly curved; colour whitish, with a reddish point, and about the eyes. Fold of increase 16—starch 441. An excellent variety.

Late field potatoes, the foliage of which, in ordinary seasons, will not decay until injured by frost, and the tubers of which generally require to be kept some time before they are fit for using to the greatest advantage.

*Pink-eyed Irish*, shape of tubers, roundish; colour whitish, slightly tinged with red, and pretty smooth. Fold of increase 15—starch 650. Mealy and healthy.

*London Blues*, shape of tubers, round; colour, dark blueish purple

and rough. Fold of increase 16—starch 687. Mealy, good flavour, and healthy.

*Stafford Hall*, or *late Wellington Potatoe*.—Specimens of this valuable variety presented at various periods; by Richard Lowthian Ross, Esq: of Stafford Hall, Cumberland, who obtained the Highland Society's medal in 1827, for its introduction. Mr. Ross has grown this sort successively on a deep rich soil, approaching to clay, for a long period, and has never found it to present the least symptom of curl or disease of any kind, either in its foliage or tubers, and to produce per imperial acre he has found in several instances to exceed 30 tons. Mr. L. Ross further states, that the Stafford Hall potatoe does not attain its greatest perfection for using until about the end of November; or until it has been pitted for a month or two, and that it remains good until the earlier sorts are ready in the following season; and that also, from its possessing great solidity in cooking, it is better adapted for steaming than boiling. Also, specimens of tubers by Andrew Howden, Esq., East Lothian, crop 1834, averaging from  $3\frac{1}{2}$  to 4 lbs. imperial each, under the names of Wellington or Provost; and besides its use as a table potatoe, he recommends its culture for feeding cattle, from the great return which it yields, and which, by referring to his important "Essay on the comparative value of different varieties of the Potatoe," published in the transactions of the Highland and Agricultural Societies of Scotland, vol. 19th, will be found in this respect surpassed by few in his collection, amounting in all to one hundred and thirty varieties. Also, specimens by Robert Downie, Esq. of Appin, grown in Argyllshire, where this variety is found to succeed remarkably well, and to keep till June. It is worthy of remark, that the Stafford Hall, or late Wellington potatoe,

was found superior in specific gravity and quantity of starch contained in a given weight of tubers, to any of the other varieties there enumerated, amounting to seventy-three. The shape of the tubers of this potatoe is rather flattened, round, or a little oblong; colour of the skin, dull red, approaching to purple. The fold of increase 22, and is described to be very mealy, very superior flavour, and very healthy. One pound of tubers produced 813 grains of starch.

Large prolific sorts particularly adapted for feeding cattle.

*Pink-eyed. Dairymaid.* Colour, pink or purplish; shape of tubers, roundish and deep-eyed. Fold of increase 29—starch 506—indifferent flavour, very healthy.

*Irish Lumpers.* Colour whitish; shape of tubers, slightly oblong, and much flattened. Fold of increase 23—starch 661—bad flavour.

*Brown's Fancy.* Colour whitish; shape of tubers, slightly oblong, and flattened. Fold of increase 18—starch 498—medium flavour.

It is not necessary for the present to allude to any other of the varieties mentioned by Lawson. We can raise as many varieties as we please in Canada from the seed-apples; and it is probable that the varieties so raised will be better suited to our climate, and other circumstances, than any we can import from abroad.

It is recommended in England, to mix some powdered fresh lime among the seed potatoes after they are cut for planting, as a means to prevent dry-rot.

#### SCARLET TREFOIL, &c.

*Scarlet Trefoil* is said to produce in England three tons per acre, where, on the same farms, red clover did not produce over one ton per acre. In Lawson's Agriculturist's Manual, this clover is fully described **TRIFOLIUM INCARNATUM**—Scarlet,

Crimson, or Italian Clover, or Trefoil. In French, *Le Trèfle Incarnate*. **SPECIFIC CHARACTERS**—Spikes, or heads oblong, tapering, and nodding on one side, of a beautiful bright scarlet colour when in flower, leaflets roundish, stem pretty upright, much branched; the whole plant (stem, branches, leaves, and calyx) villous or covered with short wool or hair, flowers in June and July; height eighteen inches to two feet; root annual, native of Italy. It has been lately introduced, and grown with much success in the South of England. It is found to succeed best, either drilled (in rows at the distance of from 8 inches to 12) or sown broadcast on stubble after the corn crops have been removed, and with no previous preparation save a course or two of harrowing, just sufficient to stir the soil to the depth of an inch or two, so that the seed may be more easily covered. In very tenacious soils a very shallow ploughing is given; but in general it is found better to dispense with the plough altogether. Failures that have occurred are attributed entirely to the ground having been too much loosened and pulverized by repeated ploughings.

It is said to be much more readily eaten by horses than the common clovers. 18 or 20 lbs. of seed is sown to the acre in England.

The Scarlet Italian Trefoil, when ripe, the seed will appear by the top of the capoule opening of a yellow or gold colour, and when one half has attained this state, do not wait for the other; for although this will retain a green hue, it will be good growing seed; and if this is waited for until fully ripe, half the other will be left in the field. After cutting, move it as little as possible, or the capoule will separate from the stem, and when raked in for carting, perhaps it might be necessary to do so

while the dew was on in the morning. Fifteen bushels of seed is produced from the acre on an average.

*Alexandrinum, or Egyptian Clover*, has flowers of a light sulphur-yellow, or French white. It has been lately introduced in England, but is not yet much cultivated there. It is, however, considered a valuable agricultural plant.

*Sainfoin* is an agricultural plant that ought to be introduced into Canada. It is highly recommended both in England and France, as being productive on light or chalky soils. A new variety received lately from M. Vilmorin & Co. Paris, and cultivated at Meadowbank Nursery, flowered the fourth of June; height two and a half feet; seed ripe 28th July; height fully three feet; second cutting in full flower on the 4th of September; greatest height about two and a half feet; seed necessary per acre 100 lbs., or four bushels.

#### ITALIAN RYE GRASS.

In the twelfth number of the *Quartely Journal of Agriculture*, the following observations, from the *Bulletin des Sciences Agricoles*, were made on Italian rye grass:—

“This plant is said to be distinguished from the common rye grass (*Lolium perenne*), by its large leaves, by its being of a deeper green, and by the greater height to which it grows. It is usually sown in Autumn, as is the general practice with grass-seeds in the south of Europe. After the field is harrowed, it is sown at the rate of from 16 to 18 lbs. per acre, and the seed rolled in. In the following Autumn the turf is covered like an old meadow, and the crop of the following year is more than double. It may be also sown in spring. If it be sown with clover or lucerne, its growth is so rapid that it will quickly choke them.

It is eaten greedily by cattle whether green or dry, and yields fifty per cent. of hay.”

Mr. Lawson says this grass is found to be more hardy than the common rye grass; for, in the vicinity of Hamburg, the common rye grass will not stand the winter when very severe; whereas the Italian rye grass withstands the severities of winter, even when sown in September; and, consequently, the plants are young and tender when the frosts prevail. It is a perennial grass.

This grass has been lately introduced into the British Isles, and is very highly recommended by those who have cultivated it. In a future number a more full account may be given of its cultivation, produce, &c. The spring is now nearly over, and the sowing almost completed; so that it will be too late to procure any new seeds for this season.

#### SUMMER FALLOWING, WEEDING, &c.

“Exposition to the atmosphere is one of the principal advantages. The most stubborn, and unfertile soil, if exposed to atmospheric influence, will be improved in its texture, and rendered much better calculated for the process of vegetation. This is effected, either by the soil acquiring properties from the atmosphere, or by those substances which render it barren, being neutralized, destroyed, or washed away. The fact is, that by no other means but by a complete summer fallow, can a wet bottomed clay be freed sufficiently of the moisture it has imbibed, which having been long locked up in the soil, holds saline and mineral matters in solution. These matters being discharged, the soil readily imbibes fresh water, and gets into a mellow and fertile state. The soil becomes more friable, the crops which it produces are vigorous, and abundant, and,

comparatively speaking, free from weeds."—(*Extract from Sinclair.*)

An experiment has been made in Scotland by planting potatoes in a part of a fallow field where the soil was favourable, with a greater allowance of manure than the naked fallow; and it was found that the part cultivated with potatoes yielded a less crop of wheat, than the ground that had been fallowed;—the other crops on the fallowed part, were likewise more abundant; and the land much cleaner in the end. The ploughings should be carried on in dry weather, and the cross-ploughing carefully executed, otherwise the process will be imperfectly done, and will not produce much benefit to the farmer.

We cannot expect profitable results from naked fallow, if the process is imperfectly done, and certainly that work is seldom properly executed in Canada. Mr. Marshall, in his agricultural work, accounts fallowing to be the best preventive of the wire worm. All herbivorous insects which have not the power of flight, at least in their early stages, are best extirpated by keeping the soil which they inhabit free from every thing herbacious, especially during the summer months, when they are in a state of activity, and doubtless require daily support. In that case, they must be destroyed in soil that is properly fallowed. In many English counties fallow is thought essential, especially for barley, and it is considered that wherever the soil is strong, clayey, adhesive, and wet-bottomed, it cannot be profitably managed without fallowing.

The expense of six ploughings, six harrowings, and cleaning of an acre in England, is estimated at £3 11 6. It would not cost so much in Canada. In Flanders, much of the land is trenched with the spade, and light soils are preferred for that operation.

The expense on light lands, trenched 18 inches deep, is £1 6 0 per acre. On strong lands, 18 inches deep £1 11 2 per acre. And on strong lands, 2 feet deep, £2 5 0 per acre. In parts of England where men are to be found accustomed to dig, light lands would be trenched at £2 per acre, and strong lands at £2 10 0 per acre.

Summer fallowing would be extremely beneficial to the strong clay lands of Canada. But unless the lands to be summer fallowed are ploughed the previous fall, the work is not likely to be well executed subsequently.

The following remarks, on Clay Soils, are from the "Penny Cyclopædia," and correctly apply to much of the soil of Canada:—

"Clay is an essential component part of all fertile soils. A clay soil consists of a large proportion of alumina, united to silica, of various degrees of fineness, and frequently also a portion of carbonate of lime. When the silica is very fine and intimately mixed with the alumina, the clay, although stiff in appearance, is fertile in proportion to the humus which it contains, or which is artificially added to it. It then forms the class of rich wheat soils which produce successive abundant crops without change or manure. It has a strong affinity for water, which prevents the plants that grow in it being injured by drought; and it has a sufficient degree of porousness to allow superfluous moisture to percolate without making it too soft. All that is required for such a soil is a porous substratum of rock or gravel; and where this is not the case, sufficient drains must be made to produce the same effect. \* \* \* \* \*

When clay soils are well drained, and when the effect of noxious salts has been removed by liming, burning, and frequent stirring, it will be found



that a much smaller quantity of manure will produce a certain return in grass or corn, than on any light soils. The great difficulty is to choose the time when stiff clays are to be worked; and here it may be observed, that ploughing sometimes does more harm than good. When clay is wet, especially in the beginning of summer, and it is ploughed in the regular process of fallowing, the tough moist slice cut out by the plough is set on edge; and the sun bakes it into a hard mass like brick. In this state it is not improved by exposure to the air, which cannot penetrate this hard substance. It would be much better to plough out deep water-furrows with a plough made on purpose, and wait until the moisture is reduced by gradual percolation and evaporation; so that the plough should raise a slice ready to break and crumble as it is turned over. This should be done immediately before winter, and then the frost will so divide and mellow the soil, that, provided it be kept free from superfluous water by drains and water-furrows, it will have the appearance of the finest mould when worked with the harrows in spring. To plough it again would be to spoil all. It should have received the necessary manuring in autumn, and be ready for the seed to be sown on this pulverized surface. The horses which draw the harrows or the sowing machines should be made to walk in the furrows, which should afterwards be deepened out with the spade, or by a plough constructed for the purpose. A free course and outlet should be formed for all surface water; for no maxim is more true than this, that stiff clays are never injured by a continuance of dry weather, unless they were in a wet state immediately before. The driest clay contains sufficient water to supply the roots of plants for a long time; but wet clay, in drying and

shrinking, destroys the texture of the roots by mechanical pressure. This may be of use when weeds are to be eradicated, and in that case a different mode of proceeding may be recommended; but when good seed is sown, the clay should be in such a state as to crumble under the harrows, and it should not be too moist. Experience has taught the ploughman that clay soils should be laid in round lands or stiches; and much of the produce of a field depends upon the skill with which this is done. It is not only the surface which should lie in a rounded form, but the bottoms of the furrows should lie in a regular curve, without small ridges or inequalities between them; so that when heavy rains penetrate through the whole thickness which the plough has raised, the water may find its way into the intervening furrows, without being retained by the small ridges left by an unskilful ploughman. It is seldom that a common labourer can be made to perceive the consequence of his carelessness. The slightest inclination of the plough to either side makes an inclination in the bottom of the furrow. An inequality in the depth does the same. The usual method is to increase the depth of the ploughing from the crown of the stich or ridge to the outer furrow. If the land has been cross-ploughed or dragged level before the last ploughing, this may answer the purpose; but if the stiches are only reversed, and the centre of the new stich is to be where the water-furrow was before, it requires twice ploughing to bring the stich to its proper form, and this is not always done, for fear of trenching the land too much. Hence it is always preferable, where it can be done, to lay the land flat by cross ploughing and harrowing, before it is raised in stiches or ridges. The narrower the stiches are, the dryer the land will be. The

most convenient width is five bouts, as it is called, that is, five furrows on each side of the centre, which allowing nine inches for each furrow, makes seven and a half feet; leaving 13 inches for a water-furrow, which is deepened into a narrow channel in the middle. \* \* \*

Clay land will bear a repetition of the same crops much oftener than lighter lands; but every scientific agriculturist knows the advantage of varying the produce as much as possible, making plants of different families succeed each other. The cereal grasses are one family, which is the reason why wheat, oats, barley, &c. do not succeed so well after each other as after leguminous plants or clover."

The foregoing remarks will give a very good idea of the best method to manage strong clay lands. By summer fallow, one year's crop is lost certainly, but the second year the land may produce a crop that would be more valuable than two crops obtained without summer-fallowing, and the land will be left in a much more fertile and profitable state. Indeed, according to the Canadian plan of managing land, leaving it one year idle, or growing natural grass and weeds, and the next year, once ploughing it for a crop, we may say that only one crop, and that very frequently a bad one, is obtained in two years, so that to summer-fallow the land cannot be considered to cause the loss of a crop.

Weeding is simply the extracting of such plants as it is not desired or needful to cultivate. The operation may be performed in various ways, by the hand alone; aided by a broad pointed knife; by gloves or by the aid of forks, spades, or other weeding-tools. In weeding thistles from pasture land, it has been found in England, that breaking or bruising them over-renders the roots much

less liable to spring again the same season, than cutting or even pulling them up. About the 1st of July is a good time to cut down thistles on pasture. They have to be destroyed before this period in the growing crops. It is necessary, early in June, to take them out of wheat, barley, oats, &c. or they cannot well be meddled with after. They are very subject to spring a second time in the growing crops, but they do not generally grow to any considerable size to do injury.

Preventing the soils from being injured by weeds, is attended with much greater difficulties than is commonly imagined.

It is most important to free the cultivated soil, by every means that can possibly be devised, from those destructive intruders, and to prevent their growth in grass lands, on the sides of the roads and other places, wherever they are to be found.

It is the more necessary to attend carefully to this subject, as the powers of propagation, which have been imparted by nature in this description of plants, render it extremely difficult for farmers to prevent their growth. Many of them are propagated by their roots and their seeds. Some plants extend their roots so far under ground, that it becomes extremely difficult to dig them up. In some instances new plants spring up from every joint left under ground. Others stretch out runners or stolons every way above ground, and to a considerable distance, while many plants, from their seeds having wings, by means of which they are scattered about by the wind in every direction, and frequently to a considerable distance. These are so dangerous as to require every effort to have their future progress arrested, by cutting them down wherever they are to be met with, before or as soon as they have flowered.

In Canada, weeding is much neglected. Some of the richest and most fertile portions of the soil, near farm houses, and by the fences and drains, is allowed to be almost exclusively occupied by useless and hurtful weeds—weeds also occupy a portion of the surface of the cultivated soil, and thereby the production of useful plants is considerably lessened. Any regulations, Civil or Legislative, that would contribute to the destruction of weeds, would greatly improve the appearance of the country—would be highly advantageous to the industrious and careful farmer, and to the general interests of agriculture. Farmers have no right to hold lands, if they allow them to be overrun with weeds, that must scatter their seeds over their neighbours' farms to their great injury.

#### CANADIAN MANUFACTURES.

The principal Canadian Manufactures consists of woollen and linen cloth, manufactured chiefly by the Agricultural class; the tanning of leather; the distillation of whiskey and gin; and the brewing of ale and beer. There are a few other manufactures that are not of much value, and not necessary to notice at present. There is no means of ascertaining accurately whether we manufacture more wool than is grown in the Canadas, or whether we export any of our own wool in a raw state. The total quantity of wool grown annually in Lower Canada may be about 1,500,000 lbs. In Upper Canada perhaps the quantity is a third less. We may suppose that the whole of this wool, and probably more, is manufactured in the Canadas into course cloth, flannel, &c. for the use of our people. In a few small manufactories that have been lately established, cloth of excellent quality for farmers' use, is

made. There can be no doubt, that this kind of manufacture should be encouraged by the agricultural class; because it ensures a good market for an agricultural product, that might not otherwise obtain a ready sale on favourable terms for the farmer. It is converting our own raw produce into articles of indispensable necessity for our use; and the persons employed in this manufacture are supported chiefly by other Canadian agricultural products, that perhaps we would not be able to dispose of otherwise. It is a duty we owe to ourselves and to our country, to consider well all these matters, and to act in that way that we think will be most likely to advance individual and general prosperity, in the land we live in. It would not be prudent in us to manufacture for ourselves; what we could buy on more favourable terms; but if we raise a product that we cannot sell to advantage in a raw state, and that we can manufacture that product so as to make it supply the place to us of manufactures obtained from abroad, it certainly must be our interest to do so. In the present circumstances of the Canadas, with a thin population, and scanty capital, it would not be our interest to import a foreign raw produce, to manufacture here. It will be much more profitable for us to cultivate our lands; and learn to make the most of the produce, by selling what we can sell to advantage, and by manufacturing what we cannot sell, either for our own use, or for any customers we can procure.

The manufacture of linen cloth is not carried on to any great extent. It is confined to a very coarse linen that is made by private families, for their own use. If more flax was grown, this manufacture might be vastly increased, but while cotton goods are so cheap, it is doubtful whether it will be profitable to ex-

tend this manufacture so far as it would be possible to do so. The subject will be discussed in a future number.

The tanning of leather is carried on to considerable extent for our own supply; but a large proportion of the leather is very imperfectly tanned, and consequently of inferior quality. The tanning process is finished in about a third or fourth of the time that is found necessary to tan leather in England; and the Canadian leather is not certainly half so valuable as that of England. There are some exceptions. In some of the tanneries established in our cities, leather of middling quality is made, but in all of them the process of tanning is too much hurried. In a future number this particular manufacture will again be referred to.

Beer and ale, of excellent quality, is brewed in Lower Canada, and the consumption of these articles is very much on the increase. The author has not in his power at present to state what may be the probable quantity of grain and hops annually consumed in this manufacture, or the quantity of ale and beer made, but will endeavour to give this information at another time. Were the inhabitants of the Canadas, to make use of ale and beer in the same proportion that they do in England, it would take nearly 2,000,000 of bushels of barley annually to supply them. Distillation of whiskey, gin, &c. is at present carried on to a considerable extent in the Canadas, but not to such an extent as to prevent the importation and consumption of foreign spirits. While we do use ardent spirits, it would unquestionably be our interest to manufacture it from our own agricultural produce, which we cannot find a market for, unless it be applied to this purpose. No other grain but wheat can be advanta-

geously exported from Canada. We are at so great a distance from England, that it would not pay to export our barley, or oats, unless in case of the failure of the crops in Britain. We might manufacture much more ardent spirits in Canada, than would be necessary for our own consumption, but the duty that would have to be paid in Britain upon the article, were we to attempt to export it to that country, will always act as a prohibition. Perhaps the time may not be very distant, when it will be found expedient to allow Canadian spirits to be imported into Britain on more favourable terms. If we cannot grow much wheat for exportation, it is necessary we should find some substitute to exchange for what we want of English manufactures; otherwise we cannot pay for them.

For the information of those who may be disposed to commence the trade of distilling, the following extract is given from the "Penny Cyclopaedia":—

"DISTILLATION is a chemical process, for applying a regulated heat to fluid substances in covered vessels of a peculiar form called ALEMBICS, in order to separate their more volatile constituents in vapour; and for condensing them immediately by cold into the liquid state, in a distinct vessel, styled a *refrigerator*. \* \* \*

In the present article we shall consider distillation solely in reference to the production of alcohol. The process, when applied to distilled waters, ethers, and oils, belongs to pharmacy, chemistry, &c.

The subject naturally divides itself into two branches: 1, the formation of the alcohol; 2, its elimination from the ingredients with which it is mixed.

The only substances employed in this country in the manufacture of ardent spirits, upon the great scale, are different kinds of corn: such as

barley, rye, wheat, oats, buck-wheat, and maize; peas and beans also have been occasionally used in small quantities. The principles in these grains, from which the spirit is indirectly produced, are starch and a little sweet mucilage, which, by a peculiar process called *mashing*, are converted into a species of sugar. It is the sugar so formed which is the immediate generator of alcohol, by the process of fermentation. \*

In mashing one or more kinds of corn, a greater or a smaller proportion of malt is always mixed with the raw grain; and sometimes malt alone is used, as in the production of malt whiskey.

The process of malting is that incipient growth called germination, in which, by the disengagement of a portion of the carbon of the starch, in the form of carbonic acid, the ultimate vegetable elements become combined in such a proportion as to constitute a species of sugar. Malting is the most effectual method of converting starch into sugar. But it is known from the researches of Saussurs, that if starch in solution be digested for some time at summer temperature with gluten, it will undergo a remarkable change, nearly one-half being converted into a species of sugar, and one-fifth into gum. A similar change is more rapidly effected upon starch, by boiling its pasty solution with one-hundred parts of its weight of sulphuric acid. The recent discovery of diastase, by Persoz and Payen, has enabled us to effect this curious conversion with much greater certainty, and to a greater extent than was possible by the gluten or the acid. If 8 or 10 parts of ground malt be mixed with 100 parts by weight of starch, previously diffused through 400 parts of water, at 140° Fahr., and if this mixture be kept at a temperature of from 158 to 166 deg. for

three or four hours, the nearly insipid pasty liquor will become a limpid syrup, which may be evaporated by a gentle heat into an uncrystallizable sugar, not only in the vinous fermentation, but in many operations of the confectioner. The same change which takes place upon pure starch in the above experiment, is effected in the process of mashing, as carried on in breweries and distilleries. A larger or smaller proportion of the *ficula* of the corn is thereby converted into sugar, and thus brought into a state fit for producing alcohol by fermentation.

The manufacture of whiskey or ardent spirits consists of three distinct operations; first, mashing; second, fermentation; third, distillation. 1, Mashing.—Either malt alone, or malt mixed with other grains, and coarsely ground, is put into the mash-tun, along with a proper proportion of hot water, and the mixture is subjected to agitation by a mechanical revolving apparatus, exactly similar to that employed in breweries for manufacturing beer. When malt alone is used, the water first run into the mash-tun among the meal has usually a temperature of 160° or 165° Fahrenheit, but when a considerable proportion of raw grain is mixed with the malt, the water is let on at a lower temperature, as from 145 to 155 deg., for fear of making such a pasty magma as would not allow the infusion or worts to drain readily off.

The following are the quantities of malt and raw grain mixed, which have been found to afford a good product of whiskey in a well-conducted Scotch distillery:—

252 bushels of malt,	at 40 lbs. per bushel.
948 do. barley,	at 53½ lbs. per do.
150 do. oats,	at 47½ lbs. per do.
150 do. rye,	at 53½ lbs. per do.
1500 bushels.	

From each bushel of the above mixed meal  $2\frac{1}{2}$  gallons of proof whiskey (specific gravity 0,921) may be obtained, or  $18\frac{2}{3}$  gallons per quarter. A few distillers are skilful enough to extract 20 gallons from eight bushels of that mixture. Ten imperial gallons may be considered a fair proportion of water to be introduced into the mash-tun for every bushel of meal at the first infusion. After two or three hours agitation, the whole is left to repose for an hour and a half, and then the worts are drawn off to about one-third of the volume of water employed, the rest being entangled in a pasty state among the farina. About two-thirds of the first quantity of water is now let into the tun, but at a temperature somewhat higher, and the mashing motion is renewed for nearly half an hour. A second period of infusion or repose ensues, after which the second worts are drawn off. Both infusions must be cooled as quickly as possible down to the temperature of 80 deg. or 70 deg. Fahr., otherwise they are apt to run into the acetous fermentation by the rapid absorption of atmospheric oxygen. This refrigeration is usually effected by exposing the wort for some time in large shallow cisterns, called coolers, placed near the top of the building, where it may be freely exposed to the arial current. But it is sometimes cooled by being passed through serpentine tubes, surrounded with cold water, or by the agency of ventilators blowing over its surface in extensive cisterns only three or four inches deep.

After the second wort is drawn off, a third quantity of water, fully as great as the first, but nearly boiling hot, is run into the mash tun, and well incorporated with the magma by agitation; after repose, this third wort is also drawn off, cooled, and either directly mixed with the preceding worts, or after it has been

concentrated by boiling down; in most cases, however, it is reserved, and used instead of water for the first infusion of a fresh quantity of meal.

In Britain the revenue laws prescribe the range of specific gravity at which the worts may be let down into the fermenting tuns. In England the law restricts the distiller to the densities between 1,050, and 1,090. In Scotland, between 1,030, and 1,075, which for brevity's sake, are called 50, 90, 30, and 75, omitting the 1,000, common to them all. At these densities the quantities of solid saccharum contained in one barrel of 36 imperial gallons, are 47,25 lbs, 85 lbs, 28 lbs, and 70,3 lbs, respectively.

The mashing and fermentation are jointly called *brewing* in England, and the period in which they are carried on is by law kept quite distinct, from the distilling period, the one occupying usually one week, and the other another in rotation. About 150 gallons of wort or wash are obtained from each eight bushels of corn employed.

The first of the above worts will have generally the density of 1,078 when the grain is good and the mashing well managed, and the second a density of 1,054, so that the mixture will have a specific gravity somewhat about 1,060, and will contain about 60 lbs. of extract per barrel. Now, by the excise rules, 100 gallons of such wort ought to yield one gallon of proof spirits for every five degrees of attenuation which its specific gravity undergoes in the fermenting tun, so that if it falls from 1,060, to 1,000, 12 gallons of proof spirits are supposed to be generated, and must be accounted for by the distiller. If he understands his business, he will be able to produce from 5 to 10 per cent. more than the law requires.

Distillers were accustomed to use one fifth at least of malt, with raw

grain; latterly they have diminished it to one-eighth, or one-tenth of the whole grain. One principal use of malt, besides its furnishing the saccharine ferment called diastase, is to keep the mash magma porous, and facilitate the drainage of the worts.

The cost at which whiskey is made in England is stated by a Mr. Smith, in his examination before a Committee of the House of Commons, to be;—where barley is 4s. 9d. per bushel, he reckons that one gallon of proof spirits costs 2s. for corn or meal, and 1s. 2d. for the charge of manufacturing. This statement of Mr. Smith was considered to be over charged, when it was known that, from 18 to 20 gallons of proof spirits may be made from eight bushels of mixed grain.

*2d. Fermentation.* This is undoubtedly the most intricate, as it is the most important process in distillation, but unfortunately one hitherto studied with too little regard to scientific precision by the distiller. Experiments having proved the quantity of saccharine matter converted into alcohol is dependant upon the proportion of ferment or yeast introduced into the worts; if too little be used, a portion of the sugar will remain undecomposed, and if too much, the spirits will contract a disagreeable taste. In general, the worts are let down at the specific gravity of 1,050 to 1,060, and at a temperature varying from 60 deg. to 70 deg. Fahr., and for every 100 gallons one gallon of good porter yeast is immediately poured in, and thoroughly incorporated by agitation with a stirrer.

When by attenuation the density is diminished to 1,035, one half gallon more is added, and another half gallon at the density of 1,025, after which the worts usually receive no further addition of yeast. The temperature of the fermenting mass rises

soon after the introduction of the yeast 8 or 10 degrees, and sometimes more; so that it reaches in some cases the 85th or 90th degree of Fahrenheit's scale. From the appearance of the froth or scum, the experienced distiller can form a tolerably correct judgment of the progress and quality of the fermentation. The greatest elevation takes place within thirty-six hours after the commencement of the process. The object of the manufacturers of spirits is to push the attenuation as far as possible, which so far differs from the beer-brewer, who wishes always to preserve a portion of the saccharine matter undecomposed, to give flavour and body to his beverage. The first appearance of fermentation shows itself by a ring of froth round the edge of the vat usually within an hour after the addition of the yeast; and in the course of five hours, the extrication of carbonic acid from the particles throughout the whole body of the liquor, causes frothy bubbles to cover its entire surface. The temperature meanwhile rises from 10 to 15 deg. according to circumstances. The greater the mass of liquid, the lower the temperature at which it was let down into the tun; and the colder the surrounding atmosphere, the more slowly will the phenomena of fermentation be developed under alike proportions of yeast and density of the worts. In general, large vats afford a better result than small ones, on account of the quality of the process. It is reckoned good work when the specific gravity comes down to 1,000, or that of water, and superior work when it falls 4 or 5 below it, or to 0,995.

After thirty-six hours upon the moderate scale, the yeasty froth begins to subside; and when the attenuation gets more advanced, the greater part falls to the bottom on account of its density relatively to the subja-

cent fluid. In from forty-eight to sixty hours the liquor begins to grow clear, and becomes comparatively tranquil. It has been deemed advantageous towards the perfection of the fermentation to rouse up the wash occasionally with a proper stirrer, and in some cases to increase its temperature a few degrees by the transmission of steam through a serpentine pipe coiled round the sides of the vat. Distillers generally enclose their vats, after the first violence of the action of fermentation, under tolerably tight covers.

Mr. Smith, the gentleman before referred to, states that the acetous fermentation is always proceeding simultaneously with the vinous fermentation; for, judging by the usual tests, there is always a slight degree of acidity in fermenting wash; that vinegar is in fact forming along with alcohol, or that while the attenuation is increasing, acetic acid is being formed. This important fact, which agrees with our own experience, serves to show how very fallacious at best the attenuation or diminution of density is of the amount of alcohol generated and existing in a fermented wash. The acetic acid, along with the undecomposed mucilaginous starch may, in fact, so far counteract the attenuating effect of the spirits as to produce a specific gravity, which shall indicate 10 or 15 per cent. less spirit than is actually present in the wash.

With corn-wash there is never more than four-fifths of the saccharine matter decomposed into alcohol and carbonic acid, in the best managed fermentation, and frequently much less. A pound of real sugar may be dissolved, by a successful process, into half a pound of alcohol, or into about one pound of proof spirits; and hence as a solution of sugar, at the density of 1060, contains 15 per cent. by weight, or 16 per cent by measure, which is nearly 1.7 pounds per gallon, it should yield nearly 170 pounds from 100

gallons, or 180 pounds measures equal to 18 gallons of proof spirits; whereas 100 gallons of corn-wash, fermented at the above density, seldom produce more than 13 gallons and a fraction. There is thus, therefore, a wide difference between the production of spirit from real saccharine matters fermented by the men of science, and the produce obtained by our best malt and grain distillers. The main defect lies undoubtedly in the very imperfect saccharification of the ficula of the corn in the mashing process, which, in our opinion, would require to be entirely remodelled; and conducted upon sounder and more scientific principles.

In the large fermenting vats used by the corn distillers in this country (Britain), the fermentation goes on far more slowly than when conducted upon the moderate scale referred to in the account of this process given above. About one gallon of yeast is added at first for every 100 gallons of wort, and a half gallon additional upon each of the succeeding four days, making in the whole three per cent; when less can be made to suffice, the spirits will be better flavoured. The fermentation goes on from six to twelve days, according to the modifying influence of the circumstances above enumerated. After the fifth or sixth day, the tuns are covered in, so as to obstruct, in a certain degree, the discharge of the carbonic acid, as it is supposed that this gas in excess favours fermentation. The temperature is usually greatest on the fourth or fifth day, when it sometimes rises to 85 deg. Fahr. from the starting pitch of 60 deg. or 56 deg. Whenever the attenuation has reached the lowest point by the hydrometer, the wash ought to be distilled, since immediately afterwards the alcohol begins to be converted into acetic acid. This acidification may be partially repressed by the exclusion of atmospheric oxygen.

*Distillation.* Great stilleries are



usually mounted with two stills, a larger and a smaller. The former is the wash-still, and serves to distil from the fermented worts a weak crude spirit called *low-wines*; the latter is the low-wine still, and rectifies by a second process the product of the first distillation. In these successive distillations a quantity of fetid oil, derived from the corn, comes over along with the first and last portions received, and constitutes by its combination what is styled the strong and weak *faints*, in the language of the distilleries. These milky faints are carefully separated from the limpid spirit, by turning them as they begin to flow from the worm end into distinct channels, which lead to separate *receivers*.

From these receivers the various quantities of spirit, low wines, and faints, are, for the purpose of distillation, pumped up into charging-backs, from which they are run in gauged quantities into the low-wine and spirit stills.

One of the greatest improvements in modern distillation is the accomplishment of this essential analysis of the impure spirit at one operation. We shall content ourselves with investigating the scientific principles of a perfect spirit still, and with a delineation of its outlines.

The boiling point of alcohol varies with its strength, in conformity with the numbers in the following table:—

Specific Gravity.	Boilg. Point by Fahr's. Scale.	Specific Gravity.	Boilg. point by Fahr's. Scale.
0, 7939	168, 5'	0, 8575	181, 0'
0, 8034	168, 0	0, 8631	183, 0
0, 8118	168, 5	0, 8765	187, 0
0, 8194	169, 0	0, 8892	190, 0
0, 8265	172, 5	0, 9013	194, 0
0, 8332	173, 5	0, 9126	197, 0
0, 8397	175, 0	0, 9234	199, 0
0, 8458	177, 0	0, 9335	201, 0
0, 8518	179, 0		

Hence the lower the temperature of the spirituous vapour which enters

into the refrigerator, the stronger and finer will the condensed spirit be, because the noxious oils are less volatile than alcohol, and come over chiefly with the aqueous vapour. A perfect still should, therefore, consist of three parts; first, the cucurbit or boiler; second, the rectifier for intercepting the greater part of the watery particles, and the whole of the corn oil; and, third, the refrigerator. Three principal objects are obtained by this arrangement; first, the extraction from fermented wort or wine, at one operation, of a spirit of any desired cleanness and strength; second, a great economy of time, labour, and fuel; third, freedom from all danger of blowing up or boiling over by mis-managed firing. When a mixture of the alcohol, water, and essential oil, in the state of vapour, is passed upwards, through a series of winding passages, maintained at a regular degree of heat, from 170 deg. to 180 deg., the alcohol alone in notable proportion, retains the elastic form, and proceeds onward into the refrigeratory tube, in which those passages terminate, while the water and the oil are in a great measure condensed and retained in these passages, so as to drop back into the body of the still, and be discharged with the effete residuum.

The system of channels is so contrived as to bring the compound vapours, which rise from the alembic into intimate and extensive contact with metallic surfaces, immersed in a water-bath, and maintained at any desired temperature by a self-regulating *thermostat*, or heat-governor. The neck of the alembic tapers upwards, and enters the bottom or ingress vestibule of the rectifier. The top, or egress vestibule, communicates with the under one by parallel cases, or rectangular channels, whose width is small, compared with their length and height. These cases are open at top and bottom, where they are

soldered or riveted into a general frame within the cavity, enclosed by two covers which are secured round their edges with bolts and packing. Each case is occupied with a numerous series of shelves or trays, placed small distances over each other, in a horizontal or slightly inclined position. Each shelf is turned up a little at the two edges and the one end, but sloped down at the other end, so that the liquor admitted at the top may be made to flow backwards and forwards in its descent through the system of shelves. The shelves of each case are framed together by two or more vertical metallic rods, which pass down through them, and are fixed to each shelf. On removing the cover, the set of shelves may be lifted out of the cases to be cleaned, and are hence called moveable.

The intervals between the two cases, are left free for the circulation of the water contained in the bath vessel; these intervals being considerably narrower than the cases. The thermostat, or heat-governor, is shaped somewhat like a pair of tongs. Each leg is a compound bar, consisting of a flat bar, or ruler of steel, and one of fine alloy, riveted facewise together, leaving their edges up and down. There are links joined to the free ends of these compound bars, which receding by increase of temperature, and approaching by its decrease, act through a lever upon a stop-cock fixed to the pipe of the cold water reservoir, and are so adjusted by a screw-nut, that whenever the water in the bath-vessel rises above the desired temperature, cold water will be admitted through stop-cock and pipe into the bottom of the cistern, and will displace the over-heated water by the overflow pipe. Thus a perfect equilibrium of caloric may be maintained, and alcoholic vapour of corresponding uniformity be transmitted to the refrigerator.

The refrigerator consists of a dou-

ble tube, placed in a zigzag direction, but in one plane, and supported by two upright beams. The alcoholic vapour enters at an orifice, and descends along an inner tube till it becomes condensed by the counter current of water continually ascending in the annular space between a block-tin or copper tube, and an outer cast-iron pipe. The water of condensation enters into the annular space by a pipe and the nose of the stop-cock. The funnel into which the cold water is poured must be somewhat higher than the point from which the water is discharged, after having been heated to the same temperature as that of the alcoholic vapour last exposed to its influence.

When water has its particles kept by any means at rest, it becomes a very bad conductor of caloric; it acquires its maximum, conducting or cooling power, only when its particles are set in rapid and continuous motion. The present construction of worm is calculated to effect the most complete refrigeration of the vapours, with the smallest expenditure of cold water, and to turn out the spirit in the coolest state. The number of turns in this serpentine may be increased at the pleasure of the distiller. If a small portion of the overflow hot water be made to trickle down and moisten the outside surface of the two or three upper lengths of the serpentine, it will by evaporation produce a considerable degree of coolness, and thereby save cold water.

The preceding still apparatus is worked as follows; into the alembic put as much fermented liquor as will protect its bottom from being injured by the fire, when it is not plunged in a bath of muriate of lime; but exposed directly to the fuel. As soon as the ebullition in the alembic has raised the temperature of the water-bath to the desired rectifying pitch, whether 170 deg. or 180 deg., the thermostatic instrument is to be adjusted

by its screw nut, and then the communication with the charged back or cistern is to be opened by moving the index of the stop-cock over a proper portion of its quadrantal arch. The wash will now descend in a regulated stream through the pipe, thence spread into the horizontal tube, and issue from the orifices of distribution into the respective flat trays or spouts. The direction of the stream in each shelf is the reverse of that in the shelf above and below it; the turned up end of one shelf corresponding with the discharge slope of its neighbour.

By diffusing the cool wash or wine in a thin film over such an ample range or surfaces, the constant tendency of the bath to exceed the proper limit of temperature is counteracted to the utmost without waste of time or fuel; for the wash itself *in transitu* becomes boiling hot, and experiences a powerful steam distillation. Thus also a very moderate influx of water through the thermostat stop-cock suffices to temper the bath; such an extensive vaporization of the wash producing a far more refrigerant influence than its simple heating to the boiling point. It deserves remark, that the greatest distillation with the least fuel is here effected without any pressure in the alembic; for the passages are all pervious to the vapour; whereas, in almost every wash still heretofore contrived for similar purposes, the spirituous vapours must force their way through successive layers of liquid, the total pressure from which causes undue elevation of temperature, obstruction to the process, and forcing of the junctures. Whatever supplementary refrigeration of the vapours in their passage through the bath may be deemed proper, will be administered by the heat-governor.

The bath regulated by the thermostat may, however, be used for obtaining fine spirits at one operation, without transmitting the wash or low

wines down through its interior passages; in which case it becomes a simple rectifier. The empyreumatic taint which spirits are apt to contract from the action of the naked fire on the vegetable gluten in contact with the bottom of the still, is somewhat counteracted by the rotation of chains in the large stills; but it may be entirely prevented by placing the still in a bath of strong solution of muriate of lime, regulated by a thermometer, or, still better, a thermostat. Thus a safe and effectual temperature of from 270 deg. to 290 deg. Fahr., may readily be obtained.

In a future number of this work, a plan of the still, rectifier, and refrigerator, will be given, with a particular description of each, and some further remarks on Canadian distillation. For the present, perhaps too much space has been occupied with this subject.

#### SHEEP IN THE BRITISH ISLES.

The following table exhibits a view of the principal breeds of sheep in Great Britain:—

1. Teeswater, long wool, no horns.
2. Lincoln, long wool, no horns.
3. Dishley, or New Leicester, long wool, fine, no horns.
4. Cotswold, long wool, fine, no horns.
5. Romney Marsh, long wool, fine, no horns.
6. Dar Moor, or Bampton, long wool, fine, no horns.
7. Exmoor, long wool, coarse, horned.
8. Black faced, or Heath, long wool, coarse, horned.
9. Hereford, or Ryeland, short wool, fine, no horns.
10. Morf, Shropshire, short wool, fine, horned.
11. Dorset, short wool, fine, horned.
12. Wilts, short wool, middling, horned.
13. Berks, long wool, no horns.
14. South Down, short wool, no horns.
15. Norfolk, short wool, horned.
16. Herdwick, short wool, horned.
17. Cheviot, short wool, no horns.
18. Dunfaced, short wool, no horns.
19. Shetland, fine cottony wool, no horns.
20. Spanish, short wool, superfine, rams horned.
21. Spanish Cross, short wool, fine.

According to Mr. Luceoche's Treatise on English Wool, he estimates the number of long woolled sheep in England and Wales, in 1800, to be..... 4,153,308  
Of short woolled sheep..... 14,854,299

Total number of sheep shorn.....	19,007,607
Slaughter of short woolled sheep per annum.....	4,221,748
Carrion of do.....	211,087
Slaughter of long woolled sheep	1,180,413
Carrion of do.....	59,020
Slaughter of lambs.....	1,400,560
Carrion of do.....	70,028

Total number of sheep and lambs..... 26,148,463

In the General Report of Scotland, the number of sheep is estimated at 2,850,000; and, allowing for the increase that has taken place since 1814, perhaps the total number may now be 3,500,000. The number of sheep in Ireland is not exactly known. In the north of Ireland there are not many sheep; and on the best lands in the west and south, horned cattle are fattened, and many cows are kept for the dairy. Throughout Ireland the proportion of sheep stock is not so great as in Britain, and it is probable that the total number does not exceed from 4,000,000—to 5,000,000.

On the whole, if the estimates that are made be correct, perhaps the total number of sheep in Great Britain and Ireland now, may be about 35,000,000 of all ages. The quantity of wool shorn annually, in Great Britain and Ireland, must exceed 100,000,000 lbs.

#### IMPROVEMENT OF LAND IN NORFOLK, ENGLAND.

From an agricultural report for Norfolk harvest, 1835, the following selection has been made:—

“It would be a great national benefit, could the farmers of England inspect the crops now growing in Holkham Park, and the lands of Mr.

Coke's (now the Earl of Leicester) tenants—that identical land which was refused at five shillings an acre, tithe-free, when he comes to his estate. Upon this noble domain there are upwards of 400 acres of wheat, computed to yield at least eight coombs (or 32 bushels) per acre—barley from 15 to 17 coombs, (at 4 bushels to the coomb), and upon one piece in the occupation of Mr. Wiseman, it is not doubted there are 20 coombs per acre, equal to 80 bushels. We never saw corn stand so thick or so heavy in the ear. The mangel wurzel is fine and flourishing, and the turnips made as certain a crop as any grown by the ridge system of cultivation. If it be inquired how all this is achieved upon a soil naturally far from the most fertile, we must answer, it is the triumph of skill and capital. When Mr. Coke came into possession, 800 indifferent Norfolk sheep walked where 4000 of the most perfect bred in England are now depastured—notwithstanding from 1000 to 1,500 acres of land have been since planted. About 200 Devon oxen are sent to Smithfield yearly from the same fields—and, instead of horses, Mr. Coke now only employs the store stock for all his ploughing. Here, then, forty cows feed daily upon his lawns. The cattle enrich the soil, and the soil in turn gives sustenance to the cattle and the abundance of its crops. So long as the Holkham sheep-sheering continued, these facts were continually subject to a wide and beneficial observation, and we feel that we do a little towards excluding the advantages by recalling recollection to those noble bygone scenes of science and hospitality, and by making known the successful continuation of the supremely excellent system of cultivation still pursued under the same liberal and energetic management.”

Mr. Coke, the first of agriculturists, has ever been the warm supporter of whatever was likely in the least degree to forward the interests of farmers and to elevate the science he so fondly loved.

QUALITY OF MILK DURING THE PROCESS OF MILKING.

Several large coffee cups having been successively filled from one cow, till she was quite dry, the following results appeared, great care having been taken to weigh the cups to ascertain that the quantity in each was exactly the same:—In every case the quantity of cream was found to increase in proportion as the process of milking advanced. In different cows the proportion varied, but in the greater number the excess of cream in the last cup, as compared to the first, was as sixteen to one; in some it was not so considerable; therefore, as an average, it may be called as ten or twelve to one. The difference in the quality of two sorts of cream was not the less striking; the cream given by the first drawn milk was thin, white, and without consistence, while that furnished by the last was thick, buttery, and of a rich colour. The milk remaining in the different cups presented similar differences; that which was drawn first was very poor, blue, and had the appearance of milk and water; that in the last cup was of a yellowish hue, rich, and to the eye and taste, resemble cream rather than milk. It appears, therefore, from these experiments, that if after drawing seven or eight pints from a cow, half a pint remains in the tits, as much cream will be lost as the seven or eight pints will furnish.—*English Paper.*

BREAD MADE FROM SAW-DUST.

Mr. Brande, in his late lectures on

vegetable chemistry at the Royal institution, has stated, that excellent bread may be made from saw-dust; and exhibited a cake made from that material, which appeared to be good bread. It is said that bread made from saw-dust is far more nutritious, and might easily be made more palatable than the sole food of the Irish peasant—the potatoe. At all events, it is a curious instance of the wonderful transformation of chemistry. Our wonder, indeed, will abate a bit when we recollect that sugar, starch, gum-arabic, wheaten flour, wood—that is saw-dust—manna, arrow-root and vinegar, are composed of precisely the same ingredients, combined in very nearly the same proportions, so that if we were permitted to view, behind the scenes of nature, the manner in which they are combined, we might be able to transform the one into the other *ad libitum*. This will perhaps appear more evident from the following table:—

Finest Sugar Candy.	Wheat Starch.	Arrow Root.	Gum Arabic.	Wood.
Carbon...42-85	63-55	44-4	42-23	42-7
Water...57-15	45-45	55-6	57-77	57-3
100 0	100- 0	100- 0	100- 0	100-0

Saw-dust is thus made to differ very little in its chemical characters from those highly nutritious substances—sugar, arrow-root, wheat and gumb-arabic. Professor Antenneith's method of cooking it into bread consists simply in first removing every thing soluble from the wood, by frequent macerations and boiling. The wood is then reduced into a minute state of division; by minute division is meant a fine powder, which after being repeatedly subjected to the heat of an oven, is ground like corn, when it appears to be a yellowish-white flour; this flour requires, like corn-flour, to be fermented with leaven, with which it forms a uniform and spongy bread, which Antenneith also

states that wood-flour in water forms a jelly, which is in like manner very nutritious. Connected with this subject, very few know how to prepare *carrot-soup*. Mr. Brande, by the aid of chemistry, has, however, been able to discover the secret, which consists simply in adding a little alkale, or common pearlash, to the soup when boiling. The vegetable matter enters into a chemical compound with the alkale, which is soluble in water; hence the rich and nutritious character of well-prepared carrot soup. Sir J. Herschell says, that linen rags are capable of producing more than their own weight of sugar by the simple agency of some of the cheapest and most abundant acids. He also says that saw-dust is susceptible of conversion into a substance bearing no remote analogy to bread, and though certainly less palatable than that of flour, yet no way disagreeable, and both wholesome and digestible, as well as highly nutritive.

FROM PARK'S CHEMICAL  
CATECHISM.

Chemists have agreed to call the matter of heat, *Caloric*, in order to distinguish it from the sensation which this matter produces. Caloric is every where indispensable to the existence of man. "It is with fire that, in every country, he prepares his food, that he dissolves metals, vitrifies rocks, hardens clay, softens iron, and gives to all the productions of the earth forms and combinations which his necessities require." The sun is the principle, and, probably, the original fountain which furnishes the earth with a regular supply of caloric, and renders it capable of supporting the animal and vegetable creations.

According to the laws of nature, animal and vegetable life are both very much influenced by the temper-

ature in which they exist; we therefore find different kinds of vegetables, and a different race of animals, appropriated to the different climates of the earth.

That caloric is as necessary for the support of vegetable as it is for that of animal life, may be proved by direct experiment. If, in the midst of winter, a hole be bored in a tree, and a thermometer put into it, it will be seen that the tree is many degrees warmer than the atmosphere. Caloric is the cause of fluidity in all substances which are capable of becoming fluid, from the heaviest metal to the lightest gas. When the temperature of the atmosphere is reduced below 32' water gives out its superabundant caloric by degrees, till at length the cold atmosphere robs it of its caloric of fluidity also, and it becomes ice.

Owing to the distance of this globe from the sun, and to the vast mountains of ice at the poles, the atmosphere over a large portion of the earth is at times reduced to so low a temperature, that, were it not for a wise provision of providence, all vegetable life must be destroyed. Caloric has always a tendency to equilibrium; therefore, if the temperature of the air be lowered, the earth cools in proportion; but, when the atmosphere is reduced to 32', the water which is held in solution becomes frozen, and precipitates in the form of snow upon the earth, covering it as with a carpet, and thereby preventing the escape of that caloric which is necessary for the preservation of those families of vegetables that depend upon it for their support and maturity. Be the air ever so cold (and in the northern parts of the Russian empire it is sometimes 70 degrees below the freezing point) the ground, thus covered, is seldom reduced below 32', and is maintained equally at that temperature for the purpose above

mentioned. How multiplied are the means which nature has adopted for the preservation of all her productions.

The quantity of heat given out in freezing, occasions the progress of congelation to be extremely slow. The constant emission of caloric from the freezing substances operates favourably; for thus the severity of the frost is mitigated, and its progress retarded. On the other hand, if the return of caloric to the frozen body of water were not equally slow, what sudden inundations would be occasioned, in those countries where large masses of ice are collected, at the first approach of summer, as has before been remarked. That the melting of ice produces cold, is seen in many operations. By melting ice with common salt, confectioners produce cold much greater than that of the original ice.

In general, all bodies, whether solid or fluid, contract their dimensions, and become of more specific gravity when cooling. This axiom has been long known and acknowledged; but water affords a remarkable and striking exception. Water, as it cools below 42° 5, instead of contracting and becoming of greater specific gravity, actually becomes increased in bulk, and its specific gravity continues to lessen as it cools. From experiments, it has been found that water becomes of less specific gravity, whether it be heated *above* or cooled *below* 42° 5; a fact too astonishing ever to have been discovered or imagined a priori. The wisdom and goodness of the GREAT ARTIFICER of the world will manifest itself in this arrangement, if we consider what would have been the consequence had water been subject to the general law, and, like other fluids, become specifically heavier by the loss of its caloric. In winter, when the atmosphere becomes reduced to

32°, the water on the surface of our rivers would have sunk as it froze; another sheet of water would have frozen immediately, and sunk also; the ultimate consequence of which would have been, that the bed of our rivers would have become repositories of immense masses of ice, which no subsequent summer could unbind; and the world would shortly have been converted into a frozen chaos. How admirable the wisdom, how skilful the contrivance, that, by subjecting water to a law contrary to what is observed by other fluids, the water as it freezes, becomes specifically lighter, and, swimming upon the surface, performs an important service by preserving a vast body of caloric in the *subjacent* fluid from the effects of the surrounding cold, ready to receive its own accustomed quantity upon the first change of the atmosphere!

These reflections, perhaps, will not be thought misplaced, should they but afford

“One ray of light in this terrene abode,  
To prove to man the goodness of his God.”

#### THE BOUNTY OF PROVIDENCE.

The various orders of vegetables provided in every part of the globe, for the countless forms of animated existence, are eminently illustrative of the provident CREATOR, and show us how great and how good is the Father of the families of the whole earth. The Giver of all good has indeed made a bountiful provision for the use of man—“For him the earth has been covered with plants; and though their species be infinite in number, there is not one but may be converted to his use. Some may be selected out of every class to minister to his pleasure, or his support, wherever he shall please to fix his habitation. Others serve for his bed, for his clothing, for the cure of his diseases, and for the fire of his hearth. The sluggish cow

pastures in the cavity of the valley; the bounding sheep on the declivity of the hill; the scrambling goat browses among the shrubs of the rock; the duck feeds on the water plants of the river; the hen, with attentive eye, picks up every grain that is scattered and lost in the field; the pigeon of rapid wing, collects a similar tribute from the refuse of the grain; and the frugal bee turns to account even the small dust on the flowers. There is no corner of the earth where the whole vegetable crop may not be reaped. These plants which are rejected by one are a delicacy to another, and even among the finny tribes contribute to their fatness. The hog devours the horse-tail and the hen-bane; the goat, the thistle and the hemlock. All return in the evening to the habitation of man, with murmurs, with bleatings, with cries of joy, bringing back to him the delicious tributes of innumerable plants, transformed by a process the most inconceivable, into honey, milk, butter, eggs, and cream."

—*St. Pierre.*

#### UNITY OF DESIGN.

*From Rogel's Bridgewater Treatise.*

Newton, struck with immensity of nature, compared our knowledge of her operations, into which he had himself penetrated so deeply, to that of a child gathering pebbles on the seashore. Compared, indeed, with the magnitude of the universe, how narrow is the field of our perceptions, and how far distant from any approximation to knowledge of the existence of matter, of the source of its powers, or even of the ultimate configuration of its parts! How remote from all human cognizance are the intimate properties of those imponderable agents, Light, Heat, and Electricity, which pervade space, and exercise so potent a controul of the bodies in nature! Doubtless, there exists around us, on every side, influences of a still

more subtle kind, which "eye hath not seen nor ear heard," neither can it enter into the heart or imagination of man to conceive. How scanty is our knowledge of the mind; how incomprehensible is its connection with the body; how mysterious are its secret springs, and inmost workings. What ineffable wonders would burst upon us, were we admitted to the perception of the spiritual world, now encompassed by clouds impervious to mortal vision!

The Great Author of our being, who, while he has been pleased to confer on us the gift of reason, has prescribed certain limits to its power; permits us to acquire, by its increase, a knowledge of some of the wondrous works of his creation, to interpret the characters of wisdom, and of goodness, with which they are impressed, and to join our voices to the general chorus which proclaims "His Might, Majesty, and Dominion." From the same gracious hand we also derive that unquenchable thirst for knowledge, which this fleeting life must ever leave unsatisfied; those endowments of the moral senses, with which the present constitution of the world so ill accords; and that innate desire of perfection which our frail condition is so inadequate to fulfil. But it is not given to man to penetrate into the counsels or fathom the designs of omnipotence; for in directing his views into futurity, the feeble light of his reason is scattered and lost in the vast abyss. Although we plainly discern intention in every part of the creation; the grand object of the whole is placed far above the scope of our comprehension. It is impossible, however, to conceive that this enormous expenditure of power, this vast accumulation of contrivances and of machinery, and this profusion of existence resulting from them, can thus, from age to age, be prodigally lavished, without some ulterior end. Is man the favoured creature of nature's



bounty, "The paragon of animals," whose spirit holds communion with celestial powers, formed but to perish with the wreck of his bodily frame? Are generations after generations of his race doomed to follow in endless succession, rolling darkly down the stream of time, and leaving no track in its pathless ocean? Are the operations of Almighty power to end with the present scene? May we not discern, in the spiritual constitution of man, the traces of higher powers, to which those he now possesses are but preparatory; some embryo faculties which raise us above this earthly habitation? Have we not in the imagination, a power but little in harmony with the fetters of our bodily organs; and bringing within our view purer conditions of being, exempt from the illusions of our senses and the infirmities of our nature, our elevation to which will eventually prove that all these unsatiated desires of knowledge, and all these ardent aspirations after moral good, were not implanted in us in vain? Happily, there has been vouchsafed to us, from a higher source, a pure and heavenly light to guide our faltering steps, and animate our fainting spirits, in this dark and dreary search; revealing those truths which it imports us most of all to know, giving to morality higher sanctions, elevating our hopes and our affections to nobler objects than belong to earth, and inspiring more exalted themes of thanksgiving and of praise.

## AGRICULTURAL REPORT

FOR APRIL AND MAY.

The month of April was so cold and frosty throughout, that the spring work was scarcely commenced before the first of May. The consequence probably will be, that sowing and planting will be continued to a very late period of the season. The month of May was generally dry, but cold and unfavourable for vegetation up to the 22d. The frost remained so long in the ground that the soil has been kept in a wet and unsuitable state for working, except on light lands that were well

drained, and judiciously ploughed into well formed ridges last fall. Perfect drainage, and good ploughing, is the only remedy in the farmer's power against a cold and unfavourable spring. When this remedy is adopted, frost or wet cannot have so injurious an effect upon the soil as they otherwise must have, whether in tillage or in grass. When lands are left in such a state, that they can be dried only by natural evaporation; it will be found a very tedious process in such a cold, damp spring, as this has been.

Many farmers in the District of Montreal have sown much less wheat this year than usual; others have not sown any. For the last three or four years they found wheat to be a very uncertain crop, owing to the ravages of the wheat-fly. Those who have sown wheat, deferred doing so generally until the 10th or 15th of May, as the best means to save the crop from injury by these vile insects that of late years have plagued the farmers in several sections of this Province. If the season is dry and favourable, a good crop of wheat may chance to be obtained.

Barley has been sown this year to a greater extent, perhaps, than for many years past. The distilleries and breweries, already in operation, and those that are in progress of being erected and prepared for work next fall, has encouraged farmers to sow more of this grain this spring than usual. The price of barley will, very probably, continue to be a remunerating one to the farmer, and offers a fair encouragement for the cultivation of this grain that is so suitable for the climate and soil of Canada. If farmers will learn to understand their own true interests, there is not much danger of an over production of barley. There are many uses to which it may be applied, as well as to the making of beer and spirits; and by converting it to these uses, a remunerating price may always be secured.

A large quantity of oats will be sown this spring; but a considerable portion of it will be late, and hence must incur the risk of not ripening perfectly, until checked by early frosts. The rain that fell on the 23d and 24th of May, has retarded agricultural operations, particularly as the soil was not over dry previously.

Potatoe planting is not likely to be finished before the latter end of June. Unless on very dry soils, the planting is very backward now. The dry-rot has already affected the seed this year. Whether it will prevail to such an extent as in years past, it is impossible to say. That potatoes have a tendency to decay in the cellars, in a way that was not usual in former years, there can be no doubt; and potatoes that are observed to have this tendency, are not safe to be used as seed, unless planted whole. The dry-rot is a disease, that if not

checked, will cause great damage to the farmer, and the only remedy is, to obtain a new and a different seed. To prepare and manure land for potatoes, is a considerable expense, and when the crop partly, or wholly fails, it is a great draw-back to the farmer. There is a further inconvenience that is the consequence of dry-rot in the seed planted, which is, the great production of weeds where the seed fails. The farmer does not think it worth the trouble to take out the weeds as they grow, from a crop that has partly failed. Hence, the manure applied for the potatoe crop is in a great degree exhausted, in the production of hurtful weeds, that in many cases are allowed to produce seed, ripen it, fall to the ground, and remain in the soil to sprout again.

The pastures and meadows were very backward up to the 20th of May; since then they have improved considerably. Many farmers complain that meadows have been injured by the frost, particularly newly laid down lands. It was scarcely possible that meadows could escape damage by frost this season, in exposed situations, and where not covered by snow. Indeed, it is very probable that most meadows have suffered in some degree, by having more or less of the roots of grass destroyed. It is impossible for the author to say at present, how far this injury has extended. It will always be for the advantage of the farmer, that his lands should be covered with snow, from the latter end of November to the latter end of March. The roots of the grass will be preserved by it; the frost will be prevented from penetrating the soil to any considerable depth, and will be retained in the soil near the surface, and it will take less time in spring to render the soil fit for working, and for vegetation. When the lands are bare, and exposed to the severe frosts of a Canadian winter, the frost gets into the ground to a great depth, and it requires a long time in spring to thaw it; and while it is thawing, the soil is kept in a damp, cold state, unfit to be worked, or to produce vegetation in plants. These effects are more perceptible this season than in any other, during the author's residence in Canada for the last twenty years.

The price of hay has been high, since the middle of March. In the Montreal market, from ten to twelve dollars the hundred bundles was about the average price. It is not likely to be lower until we have the new crop. Straw has not been high. Wheat, Barley, and Oats, have brought a fair price; if the crop of wheat had been anything like an average. Potatoes also, have sold at a price that would remunerate the farmer, but not over. The produce of the dairy has sold at a moderate price, that cannot be complained

of, by either buyer or seller. Butcher's meat has generally brought a good price. It is higher in proportion than any other produce, and offers fair encouragement to the farmer to increase his stock of cattle, and the produce on which they can be kept, and fattened.

The country is not yet adorned in all its blossoms and beauty, but very soon will be. Spring is the season of hope to the farmer. If he executes his part properly, he ought not to feel any uneasiness about the results of the harvest. If we do our own part of the work well, we may safely confide in a Good and Bountiful Providence, for the success of our labours, that in due time, He will clothe our meadows with a thick foliage, — will crown our fields with ears of grain, — our gardens with ripe and delicious fruits, — and fill our stores with useful roots for men and cattle.

Côte St. Paul, May 26th, 1838.

### MARKETS.

The prospect of the wheat crop in the British Isles, by the latest accounts, are, on the whole, favourable. No report can yet be made of any other crop except wheat. In France, it is said, that the wheat crop has suffered from the severity of the winter, and that several fields of it have been ploughed up this spring to be sown with other grain. It is impossible to speak with any certainty at present of what the crops are likely to be. They are subject to so many casualties before they arrive at maturity, that no report made at the present moment can be of much consequence. If the braid of grain that appears over ground promises fairly, we must trust in Providence that it will progress prosperously to maturity, and yield an abundant produce.

SMITHFIELD CATTLE MARKET, APRIL 2d, 1838.—At per stone of 8 lbs. to sink the offals.

	s.	d.	s.	d.
Coarse and inferior beasts.....	2	2	3	6
Second quality do.....	2	8	3	0
Prime large Oxen.....	3	4	3	8
Prime Scots, &c.....	4	0	4	4
Coarse and inferior Sheep.....	3	4	3	6
Second quality do.....	3	8	3	10
Prime coarse woolled do.....	4	2	4	6
Prime southdown do.....	4	8	5	0
Lambs.....	6	6	7	0
Large coarse bakers.....	4	4	5	0
Prime small do.....	5	4	5	6
Large hogs.....	3	2	3	8
Neat small parkers.....	4	8	5	2

British wool per lb.

	s.	d.	s.	d.
Down Teggs.....	1	6	1	7
Half bred.....	1	6	1	7 1/2
Do. Ewes and Wethers.....	1	3	1	4 1/2
Leicester Hogs.....	1	2	1	5
Leicester Wethers.....	1	2	1	3
Blanket wool.....	0	10	1	1
Flannel wool.....	1	0	1	4
Skin combing.....	1	0	1	2
Highland wool.....	0	5	0	7
Australian wool.....	1	8	2	4

Several Articles already prepared are necessarily postponed.