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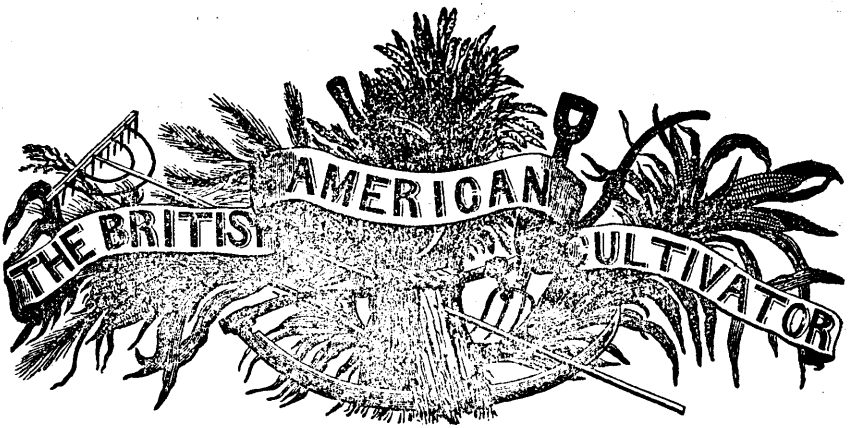

'Agriculture not only gives Riches to a Nation, but the only Riches she can call her own.'

New Series. TORONTO, APRIL, 1846. Vol. II. No. 4

THE SCIENCE OF AGRICULTURE.

A PRIZE ESSAY.

BY MR. ROBERT COOPER.

We take great pleasure in publishing the very excellent Essay upon the Science of Agriculture,—the author of which received the Gold Medal awarded last autumn by the Home District Agricultural Society. As this is the ablest written paper upon Agriculture, of Canadian production, that has come under our notice, we conceive it due the Author, as well as the Agricultural Society through whose agency it has been brought before the public, that it should be published without mutilation, in a single number of the *Cultivator*. Many who are not in the regular receipt of this magazine would probably be anxious to have an opportunity of reading the Essay in question, and to give all such the privilege of being in possession of a copy, we shall publish a larger edition than usual, and afford them upon the following scale: a single number, five pence; twenty numbers, five shillings; one hundred do., one pound. All remittances must come free of postage to the publishers, and it is earnestly requested that parties wishing to secure extra copies of this number of our journal will furnish their orders without delay.

It is highly gratifying to see productions of this kind emanating from the Canadian press especially when the author is practically as well as theoretically acquainted with his subject, as is the case in the present instance. This noble example should be followed up by every Agricultural Society in the province. A portion of the funds of each Society could not be more judiciously expended than in awarding prizes for well written Essays, or papers upon the various branches of farm labour,—and all such as are calculated to be useful should be published.

Such a course as this would assuredly tend to enlighten agriculturists upon important points which are at present enveloped in mystery, and would also give ample evidence that such associations, under proper management, are calculated to effect important changes for the better in the rural districts of the country.

We understand that the second-best Essay,—the author of which received the Society's Silver Medal,—is highly creditable; and unless some other steps are taken to have it published, all, or part of it will appear in some of the future numbers of the present volume of the *Cultivator*.

It is truly desirable that the *Cultivator* should contain as much valuable information as possible that has a sole reference to Canadian agriculture; and to encourage native talent, we shall make it a point to withhold from our columns no original article that is deserving a place in our widely circulated magazine.

Agricultural Chemistry.

It must have been highly gratifying to the friends of agricultural improvement, to have read Mr. J. W. Gilmour's communication, which appeared in the March number of the *Cultivator*. It omens well for the future prosperity of Canada, to see farmers' sons place themselves under the tuition of men of such distinguished attainments in agricultural science as Professor Johnston. There are a number of aspiring and zealous young farmers from the United States now in Edinburgh, who daily attend the Laboratory of the Agricultural Chemistry Association, for the purpose of acquiring a knowledge of the science of their exalted profession; some of whom appear considerably piqued at the idea of having so successful and talented a rival from Canada, as our correspondent, Mr. Gilmour.

We have not been made acquainted with any movement to improve the agriculture of this province that is half so well adapted to ultimately establish a sound system of Education for the productive classes, as that of placing talented young farmers under the tutorship of such masterly minds as Prof. Johnston. It must be obvious to every one at all interested in the agricultural prosperity of this country, that there is a necessity for the farmers' sons to be made better acquainted with the causes and effects, which influence favorably or unfavorably, their several practical operations; and in our opinion, this object can best be attained through Agricultural Colleges and Seminaries of Learning, where both the science and practice of agriculture form the essential features of the pupils' education. Such institutions will doubtless be established in Canada, when the people become better acquainted with their intrinsic merits, and complete adaptation to expand the genius of the young aspiring farmer and artisan.

Decision of Character.

Every person has a character of some sort or other, but every person is not possessed of that decision of character, or rather of *so much* decision of character as they ought to have. By this, we mean that prompt and speedy mode which some have, of coming to a determination now to act, and then immediately commencing the action accordingly. It will be perceived that it does not follow, by any means, that such persons always act right; for many of the most wicked and attrocious deeds recorded in history, exhibit astonishing traits of decision of character, which, if exerted in a better cause, would probably have been as productive of good as they were of evil. Nor is it necessary that the act should be one of great or momentous importance in order to exhibit this trait, although in such acts it is the most conspicuous. In actions of small and trivial importance it is not so plainly seen, or not so much is thought of it, when exhibited, as the lack of it is, when persons stand dallying and talking hour after hour whether it is best to do so and so or not, and then perhaps, after commencing it, fall back and begin again to parley and make inquiries and objections, and at the same breath give reasons for and against the doing what was wanted or attempted to be done. Young people should cultivate a habit, when anything presents itself that requires their action, of looking at both sides as rapidly, but as carefully as possible, and of immediately deciding upon a course, and of following it with energy. By doing thus, in cases of every day occurrences, it soon becomes habitual, and will then be exerted with comparative ease, when any great emergency happens. They should also in the course of their reading, note those instances of decision of character which present themselves, whether good or evil, and thus aid their judgment in conducting their own movements in future. If this trait could be cultivated, it would make a vast difference in society, especially if guided by sound judgment and the dictates of morality. Many of the evils which society suffers, arise from the vacillating, undecided course of individuals, who are desirous of doing well, but are kept from it by a want of that promptness and energy in deciding to go forward.

In all branches of business, in all pursuits of life, whether in high or lowly sphere, decision of character is essential to success, and although it may sometimes be directed in the wrong channel, and be productive of evil, yet the chances are in favor of its exercise at all times and on all occasions. Endeavor then to be decided—to be prompt, active and energetic.

To save Oats in feeding Horses.—Bruise or crush your oats in a mill, or otherwise as convenient, and your horse will become fatter on half his usual allowance of these oats than he has before on double the quantity unprepared. If you cannot bruise the oats, pour hot water on them and let them soak for a few hours.

THE PROFESSION OF AGRICULTURE AS A SCIENCE.

Agriculture, if an imperfect system of tillage may be so called, has necessarily been more or less practised in all ages and all countries; and so long as land was fertile and the population scattered, the rudest art sufficed to obtain from the soil, sufficient for the support of the few who tilled it. But as men became more numerous and more intelligent, they improved upon the common methods of cultivation, and rendered more available this most important source, whence the first wants of a people are supplied; and without which communities could scarcely exist—certainly could not increase in numbers, wealth, or importance. Still these improvements were but improvements in the art of culture; the land was perhaps better tilled, and the implements of husbandry less rude of construction. But the utmost that was attained, was the taking better advantage of the land's *natural* fertility. It remained for the genius of the present age to discover and apply to agriculture certain scientific principles, so as to increase the natural productiveness of the soil, and cause it to yield its fruits more plenteously for the support of an increased population. Art sufficed to teach man to till and gather the produce of the soil. It required the aid of science to enable him to do this in such a manner that the same soil should yield an increase year after year, and century after century.

"Agriculture, in common with other arts, may be practised without any knowledge of its theory, that is, established practices may be imitated; but in this case, it must ever remain stationary. The mere routine practitioner cannot advance beyond the limits of his own particular experience; and can neither derive instruction from such accidents as are favourable to his object, nor guard against the recurrence of such as are unfavourable. He can have no resource for unforeseen events, but ordinary expedients; *while the man of science resorts to general principles, refers events to their true causes, and adapts his measures to meet every case.*"*

This doctrine is now by no means new. Many years ago it was expounded, and the positions it contains, proven and admitted to be correct; while directions were given, by following which they might be rendered practically useful. But like many other important and wholesome truths, these were for a long time little regarded, and seldom applied. This may have been owing to that averseness to innovation so general among agriculturists; and, perhaps, in some measure to the want of education among large portions of the rural population. The removal of these causes is now apparent. Fresh discoveries have been made, and others brought more prominently before the public; and agriculture now, like other arts, owns the beneficent aid of science. The people of Britain have become convinced, that unless their soil can be made to produce much more than it does at present, the consequence of the further increase of population, must be an increase of misery. And the people of Canada, it is hoped, are generally impressed with the incontestible fact, that the produce of their soil is, and must continue to be, their only real source and means of prosperity.

It was not until about the middle of the seventeenth century*, that agriculture began to be thought of as a science; since which time many able men have written on the subject. Still, as in every other branch of learning, the more that is made known, the wider appears the field of inquiry, and the greater the room for improvement. Many important discoveries have been made, but they convince us that there are more to make; and the vast advantages derivable from the improvements already become general, should induce us to attempt others; as well as to adopt those already proven to be advantageous.

In this Province, the works of the great writers on scientific agriculture, though of immense value to farmers, have not obtained a very general circulation, nor have the principles and practice taught in them, been to any perceptible extent adopted; notwithstanding the fact that most of them are as applicable to the climate, soil, and circumstances of Canada, as to those of the many parts of Europe, where they are in use.

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* Loudon.

* Rotation of crops, and the cultivation of clover and turnips as fodder, were first recommended by *Blythe*, in a work first published in 1649.—See *Jackson*.

The science of agriculture in Europe has advanced but a few steps compared to what it must attain; here it has done much less. It has been supposed that the soil of Britain could be made to produce nearly double the quantity of produce now obtained from it. If this be anything near the truth, in speaking of perhaps the highest cultivated land in the world, how much more correctly might it be said of the soil of Canada, reclaimed for the most part from a state of wilderness, within the last quarter of a century.

That the progress of scientific agriculture in Canada should be much advanced by the writer of these pages, he has no right to expect; but the effect will be good, and his labour amply repaid, if he does but aid in stimulating inquiry,—the materials for forming a good agricultural education are by no means scarce; it is the desire to obtain and profit by the information that appears to be lacking.

It is proposed to consider the subject under the following general heads. 1. The nature of soils. —2. The manner of treating them, rotation of crops, &c. 3. The nature and use of manures; and lastly, of grain crops, and their diseases.

The first knowledge necessary for the guidance of the agriculturist, is that by means of which he may discover the nature and capabilities of the soil upon which he intends to employ his capital or labour, and from which he hopes to derive his support—this he must understand before he can gain a proper idea of the method of making his property available.

Our first consideration will then be, of the *nature of soils.*

The soils consist of those substances which having been washed from the higher rocky parts of the earth, and modified and increased by the action of spontaneous vegetation and its decay, rest at various depths upon the substrata.

The various descriptions, or parts of soils, are, first, clay, which in its pure state, is a compact substance, retentive of water, and more impervious to the air than any other kind of soil, consequently the most difficult to bring into cultivation. Secondly, sand* or gravel, which is of an opposite character to clay, being loose and incohesive, and consequently allowing moisture to pass through without producing much fertilizing effect; by itself, it is from this and other causes, comparatively barren, as clay is unproductive from opposite reasons; mingled together, they form what is commonly called loam, (a term that may comprise nearly every cultivable soil,) their union bringing into action the virtues, while it corrects the defects of each. The third element of the soil is lime, or calcareous earth. This substance as it exists originally in the soil, acts an useful part in assisting to blend the two just mentioned; according to the chemists it is also of service in fixing the carbonic acid which is generated by the decomposition of vegetable matter in the soil, or which floats in the air; this valuable gas passes with the moisture into the roots, and becomes an important agent in the nourishment of plants. Lime, after having been exposed to the action of the fire, more easily absorbs moisture, and, as is well known, is of great value as a manure; being a powerful decomposer of animal and vegetable matter, and thus rendering them fit to promote vegetation. These three substances then, clay, sand and lime, together with magnesia, which exists in smaller quantities than the others, form the ingredients of all soils; and the fertilities of the soils, as well as their capability of producing various kinds of plants, depend upon and are influenced by the relative proportions of such ingredients. By means of chemical analysis, the exact state of the soil, that is to say, the proportionate amount of its component parts, may be ascertained. To those who may be inclined, and have it in their power to avail themselves of this highly useful means of forming a correct judgment as to the nature and best manner of treating their land, the numerous works on agricultural chemistry will be an efficient guide; the experimentalist, however, must bear in mind that in order to obtain anything like a correct idea of a field, (to say nothing of a farm) he must take specimens of soil from many different places, and form his conclusion from the various results. Unless he does so his experiments cannot be depended upon, especially when the land has not been in cultivation during a number of years, in consequence of the various portions of the soil not having become sufficiently amalgamated. When, however, as in England, and in the more early settled parts of this province, fields have become equalized as it were, and capable of complete tillage, chemical analy-

* These kinds of soil are distinguished by the terms siliceous (from the Latin, silex, a flint,) sandy or gravelly; and argillaceous or clayey, from the Latin, argilla, white clay.)

sis may be made use of to advantage; and having by this means discovered the nature and properties of the soil, the agriculturist may apply the appropriate remedies, and in his course of husbandry, be guided by his knowledge of what *his land is actually capable of producing.**

A more ready method, and one of much more general use, by which an opinion may be formed as to the nature of a soil, is from the trees and *vegetables which we see it produce. The vegetation* will be the *effect*, and indicate the quality of the surface soil in its natural state; while the forest timber, in its size and vigour of growth, is indicative of its strength, and in its species enables us to judge of the soil to a greater depth;—still, neither of these are to be implicitly relied on; some plants may be the produce of seeds accidentally occupying the land, while others labor under the disadvantage of seeking nourishment in a substance which has not been subjected to the fertilizing influence of the air and rain, by being opened and disturbed; this is apparent from the well known *fact, that a field after being* ploughed and then allowed to remain without further tillage, will become covered with herbage not only of a different description from that which it bore before it was disturbed, but also of a much more luxuriant growth. A similar kind of change is apparent in forest land if it be neglected after the timber is removed; the soil again produces trees, but of a different species from those which formerly occupied it. *The poplar, the elm*, or maple, may be seen growing about the decaying roots of the pine or the oak. These effects are caused by the fact, that different portions and properties of the soil are brought into action.—The primitive woods were the produce of the sand, the loam or clay which was nearest the surface, but after this has been mingled with the other portions, and those exposed to the action of the atmosphere, a new substance becomes fertilized, and produces a vegetation according to its properties. Again, it is with trees as it is with plants: each description exhausts a certain portion, that is, principally requires for its growth one component part of the soil, while another kind of tree or plant draws more heavily from another component part; now, where the same kind follows annually; it either, by decomposition, or by means of the falling leaves, returns to the earth the same material of which it continues to exhaust it, and still continues to flourish in the *soil which itself is made to supply and renovate*; but this kind of tree or plant being once destroyed, other portions of the soil which have long lain dormant, send forth their spontaneous vegetation, and a new race of trees or herbage takes the place of the old. In judging then of land before occupying it, the natural growth, whether of trees or herbage, may be advantageously taken into consideration; but it is also important to discover what description of soil lies beneath the surface, and what may be accomplished by a proper mixture of the various parts.

The next thing to be considered is, the best way of turning the soil to good account; that is, the obtaining from it the greatest amount of produce at the least expense. He is the best agriculturist who succeeds best in doing this, and will succeed in *proportion* as he *understands and applies* to practice, scientific principles. The proper course to pursue, will depend upon the nature of the soil to be worked, and in a great measure upon the climate under which it is situated. The climate not only varies with a country or district, but is frequently very different on the adjoining farms, and even in different parts of one. The slopes facing the south, will be found *much warmer, and on them crops will* come to maturity and ripen in a shorter space of time than on the levels or those which incline in another direction. The practical agriculturist knows well how to place his crops so as to take advantage of the varieties of surface and climate on his farm.

The climate most favorable to the agriculturist

* For practical information as to the methods of analysing soils, the reader is referred to Loudon's Encyclopædia. The limits of an essay would not permit of entering into detail on this branch of agricultural science. The following remarks, however, are interesting, and may be useful:—

"There are few cases in which the labour of analytical trials will not be amply repaid by the certainty with which they denote the *best methods of melioration*; and this will particularly happen when the *defect* of composition is found in the proportion of the primitive earths. In supplying organic matter, a temporary food only, is provided for plants, which is in all cases exhausted by a certain number of crops; but when a soil is rendered of the best possible constitution and texture, we have regard to its earthy parts, its fertility may be considered as *permanently established*."—Sec. 2136. And this may be done by supplying such ingredients as have been proved by the analysis to be wanting.

is that in which the alternations of heat and cold are most regular, and the changes from one to the other most gradual; but judicious management may guard against even the disadvantages of climate. We seldom (in Canada, at all events,) experience much inconvenience from excessive heat or dryness,—the complaint is generally of wet and cold. The cause of this in America is obvious. As long as a country is, for the most part shaded with trees, the dense foliage intercepts the rays of the sun in their passage to the earth, and consequently prevents them from communicating heat to the soil. Again, from the numerous swamps and rivers, and immense mass of vegetation, fogs and vapours arise, preventing the earth from receiving that modicum of heat which it otherwise would. These fogs and vapours are caused by evaporation, which drives back the heat. When the forest is taken off, and the country drained, these causes no longer exist; and the climate consequently undergoes a change, becoming more favourable to agricultural pursuits. This has been the case *long since in Britain; while in America, the* change is beginning to take place. We know, that in what are called the "*older* parts of the country," the winters are said to be less severe, and certainly are of shorter duration, than in the "newly-settled" districts. Still great inconvenience is often felt in the former, as well as the latter, from excess of moisture. This may be obviated by a proper system of draining. This *is a subject to which the attention of men of science* in Europe is now very generally directed, and their discoveries and discussions have led to much improvement in the system of agriculture, on the other side of the Atlantic, while much waste land has been brought into cultivation by these means.

"Thorough draining," we hold to be the first thing necessary to make a farm available to its *full extent, whatever may be the consistency of* the soil, and in this Province, as well as elsewhere. Not only does this deserve the attention of the farmers on "old land," which has become, by constant tillage, nearly assimilated to that of the old country; but also of the "*settler*," who may, by draining as much as the rough nature of his farm will permit, save to himself the use of such ground, from which the young grain is *frequently destroyed by the settling of water.*

Vegetation, it should be remembered, is assisted by moisture passing through the soil; it is destroyed and prevented by the stagnation of w in and upon the land. To the numerous class of farmers who have their land undrained, and are great losers in consequence, from the wrong impression, that it does not require draining, being already dry enough, the following passage, from perhaps the most useful work on agriculture that has issued from the press, may be of service:—

"Land," says Mr. Stephens, "though it does not contain such an abundance of water as to obstruct arable culture, may nevertheless, by its inherent wetness, prevent or retard the luxuriant growth of useful plants, as much as decidedly wet land. *The truth is, that deficiency* of crops on apparently dry land, is frequently attributed to unskilful husbandry, when it really arises from the baleful influence of *concealed stagnant water;* and the want of skill is shown, not so much in the management of the arable culture of the land, as in the neglecting to remove the true cause of the deficiency of the crop, namely, the concealed stagnant water."*

The same writer gives it as his opinion, that there is scarcely a farm "throughout the kingdom," which would not be much the better for thorough draining. If this be true with regard to Britain, it is certainly so in Canada.

The fact is, that by deep-draining, the agriculturist brings into use an additional portion of soil, and consequently enables his crops to *absorb more nutriment. The water being once* drawn off, the soil will bear tillage to a greater depth,—it may be ploughed and trenched as deep as the level of the drain; by this means a fresh substance is turned up, and mingled with the surface soil which has become exhausted; but going below the surface again acquires the materials of vegetation. The consequence necessarily is, that the land is rendered capable of *yielding a greater number of crops without being* exhausted, from the simple fact, that there is much more to exhaust. The farmer, by this means, as has been well said, "adds to the available extent of his possessions."

It is now necessary to speak of the treatment of the different kinds of soils. Draining, of which something has been said, is universally admitted to be useful and necessary to the proper management of all descriptions of soil.

* Stephen's Book of the Farm, as quoted in *Blackwood's Magazine.*

First, of Clay.—This requires more labour to bring to and keep in a state of cultivation, than the other soils; nevertheless it is known to contain the materials of vegetation to a great extent, but which can be of no service unless so pulverized as to admit of the passage through of air and moisture. Both practical experience and scientific experiments have shown that no soil, however rich, will send forth vegetation, unless subjected to the action of the elements. Clay, being compact, keeps all but the surface out of the reach of this fertilizing influence, and prevents the roots of plants from penetrating through it; in order then to render it useful, the substance must be broken up and kept friable. To do this, it is necessary to mingle with the clay some substance of an opposite nature, as sand or gravel. —Where either of these exist as subsoil, deep ploughing at once suggests itself as the best means of melioration; by this the very nature of the soil is changed, and becomes a rich loam.—When, however, there is no subsoil of this description, the application of a pulverised substance, such as sand, dust or lime, will assist to separate the particles of clay, and cause them to contribute to vegetation.

Sand forms a portion of nearly every soil; when its proportion is too large, some means are required to counterbalance the evil and render the land fertile. Sandy soils, which, according to Sir Humphrey Davy, are properly those which contain more than seven-eighths of sand, require less labor to work than those in which clay is the predominant material. But they require in a greater degree the aid of extraneous matter to keep up the requisite moisture, temperature, and consequent fertility; and as clay, in order to take advantage of its virtue, requires the aid of other substances to separate the particles, so sand does to give it tenacity and firmness. In order to improve all kind of soils, a system in very general use is that of "summer-fallowing," a system strongly advocated by many and as earnestly deprecated by others. The real solution of the question seems to rest upon the fact, that whether the method be beneficial or otherwise, depends upon the nature of the soil to be dealt with; and as many of the erroneous ideas upon this subject are owing to a want of knowledge concerning the different properties of the soils, and their manner of treatment, the subject may be properly considered here.

A heavy clay soil will undoubtedly be improved by fallowing, and in many cases perhaps it is the only means of bringing the land into working condition. This is done, however, not so much by the working and exposure of the soil during the summer, as by the action of the frost and moisture upon it during the winter. It is this that renders the soil friable and fit for tillage in the spring. The more modern system of substituting green crops for naked summer-fallows, if it can be so managed as to do no serious injury to the land, is certainly more profitable than the other method by which a year's use of the land is lost. The question then arises, whether the system of fallow-cropping may be practiced without harm to the soil, or it would be more profitable to give the land a year's rest, that it may gather strength for the next course? In order to satisfy ourselves upon this point, it is necessary to consider the nature and effect of "naked-fallowing."

Two principal causes probably gave rise to the system; in the first place, the scarcity of manure by which the soil might be recruited, and secondly, it appeared the most effectual means of cleansing the land of weeds. In this respect it is certainly beneficial, and the soil will become fertilized in the course of the operation, each successive growth of herbage being turned beneath the surface, and as it decomposes, forming an enriching manure. The great benefit however of fallowing consists in its effecting a complete pulverization and admixture of the various parts of the soil; and consequently adding to its powers of production. The chief thing necessary in fact for doing justice to a soil and obtaining from it the greatest benefit with the least possible injury, is complete pulverization—it gives scope for the roots of the plants to spread and gather nutriment, it increases the sponge-like property of the substance, and consequently gives free passage to the air and moisture, while by the admission of the heat the temperature of the soil is improved and regulated, —and the supply of food for vegetation is increased by the exposure of the air and consequent decomposition of the animal and vegetable substances.

This pulverising the soil, however, it must be remembered, only renders more available the soil itself and its capabilities of production, which would otherwise have lain dormant; it does not add to those capabilities—this is effected by the

means of manure, the virtue of which is most completely taken advantage of the more the soil is mingled and pulverised. Another means of giving new strength to the soil, is to bring into use a portion of the earth from a greater depth than was formerly done, and from which no nourishment has yet been drawn. This may, however, be done, and the necessity for fallowing much obviated, by *deep-draining*,—this being done and the air and moisture finding their way downwards a chemical change is effected throughout the soil to the depth of the drains, rendering it more favourable to vegetation; nothing is then required but to turn up the soil and bring it into use, which may be done without fallowing,—the tillage in clay soils can scarcely be too deep; land therefore, which is well and deeply drained will be less likely to require fallowing, than such as is not drained, and consequently only permits of the surface *being used for the purposes of vegetation.*

Some writers lay much stress upon the good effects of fallowing in exposing the soil to the heat of the sun, as well as the general action of the atmosphere; others, again, tell us that the exposure to so much heat, causes the virtues of the soil and the rich juices of the manures to evaporate, and that therefore the object should be to keep the earthy substances as much as possible shaded. As usual, the truth is to be gathered from both positions. That fertilization is aided by the free admission of the atmosphere is sufficiently evident, but it has not been proven that a scorching heat is desirable for the purpose. On the contrary, it is injurious, inasmuch as it carries off much nutritious matter, by means of evaporation; it is this which furnishes one strong argument in favour of *green*, in preference to *naked* summer-fallowing. Let us suppose that the land has been well ploughed in the autumn—until the the following summer it receives the benefit of the atmospheric action and is pulverised by the winter frosts, at the same time that it has imbibed sufficient moisture; still it would not be in the course of good husbandry to take off a scourging crop of grain, nor will nature allow the land to remain idle. If nothing be sown, weeds will certainly spring up, nor is the summer heat required to improve the tilth. The object must be to keep the land as nearly as possible in its present state, until the time arrives for manuring and ploughing, preparatory to sowing the fall or next spring grain. Nothing can do this so effectually as a green crop,—what it extracts from the soil is neither so much, nor of the same description as the nutriment required for the growth of the crop which is to follow, while by shading the ground, it causes it to retain its moisture, and the proper temperature of the soil is kept up. Thus, if judiciously managed, the land may be more benefited than if it is allowed to remain idle, while the cultivator has all the advantage of an extra crop, which has probably done less to exhaust the soil than would a growth of wild herbage or the heat of the sun * This naturally leads us to consider cropping in rotation —

The theory of rotation of crops, though by no means new, has become much better understood within the last few years. The main ground on which it rests, is that already hinted at, namely, that each kind of crop principally exhausts a peculiar portion of the vegetating properties of the soil; and in the course of rotation, those portions which were nearly exhausted, are, from various causes, (such as mixture of the soils, decomposition of fresh matter, and the action of the atmosphere,) again prepared to yield the supply of food to the crop for which they are intended.—This system, with manuring at proper intervals, and sufficient draining, may nearly, if not quite do away with the necessity for naked fallowing, except for the purpose of destroying very noxious and obdurate descriptions of herbage in stiff clay soils, and even in that case, much may be done by the application of lime

The first principle then is, that all crops, although they more or less exhaust the soil, do not exhaust it equally or in the same manner; that is, they exhaust different portions of it; and this is true of all soils Again, plants differ in the room they allow for the growth of weeds, and consequently one is sometimes useful to cleanse

* In this province the most usual summer fallow crop is peas; beans which are much grown in England in the same manner, can not be cultivated to so good advantage here, and require much labour in tillage Potatoes or turnips will do well if the land is not to be sown until the following spring. In soils partaking largely of sand, it is frequently necessary to forego the advantage of the summer crop, and obtain a sort of clover to plough in,—a course adopted to good advantage in some sandy districts of this province. If this, however, be not done, the crop of peas will certainly do less harm to an overdry sand than leaving it exposed to a summer's heat.

the land from the effects of a former. In another respect, rotation of crops is useful in destroying *insects*, those which feed on one plant not being able to exist on another, and they therefore disappear for want of nourishment for the larvæ.—The principle first mentioned, however, is the most important, and if this be true, namely, that each kind of crop requires chiefly for its support a particular portion of the soil, and another a *different portion, then the soil will grow to the* best advantage, and be least injured by that kind of crop for which it contains, in the greatest quantities, the proper nutriment; still this portion of the soil will become exhausted, and it is found necessary to have recourse to a crop which will be fed by other ingredients. And as a necessary, consequence the same crop should not be repeated until the soil has had time to become in a manner reformed by the addition of decomposed animal or vegetable matter, so as to renew the substance whence the crop to be repeated was supported.*

Keeping up the rotation will of course not be sufficient to prevent exhaustion of the soil; it must be assisted by fresh material,—and this leads to the consideration of manures.

It is well known that animal and vegetable substances subjected to the process of decay, form food for the growth of plants; in other words, the process of vegetation goes to consume the animal and vegetable matter existing in the soil. The best soils by repeated cropping become to a degree exhausted of this nutritious substance, and require renovating. Some soils will bear cropping for many years without being sensibly impoverished; but by allowing them to remain too long without the assistance of artificial fertilizing, they become so reduced as to require a great length of time to bring them again into a fit state for culture. If the soil were originally ever so fertile, that course of husbandry must certainly be the best, by means of which it is kept so. It is too late to begin good farming after the land has become completely impoverished.

Manures may be divided into two classes: first, animal and vegetable matter, such as farm-yard dung, which is composed of both these; and fossil or mineral manures, which serve rather to decompose some substances, and modify the effects of others, than to contribute of themselves *to the supply of vegetable matter and support of* vegetation.

Before vegetable and animal matter can be rendered serviceable as manure, it is necessary that putrefaction should take place. To accomplish this, the substance must be sufficiently exposed to receive the action of the air, but not so as to allow too great a quantity of the moisture to evaporate, it should therefore be placed some little depth below the surface of the soil, for if left for a length of time unburied, it loses greatly by evaporation without enriching the soil. The most hungry soil is capable of being enriched by the mixture with it of the putrefying substances and by the gases which these substances emit in the process of decay. The covering of earth promotes decay and absorbs these gases, causing them to contribute to vegetation, while, if exposed to the air and heat, the enriching juices of the manure are wasted, and only that part of the soil benefitted on which the heap rests. Manure (we are now speaking more particularly of farm-yard manure) should be ploughed in as soon after it is laid on the field as possible, for while exposed it is constantly losing its value.

Salt, in its various forms, is an useful manure, possessing qualities favorable to vegetable as well as to animal life; it renders the soil more fertile, and cleanses it as well as the seed grain from noxious infirmities; and by its action on the roots of plants it causes them more readiily to absorb the nutriment from the soil. The fertility of land near the sea coast is known to be much enhanced by the vapour of the sea, hence one cause of the fertility of the soil of Great Britain, and a strong argument in favor of manuring in inland situations such as this Province; for not having the benefit of the salt vapor, the want may in some measure be supplied by the portions of saline matter contained in the farm-yard manure.

Of earths the most important assistant to the soil is lime, principally from its power of decomposing

* To discover what each crop actually requires, so as to render the land again capable of bearing it, by adding the substance, has as yet proved beyond the power of the learned. Even Johnston says, "if we knew exactly *what to add to each* crop" Experience, however, amply supports the theory. For a detailed account of the approved rotations on clay, loam, and sand, the reader is referred to "Jackson's Agriculture." It will be at once seen how far they are applicable to the climate, soil, and price of labour in this province In the main it is submitted they might be beneficially adopted.

animal and vegetable matter, but also because it assists in the formation of the plant. When meal which has been burnt is mixed with any moist fibrous vegetable matter, there is a strong action between the two substances, and they form a kind of compost, and matter before comparatively inert is thus rendered nutritive. The operation of mild lime or chalk is different, this only serving to improve the texture of the soil and prevent instead of promote the rapid decomposition of matter; it in fact goes to form one of the earthy ingredients of the soil. Quick lime should therefore be applied where there is hard vegetable matter requiring to be brought into use by mingling with the other portions of the soil,—as for instance, a hard sod which it is intended to plough under,—mild lime, it is evident, should be applied where this is not the case; but where the proportion of calcareous matter in the soil is too great, and requires the correction of a friable substance. And if the soil be exhausted, mixing with the lime a portion of earth different from that to be improved, has been found highly beneficial. "Compounds of all kinds are valuable, for the different parts so act upon one another that the chemical properties of the whole mass are changed, as to render it an efficient manure. And to an obdurate or exhausted clay soil, no better compound can be applied than a mixture of lime and silicious earth."*

Before concluding our remarks upon the subject of manures, it may not be out of place to allude to a discovery lately made which promises to be of vast service in the science and practice of agriculture. This is, the making electricity an agent in assisting the growth of plants. The method made known to the public from the work of the great Liebig, though it promises success, cannot as yet be sufficiently understood. If, as appears probable from the result of experiments made in Europe, it can be applied to advantage, the benefit that must accrue to farmers, both in Europe and America, is beyond calculation. And it is no small argument in its favour, that the *principle*, which the great chemist has discovered how to *apply*, has been before urged by men learned in agricultural science. The following, though perhaps familiar to most readers on the subject, will bear quoting in the present state of inquiry on this important and interesting question:—"Electrical changes are constantly taking place in nature, on the surface of the earth and in the atmosphere; but as yet the effects of this power on vegetation have not been *correctly estimated. It has been shown by experiments* made by means of the volcanic battery, that compound bodies in general are capable of being decomposed by electrical powers.

* * * * *

"A profitable application of electricity," Dr. *Darwin observes*, "to promote the growth of plants, is *not yet discovered;* it is nevertheless probable, that in dry seasons the erection of numerous metalic points on the surface of the ground, but a few feet high, might in the night time contribute to precipitate the dew, by facilitating the passage of electricity from the air into the earth; and that an erection of such points higher in the air, by means of *wires wrapped round tall rods*, like angling rods, or elevated on buildings, might frequently precipitate showers† from the higher parts of the atmosphere. Such points erected in gardens might promote a quicker vegetation of the plants in their vicinity, by supplying them more abundantly with the electric ether.—(Phytologia, xiii, 4.)†

The electricity, it was contended, lessened "that superabundant moisture which is yearly increasing from the increased evaporating surface, produced by the vegetation of improved *culture, from pastures and plantations*,"—or in Canada, from the great extent of forest.

Having spoken of the method of managing the soil, so as in the best manner to produce crops, it may be useful to say something of the diseases incidental to some crops notwithstanding the care with which they are cultivated. One of the most pernicious of these, as every farmer knows, is "*the rust*," which affects wheat. Heavy mists and rain, when the plant has attained such a height as to shade the ground and consequently retain the moisture, are generally considered the principal causes of this disease. In this province, it is frequently occasioned by cold and frosty nights, succeeded by hot days; any cause is indeed sufficient which keeps the roots of the plant cold for too long a time. In Britain, it has been found, that on highly manured lands

* Sir J. Sinclair, as quoted by Jackson.

† Showers of electricity, which it plainly appears, has long been considered fertilizing in its effects. The idea has evidently been long afloat among men of science. To Dr. Liebeg is due the credit of making it available.

† *Loudon's Agri.*, sect. 2321–2329.

where the straw grows too strong, the crop is more liable to rust, the straw being more soft and porus, and consequently easily affected by changes in the atmosphere. This may account for the fact that here, upon new lands, rust is most prevalent; and when affected, those parts are found to have suffered most where the soil is richest, and the straw stands closest together. Nothing, to prevent this, is more advisable than to mix the soils as much as possible, and sow early, so as to avoid the autumn rains, frosts, and mists.

Smut is a disease affecting wheat, of a more serious nature still, and exceedingly difficult to prevent. Indeed some maintain that it is impossible to reckon with any degree of certainty upon producing a crop free from smut, whatever means may have been taken to prevent it. The cause of so many failures has been, that the remedy was attempted without the disease being properly understood, nor have the causes of it been as yet quite satisfactorily ascertained. The most probable supposition, and one which agrees with the known result of various experiments is, that smut originates from the growth of fungus in the plant. The fungi, it is supposed, grow from the particles of smut which are attached to the seed, and being absorbed by the roots, are carried up in the plant, and so cause the disease. This is in accordance with the fact, that smutty wheat will produce a diseased crop, although it is well known that a seed of smut will not germinate by itself, the fact appears to be, that it requires the aid of the plant, which, affording it nourishment, matures it in the ear of smut, instead of sound grain, which the healthy seed would otherwise have produced.

If this be the solution of the question, and the smallest particle of smut being, with the assistance of the wheat plant, sufficient for reproduction, it is evident the cleaner the seed is made, the less liable is it to produce smut. To cleanse the seed thoroughly is nearly impossible from the small particles which lodge in the soft furry substance at the end of the grain; hence the use of lime in preparing seed wheat, as it burns off the portions of the husk where the dust is lodged. From this, the reasonable conclusion is, that all the various means in use for preventing smut, succeed more or less as the seed is more or less cleaned—the land being in a healthy state for its reception.* The approved modes of cleaning the seed are well known, but the principle stated appears to be that on which their success depends.

There are many other diseases to which grain crops are subject, but the two spoken of, are the most pernicious that annoy the Canadian farmer.

Did our limits permit, a good deal might now be said of that most satisfactory portion of a farmer's labours—the harvesting We will only remark of grain That it is now generally acknowledged *that wheat is better in quality, and* produces more and better flour when harvested early, than if allowed to become completely ripe. The fact is, that when the grain is fully formed and has *attained a certain degree of firmness,* instead of receiving further nourishment from the soil, it loses both in weight and quality This it does after the straw has become dead and yellow at the lower parts Experiments made by scientific men, have set this question at rest,† and early harvesting seems only prevented from becoming general, because it renders the grain less easy to thrash, but, on the other hand, much less is wasted in the carrying; and in these days of thrashing machines, the argument can be of little avail.

* If the land has borne a crop affected with smut, it is necessary, either by turning the surface well under, or burning, to get the remains of diseased grain out of the way, or it will have the same effect as if sown with the grain.

† *The time of cutting affects the weight of produce,* as well as the relative proportions of flour, bran and gluten. Thus, from three equal patches of the same field of wheat, cut respectively 20 days before the crop was ripe, 10 days before ripeness, and when fully ripe, the produce was in *grain*—

	20 days before, 166 lbs.	10 days before, 220 lbs.	Fully ripe, 209 lbs.

In Flour, &c., when cut	*In the Grain, per cent.* Flour.	Sharps (or Shorts).	Bran.	*In the Flour, per cent.* Water.	Gluten.
20 days before it was ripe	74.7	7.2	17.5	15.7	9.3
10 days before it was ripe	79.1	5.5	13.2	15.5	9.9
Fully ripe	72.2	11.0	16.0	15.9	9.6

—*Johnston, part 4, on the produce of the soils.*

Thus, there was more flour and less bran, more gluten, or substance, and less water in the grain, cut ten days before the crop was completely ripe, it being sufficiently matured, and not over-ripe.

Such are some of the leading principles necessary to be understood in order to follow the "profession of agriculture as a Science" It is not pretended that they have any claim to novelty; on the contrary, most of them have in some shape or other been laid before the public many years since; but it is submitted that not all, even of what are usually called "good farmers," know and acknowledge their existence. Still, fewer place sufficient reliance upon them, or attempt to gain such a knowledge of the theory of their business, as to render their practice more perfect. Men who follow other professions and trades, take pains to acquire a theoretical as well as practical knowledge of them, and attain eminence or opulence in proportion as they do so. Why should not the farmer do likewise? But he, in too many instances, although his is a science which in an eminent degree requires a knowledge of sound principles and the application of them to particular cases, contents himself with following the customs of his forefathers, without caring to understand their merits, or wherein they may be right or wrong: he takes pains to inform himself of the politics and news of the day, but apparently deems it unnecessary to study books upon a science which he professes to live. Men rise in importance and usefulness, and acquire reputation, by excelling in the calling they have chosen for themselves, and this can only be done by careful study and pains to improve in the knowledge and duties of that calling, whatever it may be. This may appear a mere truism, but it would be well were it more generally borne in mind.

In the countries of Europe the imperative necessity for an improved system of Agriculture has given rise to much inquiry on the subject; much able writing and the adoption of many improvements. Perhaps the necessity here, is not quite so plainly urgent; but nevertheless, we may turn the knowledge there promulgated and acted upon to good account. The resources of Canada depend upon, in fact consist of, the amount of produce raised within her fields,—there can be no question here between manufacturing and farming interests, for they are merged in one. It requires no skill in the much agitated science of the "wealth of nations" to enable a reasonable person to become convinced of this fact. The fields of Canada are her real treasuries, to which every farmer contributes in proportion as he cultivates his soil. In no country, then, is it of more importance that improvement in scientific agriculture should occupy the consideration of the community,—and be urged upon and practised by the agriculturists. A very common cry is, that all these scientific improvements may be very well in "the Old Country",—you can make nothing of them here. Plain reason leads to the contrary conclusion. We possess a climate nearly similar to, and scarcely less favourable (if we except winter-ploughing being prevented,) than that of Britain, and a soil, comprising all the varieties, and capable of producing most of the plants that can be grown there. Certainly then, rules which apply there should not be discarded here; for the experiments which have succeeded on the other side of the Atlantic, have produced results which may be taken advantage of on this. It is true, that the high price of labour prevents the Canadian farmer from availing himself of *all* the improvements that have been adopted in Europe, but he may derive much benefit from adopting some of them, and always acting on *similar principles*. The difference is only in details, and this difference will daily decrease with the manufacture of improved agricultural implements. Nor in these remarks would I except the "back-woods" farmers, who are too apt to think that they at all events can have nothing to do with science or improvement in the mode of culture; but it is of no less importance to them than to the farmers of the older districts, that their land should be made to do its best for them, especially when we consider the labor and expense of substituting a wheat field for a few acres of gigantic forest timber. It is true, that the land cannot be brought at once into a regular and properly arable state, for it must take some time to mingle the soils and vegetable matter in a proper manner; but such a course may surely be adopted as to produce this effect in less time than is usually done. It is said not, on account of the stumps; but the fact is, that these are prevented from rotting by the roots being kept from the free action of the air and moisture—being protected by a close sod which covers them. The labor of keeping this sod off, will be amply repaid, both by an increased quantity of produce and the more rapid decay of the roots. Draining too (which on new farms is often quite practicable) will cause the hollows to bear grain as well as the drier spots,—cause the subsoil and vegetable matter, by the influence of the air, to become fit for vegetation, and above all, prevent the wheat from being "winter killed,"

as is frequently the case in the hollow places, from excess of moisture. By these means the new farm is increased in fertility, and improved every year rather than exhausted. It is too much the custom to continue cropping the new soil, or rather the thin coating of vegetable mould which forms the surface. After the first year, this rapidly loses its virtue, being exposed to heat to which it was before unaccustomed, and not renovated by the fresh material which the woods had annually supplied to it, or any substitute therefor. Still, the farmer goes on taking crop after crop, (frequently grain after grain,) from this exhausted substance; sometimes, but not always, giving it an apology for a ploughing. The inevitable consequence is a failure of the crop; and the farmer comes to some such sage conclusion as that "his land will not answer for wheat," or "the climate is decidedly against it." The fault is in neither the land or the climate, but in treating an unformed soil with a course of cropping more severe and exhausting than is generally attempted on well tilled lands, regularly manured. The land should have rest under pasturage, or be tilled for green crops as soon as possible, no opportunity of draining being lost, and when it can be ploughed to any depth, the different kinds of soils may be mingled, and the same course of rotation and manuring adopted when practicable, as is generally recommended and adopted on land of a similar description in Europe and the more improved parts of America. The difference between a farm so managed and one on which the crops are merely attempted to be scratched from the surface soil, will soon be apparent. If the soil has become, as is frequently the case (from inability or neglect to plough it,) covered with a tough sod, lime may be of material service in promoting decomposition, and enabling the farmer to change what appeared to forbid cultivation, into a fertilizing manure.

The great movement towards improvement in agriculture by means of science, has commenced, and is making rapid strides in the other countries, —why should not a similar spirit prevail in this? The necessary information is within the reach of most people; none can reasonably complain of the high price of such books as may be exceedingly useful in this branch of learning. The necessary thing is to be convinced, that agriculture being as important and useful and difficult an art as others, can, like others, be much improved and advanced by the aid of science. Long accustomed to act by rule and measure, and set a high value on his practical experience, the farmer of the old school declines the assistance of science and "book-learning." Many learned and able and hard-working practical farmers have thought and acted otherwise; theirs is the example worthy of being followed. The practical experience of the farmer can scarcely be too highly estimated. It is by no means to be understood that another kind of learning should take the place of experience in practice; but something further may be learnt by which the knowledge acquired by practice can be improved, and the experience turned to better account. Practice truly is the *grand thing;* but let it be remembered that good and sound practice is the *proper application of science,* and the making its rules bear upon particular facts and circumstances.*

In this age, when improvements in every other branch of industry are astonishing the world, wherefore need the primitive, the most innocent and most important pursuit of all be in the back ground? And if in other countries it is pushing forward and drawing to its aid the ingenious, the learned and industrious, we may reasonably expect that in Canada, which should be eminently an agricultural country, important progress and improvement will take place in scientific, and consequently practical and useful *agriculture.*

* The general reader will perhaps observe that this idea is not original; but the authority on which it rests is the very best, and it is clearly founded on sound reason.

Grafting Currants.—The *Gardner's Chronicle* recommends, for the pretty appearance presented, as well as for the improved flavor, to graft currants of different colors, as the red, black and white, variously intermixed, on stocks trimmed up to a single stem three or four feet high. The tops may be headed down to a dense compact head, or trained as espaliars in the horizontal, or fan method, the two latter modes of training, by the free exposure to sun and air, much improves the quality of the fruit. The importance of trimming the bushes up to a single stem to improve the fruit and facilitate clean culture, instead of suffering two hundred and fifty suckers to shoot up all around into a dense brush heap, is very obvious to those who have tried both.

To take Stains out of Mahogany.—Spirits of salts, 6 parts; salt of lemons, 1 part. Mix, then drop a little on the stains, and rub them until they disappear.

Backwoodsman's Department.

In the February number of the *Canada Agricultural Journal*, its editor, Mr. Wm. Evans, has taken some exceptions to the statements made in the *Cultivator*, under this department, and has placed much importance upon the fact that "immense fortunes" have been made in the business of bringing forest-land into cultivation in Western Canada. Space will not admit of a lengthy discussion upon points of this nature, or else we should take up Mr. Evans' objections to our article item by item, and show, in a most forcible manner, that what is stated in relation to the principle of bringing forest-land into cultivation, was even greater, when executed in a proper manner, than we represented it to be.—"As we understand the term—*immense fortunes*—we cannot see how it is possible, under the most favorable circumstances, that the very best wheat soil could give sufficient to make fortunes by clearing the forest and sowing wheat." If Mr Evans cannot solve this problem, there are hundreds in Western Canada who have practically done it, and thousands who will yet do it, provided that they are blessed with as favorable seasons and markets as has been the case for the last twelve years. The term, *immense fortunes* might not have been properly qualified by us, but what we meant was, that an industrious, frugal young man, with a small capital, might commence a backwoodsman's life with a fair prospect of accumulating property to the value of two or three thousand pounds in the course of 25 or 30 years; and one with a large capital, a corresponding increased amount. There are hundreds of farmers in Western Canada who are worth from £19 to £15,000, who commenced on bush farms without a farthing in their pockets forty years ago. What has been done in the early settlement of this country is in process of being done in thousands of instances that might be enumerated; and to show Mr. Evans, as well as all other sceptics, upon matters of this kind, that we were not treating our readers with a profusion of unmeaning words, or that the statements we made were susceptible of being questioned, we shall point out a few instances in which British emigrants have commenced, and are in the course of acquiring independent fortunes in bringing forest land into cultivation. We shall not go back and point out what has been achieved by many of the early pioneers of Western Canada, but simply give a few cases to show the manner in which independencies have been acquired in the business alluded to within the last fifteen years. As our readers in the new townships will not feel much interest in this discussion, we shall content ourselves for the present by disproving three of Mr. Evans' positions.

1st. "That we never thought the country favorable for acquiring a large amount of wealth by farming, however skilfully carried on."

2d. That "we cannot see how it is possible, under the most favorable circumstances, that the very best wheat soil could give sufficient to make fortunes by clearing the wild forest and sowing wheat."

And 3d. That it is necessary that a "farmer and his family work like slaves, and subsist upon the plainest descriptions of food possible, and cover themselves with home-made clothing," to accumulate property.

1st. We could point Mr. Evans to one hundred farmers in the Home District, who emigrated from England in 1832 and 1834 with small families and without £5 worth of property, excepting clothing, who are now worth from £1,200 to £1500, and many that brought from £500 to £1000 with them are now worth £5000, and the whole of this increase of property has been made in agricultural operations and the rise of land.

But it may be said that assertion is not proof; we shall therefore advance the proof, and for the present let the matter rest. A Mr. Davidson of the township of Maraposa, Colborne District, about 12 years since, commenced a clearing upon a bush farm, and at that time was worth but little property. He now owns 800 acres of excellent land, 600 of which are cleared. The profits of the potash, and the first crop of wheat has in every instance more than paid for the land, chopping, clearing, and all other expenses included. Only two years ago he purchased 200 acres of bush-land, and gave out 160 acres of it to be chopped, cleared, and fenced, by contract—the whole of which was sown with Siberian spring wheat last spring. The product from this operation was taken to market and sold the past winter, and yielded a sum which paid for the land, as well as all other expenses, and left a handsome sum in the coffers to carry out similar other enterprises. Mr. Davidson is so well satisfied with this mode of acquiring property, that he is now

most anxious to purchase a tract of 1000 acres of forest land for a similar purpose.

2d A Mr White, of the neighborhood of Beaverton, Lake Simcoe, some years since settled in the wilderness, chopped, and cleared, and sowed ten acres of land with wheat, from which he had 300 bushels of superior wheat, which brought in the Whitby market £125. While on this point we might mention another case, which would serve to show the extreme productiveness of the soil of Western Canada. Mr. Gabriel Lount, upon the strength of the Government Bounty which was said would be awarded for the growth of Canadian hemp, prepared two acres of land in the best possible manner, and manured it at the rate of 30 tons of barn-yard manure to the acre, and after the hemp crop was harvested the land was ploughed over and sown with winter wheat, which gave the extraordinary yield of sixty-five bushels of marketable wheat per acre.

3d To prove that it is not necessary that a man should be a slave and a niggard to get along prosperously in clearing up land, we would mention the case of Mr. John Gildroy of the township of Reach. Mr. G. bought his farm and paid for it, and instead of engaging in the business of chopping and logging himself, rented a farm in the neighborhood, which, with a little hired labour, he managed profitably, he had from 15 to 20 acres of new land cleared and cropped with winter wheat yearly, the labor of which was all executed by contract, and by having the ground thoroughly clean, and the seed sown in season, the first crop has in an average of seasons more than paid all expenses, and he has now a large farm cleared and fenced, without having cost him a single farthing in reality.

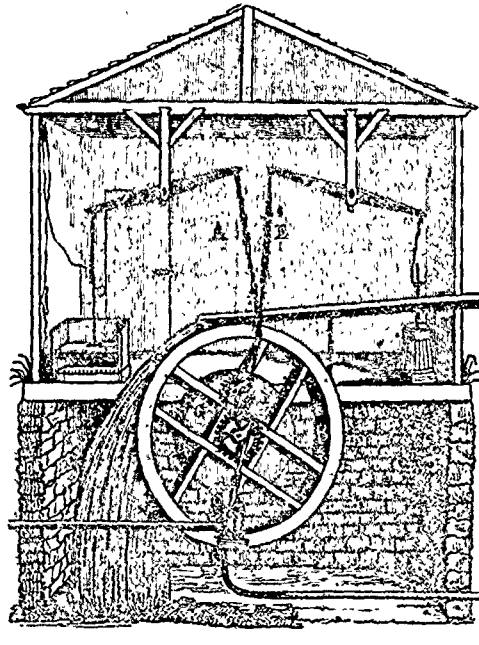
These cases will at least serve to prove, that we did not over-rate the profits of bringing new lands into cultivation. If circumstances would admit, we could point to scores of German and Quaker farmers who have acquired very large properties by agricultural pursuits;—but sufficient has been advanced to satisfy any inquirer after truth, that a skillful farmer may safely invest his capital in the cultivation of the soil.

Wedding Cake—Flour and butter, each, 3 pounds; sugar and raisins, each 3 pounds; eggs, 2 dozen; currants, 6 pounds; citron, 1 pound; brandy, 1 pound; cinnamon, nutmegs, mace, each 1 ounce; cloves, ½ ounce. Bake thoroughly.

Deep Plowing—"Few individuals are aware of the extension of roots in pulverized soil. Von Thaer mentions finding roots of sainfoin from 10 to 15 feet deep in the ground. There are now in the National Gallery, corn roots taken from one side of a hill of corn laid bare by the freshet, and presented by the Hon. J. S. Skinner, to the National Gallery. The corn was planted on the 20th of May, and roots gathered the 14th of July, 1842. In sixty days, some of the large roots extended more than four feet, covered with lateral branches. I have caused the roots to be measured; the aggregate length of roots in the hill is, by Mr. Skinner's estimate, over 8000 feet. The specimen alluded to, is open for examination. The fact is here mentioned to show the importance of deep plowing, to enable the plant to find nourishment so much below the surface as may avoid the effect of drought, give support to the stalk, and not expose the roots to be cut off by needed cultivation. Soil is made by exposure of earth to the atmosphere; and whoever wishes to make permanent improvements will not fail to plow deep!"—*Ellsworth.*

Effects of Crossing on the Constitution.—Those classes of the human race which preserve their blood free from mixture with strangers, while they have less variety in external appearance, and perhaps less variety in the scope of mental capacity, than those who cross and recross at pleasure, have more endurance in action, firmer attachments to purposes, and less desultory impetuosity. This is a physical truth. The explanation of it is difficult; but it may be illustrated and comprehended in some degree by those who study the animal fabric, and who are acquainted with the laws of animal economy. In brute animals—horses, sheep, and cattle—the mixture of different races is observed to change the qualities, to improve the beauty, and to enlarge the size; it diminishes the hardiness and the security of the physical health. In man, the mixture of different races improves beauty, augments the volume of the bodily organs, and even perhaps expands the sphere of intellect. It diminishes the power of enduring toil, and renders the habit more susceptible to the causes of disease. —*Jackson's Economy of Animals.*

To prevent Depredations by Hawks—One or more guinea-hens in a flock of fowls it is said will effectually prevent molestation from hawks.



PUMPS WORKING BY WATER WHEELS.

The above cut presents a sectional view of a small building covering a water wheel. To the shaft of the wheel a crank is attached by a shackle bar to the piston rod of the pump. The shaft on the opposite side of the wheel carries a grindstone; above, to the right, is a churn; at the left is a box for cleansing clothes, to which is attached a steam apparatus.—This cut represents the works of Winthrop Phelps, Esq., of Chatham, Columbia County, New York, put up in 1839 a description of which is given by Mr. Phelps. in the "Cultivator," vol. vii. No. 11, as follows:

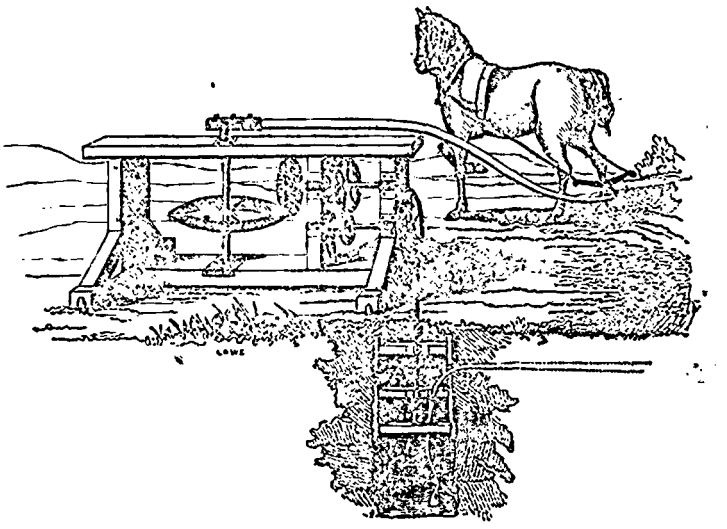
For the benefit of those farmers and others situated as I have been, without the conveniences of good water near my premises, I would state that in November 1839, I engaged Mr. D. L Farnam, of 247 Water street, New York, to put up an apparatus that should enable me to have water at my house, barn, &c. I had a spring of excellent water 400 feet from the kitchen, that discharged 30 feet lower than my house. I had in the meadow above the house, several small springs that discharged together a small but constant stream during the year. The plan was to use the water of the latter to force up the water from the spring to those places where I wanted it. For this purpose I put up a building 12 feet square, standing on a stone wall about 5 feet high. This building was placed about 200 feet from my house on the low ground between the spring and house. In this I put a water wheel 9 feet diameter and 12 inches wide. The water was brought along the side hills from the upper springs and, by a spout carried on to the wheel. An inch lead pipe was laid from the spring to a small double action pump, attached to the wheel shaft by a crank as seen in the cut, thence leading under ground to a reservoir adjoining my milk house, within 20 feet of my kitchen door; from this reservoir a pipe leads to the kitchen, and discharges into the sink by a cock. From the reservoir I convey water on to the shelves in my milk room. they having a raised edge so that at pleasure I have water running one inch deep on each shelf, to keep the milk cool in warm weather Likewise from the reservoir I have a half inch pipe laid to my barn yards, 15 rods farther, and a pipe running to the hog pen, keeping a constant supply. Attached to the water wheel is a grindstone, and machinery to do our churning, which we have used through the season. The apparatus marked A is the plan I intended

for pounding clothes.—With the addition of a steamer it would save much labor to the women, and the same steamer might be used to steam hay, potatoes, corn, &c., for cattle and hogs. My water works continued to work well all last winter, without in the least being affected by the frost. The quantity of water thrown up is about six gallons per minute, and has required since put in operation, but a few moments' attention once a month, to tighten the packing around the piston rod, and oiling. To those situated as to water similar to myself, I would say that the cost of the water works is a small consideration compared to the advantages. I shall be happy to give any information that may be wanted, or show my works to any disposed to call and examine them.

WINTHROP PHELPS.

Chatham Centre,
Columbia Co., N. Y., Sept. 23.

—*Far. and Mech.*



HORSE POWER TO RAISE WATER.

The above represents one of Mr. Farnam's methods of raising water. The pamphlet from which we make the extract, and which is published at the office of the Farmer and Mechanic, and sold at 37½ cents, is beautifully executed and numerously embellished.

Here is a plan of one now in use for raising water 137 feet, to which is attached a pump, as described (page 16) under the head of lift pumps, for drawing water from wells 80 to 180 feet deep.

Another plan of a horse power is here given, which may be preferable in many situations. The drawing, however, is incorrect in one particular, the balance wheel, which is represented outside of the frame, ought to be between the posts, and the rod to connect the pump with the machine ought to be attached to the crank on the upper shaft, because the speed of the balance wheel on the shaft, as represented, would not be sufficient unless it was very large. The circle for a horse to travel in, to work a power to advantage, ought to be 25 feet diameter, and a horse will pass around on an average about three times a minute. In order to get 25 revolutions to the crank, the large wheel must be eight times the diameter of the small one, or 8 feet and 1 foot, if of cast iron. But if made on the plan represented in cut, Fig. 16, the large wheel may be made of wood with iron segments. In that case it would be well to make the large wheel 12 feet and the pinion 18 inches, as the friction is less as the pinion is larger.—*Far. and Mech.*

Newmarket Agricultural Club.

Question for discussion.—What breed of horses is best adapted to the wants of the country?

P. Pearson.—Some of the entire horses that have been imported into this country within the past few years to cross upon our mares, are too heavy, and others are as much too light, for the general wants of the country. A horse possessing rather a light bone with good action, is preferable to the very heavy bored draught horse. It is common to hear stated that the horses in this section of country are not so good now as they were 15 or 20 years since. This, to a certain extent may be true, but it should be remembered that at that period the country was new, and oxen were employed to do heavy work upon the farm, and the horses were favored so much that they could not otherwise but look well. At the period alluded to, six barrels of flour, or 25 bushels of wheat were considered a heavy load for a span of horses, upon the best winter roads. But now the case is altered; oxen are entirely out of use, and horses, and even brood-mares are made to perform a greater amount of labour and hardship than the constitution of those animals are capable of enduring; hence the degeneracy so much spoken of. The blood-horses in England and the Southern States are large and well proportioned, and if some of the large and best specimens were imported into this province and crossed upon our large mares, they would get a race of animals that would bring a high price in the market, and would in every point of view be adapted to the wants of the country.

Eli Irwin.—The subject under discussion is one of vast importance to the country. Not many years since this section of the Home District was noted from one end of Canada to the other for its valuable race of horses; and by the introduction of the small race of English blood-horses from England, to cross upon our large Pennsylvania mares, the whole race is considerably run down and reduced in value. It is an acknowledged fact, by every one at all acquainted with the subject, that the present half-bred horses owned in the district will not endure the service that the remnant of the old-fashioned race is capable of enduring. He had noticed that almost every blood horse at the age of seven or eight years was more or less blemished; and he felt confident that the cause may safely be attributed to the smallness of their bone and the high metal or spirits which distinguishes them from all other breeds of horses. There is now a great demand for roadsters. A cross of the largest sized French or Lower Canadian horses, upon our best mares, would produce a breed that would be adapted for all useful purposes. The Lower Canadian horses are great travellers, and will cost less to keep in good condition, and are more ready than any other race known in this country. He had considered much upon this subject, and every additional information that he obtained only strengthened the conviction that a change in the policy of breeding or improving our race of horses, was necessary to ensure success. He once attended the race in Virginia, and saw thorough bred horses upon the course, that stood as high as sixteen hands. In that country the blood-horses are large when compared with the pigmy race found in Canada; and notwithstanding their size, the farmers of that state are not so unwise as to put their mares to a blood-horse to breed horses for agricultural purposes.

B. Pearson.—The bone of the blood-horse is supposed to be much stronger than that of any other race of horses. They combine action with strength, and are capable of taking a heavy load over the ground, and are adapted for the carriage, saddle, or plough; and a horse possessing so many excellent qualities, besides the high value which they bring in the market undoubtedly deserves attention at the hands of the stock-breeder. He concurred in the opinion expressed by other members of the club, that only the largest description of blood-horses should be encouraged in the country.

Joseph Willson was of opinion that the character of the horses in this neighborhood had been seriously injured by injudicious breeding. The best and largest sized Lower Canadian horses, if crossed upon our mares, would get a stock that would be hardy in the extreme, and for all practical purposes, could not be excelled. He had travelled much through the country for the purpose of purchasing horses, and had met with an entire horse that was got by a thorough-bred Canadian horse and a Pennsylvania mare, and in his opinion a better animal could not be found for the road or for general agricultural purposes. Horses of a very large size, as well as those of a small size, are objectionable for the farm, but these two objections could be cancelled if proper attention were paid in breeding from the Lower Canadian horses.

Alfred Stephens.—All that had been said in favor of the Lower Canadian French horses is strictly correct. A farmer requires a breed of horses that is capable of ploughing, and at the same time adapted to the roads, and in fact, suitable for all purposes. In this country long journeyings are often made with horses, both under the saddle and in harness; and no breed of horses can perform these various degrees of servitude, upon the same provender and attention, as well as the thorough or even half-bred Canadians.

J. Gamble was of opinion that the race of blood horses that had been imported into this country had done great damage to the stock of horses. He agreed with the speakers that preceded him, in opinion, that the Lower Canadian horses crossed upon the large Pennsylvania mares, would produce a most valuable description of stock. The expense of keeping horses is a heavy item to a farmer who has a large stock; and it is a fact that few will question, that no breed of horses will perform the same amount of labour upon a given amount of provender, as will the French Canadians.

Edward Randall.—The English draught horse has proved itself to be capable of getting a most superior stock of horses for all work, when crossed upon the mares owned in this district. The light English draft or carriage horse, such as are of the class known by Cleveland Boys and others possessing a dash of blood, are good roadsters, and will bring a higher value in the market, for pleasure or in the carriage, than any other description of horses. It is no more trouble, and costs but a trifle more to raise a good horse than a bad one. A well-proportioned five years old horse possessing good action, is worth in the Toronto market £30, and the common stock owned by the farmers in general is not worth more than half that sum per head, which shows pretty clearly, that the question is one that is not sufficiently well understood by the stock breeder. He was opposed to blood horses, or at least to such as have been introduced into this part of the province; the larger the horse the better, if he only possess a good constitution and action, and is well proportioned.

G. Playter was of opinion that many members of the club were not correct in attributing the degeneracy of our stock of horses to the introduction solely of the blood-horse. Keeping entire horses has been a profitable business with a few: and when this fact became known, every farmer who had a colt that happened to be a little better than the generality of those in the neighborhood, was silly enough to keep him up for mares. In fact, this false notion has become so general, that almost every farmer has an entire horse, and hence the degeneracy so much adverted to. There is little or no encouragement given to a well-bred horse, and so long as this is the case, it is not to be supposed that the stock of horses will improve in character or value. He did not set a high value upon Canadian French horses. With proper encouragement, a description of blood horse might be imported into this District, that would improve the stock to a greater degree than any other possibly could.

For want of space we are obliged to defer publishing speeches made by P. Pearson, Esq., M. P. Empey, Esq., W. M'Leod, and the Secretary.

Old Bread the Best.—It has been found that baked bread on the first day produces from seventy-one to seventy nine per cent. of nutritive matter, while that five days old yields from eighty-one to eighty-two per cent. New bread loses the five per cent. of its weight by evaporation in cooling. Aside from the advantages of stale bread in its nutritive matter, it is more wholesome, more easily digested, has more taste and is sweeter; while new bread lies heavily in the stomach and is of difficult digestion. With these advantages it is strange that most people reject stale bread or prefer the new. It has been found that, on feeding the poor, very stale bread mixed with soup is far more satisfying than any other they can obtain. Thus the laboring classes consume one-eighth more bread than would be necessary if stale bread were used, or a family that consumed six pounds of bread per day would expend, at the present price, some ten dollars more a year by eating new, than by eating stale bread, with all the other disadvantages we have mentioned.

Bottled Ginger Beer.—Take the bottles and nearly fill them with lear water, then add white sugar, 2 drachms, bicarbonate of soda, 35 grains; tincture or essence of ginger, 2 drachms; sulphuric acid, 10 or 12 drops. Three to six drops of essence of lemon will improve this article. The acid must be added last, and the bottles immediately corked and wired.

Mechanics' Department.

On the Mechanic Powers.

Copied (with abridgements) from Lardner's Popular Lectures on Science and Art. By the express permission of the Publishers—Messrs. Greely and M'Elrath, N. Y.

A Machine is an instrument by which force or motion may be transmitted and modified as to its quantity and direction.

In the application of a machine there are three things to be considered. 1. The force or resistance which is required to be sustained, opposed or overcome. 2. The force which is used to sustain, support or overcome that resistance. 3. The machine itself, by which the effect of this latter force is transmitted to the former. Of whatever nature be the force or the resistance which is to be sustained or overcome, it is technically called the *weight*, since, whatever it be, a weight of equivalent effect may always be found. The force which is employed to sustain or overcome it, is technically called the *power*.

When a machine is used dynamically a very small power may elevate a very great weight; but, in so doing, whatever be the machine used, the total expenditure of power in raising the weight through any height, is never less than that which would be expended if the power were immediately applied to the weight without the intervention of any machine. This circumstance arises from a universal property of machines, by which the velocity of the weight is always less than that of the power, in exactly the same proportion as the power itself is less than the weight; so that, when a certain power is applied to elevate a weight, the rate at which the elevation is effected is always slow in the same proportion as the weight is great.

The most simple species of machines are those which are commonly denominated the *machine powers*. These have been differently enumerated by different writers. If, however, the object be to arrange in distinct classes, and in the smallest possible number of them, those machines which are alike in principle, the mechanic powers may be reduced to three:—

1. The lever.
2. The cord.
3. The inclined plane.

To one or other of these classes all simple machines whatever may be reduced, and all complex machines may be resolved into simple elements which come under them.

The first class includes every machine which is composed of a solid body revolving on a fixed axis, although the name *lever* has been commonly confined to cases where the machine affects certain particular forms. The power and weight are always supposed to be applied in directions at right angles to the axis. If lines be drawn from the axis perpendicular to the directions of power and weight, equilibrium will subsist, provided the power, multiplied by the perpendicular distance of its direction from the axis. This is a principle to which we shall have occasion to refer in explaining the various machines of this class.

If the moment of the power be greater than that of the weight, the effect of the power will prevail over that of the weight, and elevate it; but if, on the other hand, the moment of the power be less than that of the weight, the power will be insufficient to support the weight, and will allow it to fall.

The second class of simple machines includes all those cases in which force is transmitted by means of flexible threads, ropes or chains. The principle by which the effects of these machines are estimated is, that the tension throughout the whole length of the same cord, provided it be perfectly flexible, and free from the effects of friction, must be the same. Thus, if a force acting at one end be balanced by a force acting at the other end, however the cord may be bent, or whatever course it may be compelled to take, by any causes which may affect it between its ends, these forces must be equal, provided the cord be free to move over any obstacle which may defect it.

Within this class of machines are included all the various forms of *pulleys*.

The third class of simple machines includes all those cases in which the weight or resistance is supported or moved on a hard surface inclined to the vertical direction.

The effects of such machines are estimated by resolving the whole of the body into two elements by the parallelogram of forces. One of these elements is perpendicular to the surface, and supported by its resistance; the other is parallel to the surface, and supported by the power. The proportion, therefore, of the power to the weight will always depend on the obliquity of the surface to the direction of the weight.

Under this class of machines come the inclined plane, commonly so called, the wedge, the screw, and various others.

THE LEVER.

An inflexible, straight bar, turning on an axis, is commonly called a *lever*. The *arms* of the lever are those parts of the bar which extends on each side of the axis.

The axis is called the *fulcrum* or *prop*.

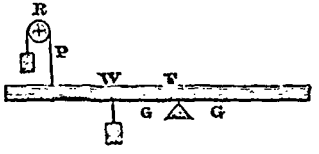
Levers are commonly divided into three kinds, according to the relative positions of the power, the weight and the fulcrum.

In a lever of the first kind, as in fig. 1, the fulcrum is between the power and the weight.

Fig. 1.

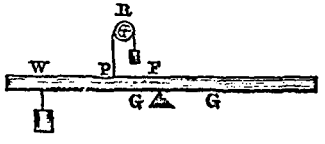
In a lever of the second kind, as in fig. 2, the weight is between the fulcrum and power.

Fig. 2.



In a lever of the third kind, as in fig. 3, the power is between the fulcrum and weight.

Fig. 3.



In all these cases the power will sustain the weight in equilibrium, provided its moment be edual to that of the weight. But the moment of power is, in this case, equal to the product obtained by multiplying the power by its distance from the fulcrum, and that of the weight, by multiplying the weight by its distance from the fulcrum. Thus, if the number of ounces in P, being multiplied by the number of inches in P F, be equal to the number of ounces in W, multiplied by the number of inches in W F, equillibrium will be established. It is evident from this, that as the distance of the power from the fulcrum increases in comparison to the distance of the weight from the fulcrum, in the same degree exactl will the proportion of the power to the weight diminish. In other words, the proportion of the power to the weight will be always the same as that of their distances from the fulcrum taken in a reverse order.

In cases where a small power is required to sustain or elevate a great weight, it will therefore be necessary either to remove the power to a great distance from the fulcrum, or to bring the weight near it.

Numerous examples of levers of the first kind may be given. A crowbar, applied to elevate a stone or other weight, is an instance. The fulcrum is another stone placed near that which is to be raised, and the power is the hand placed at the other end of the bar.

A handspike is a similar example.

Scissors, shears, nippers, pincers, and other similar instruments, are composed of two levers of the first kind; the fulcrum being the joint or pivot, and the weight the resistance of the substance to be cut or seized; the power being the fingers applied at the other end of the levers.

The brake of a pump is a lever of the first kind; the pump-rods and piston being the weight to be raised.

Examples of levers of the second kind, though not so frequent as those just mentioned, are not uncommon.

An oar is a lever of the second kind; the reaction of the water against the blade is the fulcrum; the boat is the weight, and the hand of the boatman the power.

The rudder of a ship or boat is an example of this kind of lever, and explained in a similar way.

A wheelbarrow is a lever of the second kind; the fulcrum being the point at which the wheel presses on the ground, and the weight being that of the barrow and its loads, collected at their centre of gravity.

The same observation may be applied to all two-wheel-carriages, which are partly sustained *by the animal which draws them.*

In a lever of the third kind, the weight being more distant from the fulcrum than the power, must be proportionably less than it. In this instrument, therefore, the power acts upon the weight to a mechanical disadvantage, inasmuch as a greater power is necessary to support or move the weight than would be required if the power were immediately applied to the weight, without the intervention of a machine. We

shall, however, hereafter show that the advantage which is lost in force is gained in despatch, and that, in proportion as the weight is less than the power which moves it, so will the speed of its motion be greater than that of the power.

Hence a lever of the third kind is only used in cases where the exertion of great power in a consideration subordinate to those of rapidity and despatch

The most striking example of levers of the third kind is found in the animal economy. The limbs of animals are generally levers of this description The socket of the bone is the fulcrum; a strong muscle attached to the bone near the socket is the power, and the weight of the limb, together with whatever resistance is opposed to its motion, is the weight. A slight contraction of the muscle in this case gives a considerable motion to the limb. this effect is particularly conspicuous in the motion of the arms and legs in the human body, a very inconsidera e contraction of the muscles at the shoulders and hips giving the sweep to the limbs from which the body derives so much activity.

The treddle of the turning-lathe is a lever of the third kind. The hinge which attaches it to the floor is the fulcrum, the foot applied to it near the hinge is the power, and the crank upon the axis of the fly-wheel, with which its extremity is connected, is the weight.

Tongs are levers of this kind, as also the shears used in shearing sheep. In these cases, the power is the hand placed immediately below the fulcrum, or point where the two levers are connected.

When the power is said to support the weight by means of a lever, or any other machine, it is only meant that the power keeps the machine in equilibrium, and thereby enables it to sustain the weight. It is necessasy to attend to this distinction, to remove the difficulty which may arise from the paradox of a small power sustaining a great weight.

In lever a of the first kind, the fulcrum F, fig. 1. or axis, sustains the united forces of the power and weight

In a lever of the second kind, if the power be supposed to act upon a wheel, R, fig 2, the fulcrum F sustains a pressure equal to the difference between the power and weight, and the axis of the wheel R sustains a pressure equal to twice the power; so that twice the pressure on F and R are equivalent to the united forces of the power and weight.

In a lever of the third kind, similar observations are applicable. The wheel R, fig. 3, sustains a pressure equal to twice the power, and the fulcrum F sustains a pressure equal to the difference between the power and weight.

These facts may be experimentally established by attaching a string to the lever immediately over the fulcrum, and suspending the lever by that string from the arm of a balance. The counterpoising weight, when the fulcrum is removed, will, in the first case, be equal to the sum of the weight and power, and in the last two cases equal to their difference.

Sketch of the Corn Laws.

A short summary of the history of the Corn Laws cannot fail at this moment to prove interesting The first act for regulating the rates of duty, was 13th Geo III., c 18 Previous to the passing of that act, the statutes or orders in Council on the subject were rather dictated by circumstances, such as prosperous and deficient harvests, than any intelligible and settled principles Usually, a greater quantity of corn was grown than was required for our own consumption When there was a scarcity the exportation of all kinds of grain was prohibited, and even bounties offered for importations from abroad. When, on the other hand, there was a glut in the country, bounties were offered for its exportation. From an early period, certainly as early as the reign of Henry VI., the principle of protection to home-grown corn, has been invariably maintained by our legislature. In the reign of James I., the importation of foreign wheat was prohibited when the price in the English market was below 32s. per quarter; and in the reign of Charles II., when the commerce of England became more extended, it seems a complete sliding scale was established, the duty on foreign wheat being 16s., when the price here was 53s per quarter or under; 8s., when between 53s. and 80s.; and when above the last price all imports to be allowed free. The same line of policy may be traced pervading the whole of the succeeding changes in the laws until 1773, when they assumed a more constant and regular shape. By the act of 13 Geo. III., the duty was 24s. 3d., when wheat was under 50s. per quarter, and when the price was at or above 54s. the duty was 6d. These rates seemed to have been fixed with a view of keeping the price of wheat as nearly as possible at 50s. per quarter—which, regarding the greater value of

money in those days, would probably be about equal to 65s. the quarter at the present time. Shortly after the commencement of the last great war the pivot was raised, and when the price was below 63s. per quarter, the duty on foreign wheat was 50s. 3d., falling to 7½d. when the price reached 66s. These duties were advanced soon afterwards, and in 1815, Mr. Robinson succeeded in passing an act absolutely prohibiting the importation of foreign wheat until the price in our markets had been, for three consecutive months, above 80s. per quarter. Another law was passed in 1822, prohibiting the importation of foreign wheat when the prices were at or under 70s. per quarter, admitting it when between 70s. and 80s at a duty of 12s., when between 80s. and 85s., at a duty of [illegible], and when above 85s. at a duty of 1s. This law, however, never came into effect, as it was provided that its operation should be delayed until wheat rose above 80s. per quarter, which did not occur before another alteration took place. Early in 1827, Mr. Canning brought forward a series of resolutions for the purpose of forming them into a corn law. He proposed a sliding scale, nearly similar to the one afterwards carried by the Wellington cabinet, and which remained in force until Sir Robert Peel's bill in 1842, which now regulates the admission of foreign corn.—*English Paper.*

Surface Drainage.—The water resulting from the spring thaws, serves, in its course, to point out to the farmer the rise and fall of his land, and consequently the most natural course for laying drains. If, then, your land has not already been put under a thorough system of drainage, it were well to act upon the present suggestion, by running a deep furrow, with the plough, in the directions thus shown, to afford the readiest passage for surface water. Should time permit, the furrows may be deepened with the spade, they will then prove efficient as open drains, and when the drier season of the summer months is at hand, may be deepened and converted into any one of the various covered drains as may seem best, cheapest, or most feasible, in your own judgment. A little work each season, if well directed, will soon put your own farm under thorough drainage.

Backbiting.—The meanest of all *biting* animals is that species known by the name of *backbiter*. Set it down for a fact that whenever you see one you see a *coward*. One who dares not look you in the face and calmly tell you that he has aught against you, or that you have in his opinion done him wrong. An honest, generous man, will go to you and commune with you quietly and calmly, if he either has or fancies that he has received injury from you. But one of your jealous and narrow minded persons, will never go to the right person to unburthen himself of any trouble of the kind. Every other person in christendom must hear the story, with all its variations, but the very one most interested. Hence nine-tenths of the mischief, the tattling, and scandal, which disturbs almost every neighborhood. This talking about instead of to the person in question. For our part we like a *face-biter* better than a *backbiter*. There is some chance to "fend off" if you are abused.

The Value of Manure.—The value of animal manure annually applied to the crops in England, at current prices, surpasses in value the whole amount of its foreign commerce.

Beautiful Thought.—There is something touchingly beautiful in words when rightly put together. They leave an impression that can never be effaced. We have read again and again, till it is familiar to us as the face of a friend, the following splendid thought, and every time we see it, 'tis fresh and beautiful as ever. The author we know not, but he deserves to be immortalized for his meed alone:—

"How beautiful falls
From human lips that blessed word—forgive;
Forgiveness—'tis the attributes of God—
The sound which openeth heaven: renews again
On earth lost Eden's faded bloom, and flings
Hope's halcyon, hato o'er the waste of life.
Thrice happy he whose heart has been so schooled
In the meek lessons of humanity,
That he can give it utterance; it imparts
Celestial grandeur to the human soul,
And maketh him an angel."

Let not any one say he cannot govern his passions, or hinder them from breaking out and carrying him into action, for what he can do before a prince or great man, he can do alone, or in the presence of God if he will.—*Locke.*

Veterinary Department.

Swelled Legs.

At the request of a friend, who says he can testify to its correctness from his own experience, we insert the following from Clater's "Diseases of Horses," by Skinner. The difficulty alluded to is a very common one in this country:

This is a very frequent and most troublesome complaint The cause is often exceedingly difficult to be detected, and when discovered, is often so complicated, and the disease becomes so inveterate, that the practitioner has little prospect of completely eradicating it.

The fore legs occasionally take on a disposition to enlarge; but it is oftener, and running to a greater extent, found in the hinder ones. A horse is sometimes left in perfect health at night, and is found, on the next morning, with one or both hind legs enormously enlarged. The skin is tense and glistening, it is hot and exceedingly tender; the horse cannot bear to have it touched; he catches up his leg suddenly, the limb moves as if the lower part of it had no joint; and, in the convulsive effort to get it out of reach, the animal not unfrequently loses his balance, and falls, or threatens to fall, on the examiner.

This complaint, which is known by the name of *weed* in many parts of the country, is evidently sudden and very intense inflammation of the absorbents of the leg. A considerable degree of general fever often speedily follows; the pulse quickens; the mouth is hot, and the horse is entirely off his feed. Young horses are peculiarly subject to this, especially if, after being taken from grass, they are too highly fed, and suffered to stand idle in the stable. Sometimes in older horses, as well as in the younger ones, it is the sudden shifting of inflammation from some other part, as the lungs or the intestines.

This apparently formidable species of swelled leg readily yields to proper medical treatment. The leg should be frequently fomented with warm water; from four to six quarts of blood should be taken away, and a good dose of physic administered, which should be followed by a diuretic medicine. The swelling, however, having subsided, and the tenderness having gone off, the legs should be well rubbed, and then lightly bandaged; gentle exercise should be used and alterative medicine administered; for the over-distended vessels must necessarily be weakened, and the disease is apt to return.

If an old horse, or a young one that has been over-worked, is suffered to stand a day or two in the stable, his legs often fill, but without pain or heat The legs of some horses regularly swell every night. This is connected with debility, either general or of the part. The case must be considered very attentively before any measures are adopted The horse may be too highly kept, but his legs are suffering from occasional overwork: then mild physic, mild diuretics, regular exercise, hand-rubbing, and bandages around the leg, will be the proper means to be adopted; decreasing a little the quantity of food, and giving mashes and green meat, if the season will allow it. The habitual use of the bandage is an excellent thing in these cases, and has often gradually strengthened the vessels of the part, and rendered the leg as fine as ever.

Frequently an enlargement of the leg is connected with general debility. The horse has been cruelly over-worked—or he is recovering from serious illness—or he has been half starved, and he is generally weak, and these weaker and injured parts yield. A very mild dose of physic will sometimes be indicated even here, and especially if there is any foulness about the horse. A daily mash should be given, a fair allowance of corn, green meat if it can be procured; gentle and regular exercise should be used, and small doses of cantharides, varying from three to five or six grains, and a few tonic diuretic balls.—Every thing should be done to increase the strength of the system generally, and the vessels of the extremities will soon regain their proper tone.

The course of treatment will be particularly proper if the legs swell at the spring and fall of the year. The horse is then shedding his coat, a process which is always attended with some debility. The tonic diuretic balls will here be exceedingly useful.

In every case, however, of swelled legs, a great deal more depends upon management than on medicine; and there is nothing so likely to be injurious as the frequent use of diuretics, of which many grooms are so fond. They are fruitful sources of debility (the worst cause of swelled legs) they first weaken the urinary organs, and loss of tone in the system generally too soon succeeds."

If it be possible as much as lieth in you live peaceably with all men.

The Canadian Agricultural Reader.

We have lately been presented with a copy of this work, and have carefully examined its varied contents, with a view of coming at a correct estimate of its value for the use of Common Schools in the rural districts, and without favor or reward, are prepared to pronounce it a most suitable book for the purpose designed, and should, without delay, be introduced into every School District in the Province.

The Agricultural Reader contains 300 pages, and is printed with new type upon good paper, and the workmanship reflects much credit upon its publisher, Mr. John Simpson, of the *Niagara Chronicle Office*. The compilers of the work are unknown to us; but one thing appears certain, that from the judicious manner in which it is arranged, and the mass of practical information embodied in its columns, they are intimately acquainted with the wants of the country in this particular. There is scarcely a point upon practical agriculture but what is ably discussed and clearly illustrated in this book: and in our judgment it is only the first of a series of class books of this description, which, if widely introduced and read by the junior farmers, will add lustre to the agricultural prosperity of this rising province. The day, we trust, is not far distant, when Libraries will be formed in each School District in Canada, for the especial benefit of the young; and by encouraging the sale and introduction of such works as the *Canadian Agricultural Reader*, in our Common Schools, a taste for useful reading will thus be created. Every promoter of of agricultural improvement should lose no time in ordering a copy, and by doing so, it will be found that all we have said in its favor is strictly correct.

A Lacker to give Tin the Appearance of Brass.—Melt, in separate vessels, two ounces of gum lac and eight ounces of amber, mix them well together, and add half a pound of drying linseed oil. Digest in a pint vial a little saffron in half a pint of oil of turpentine, strain this liquor, and add to it some gum tragacanth and annotto, finely powered. Mix this last compound with the former, and shake them well. It is by this varnish that leather is made to appear as if gilded, after it has been covered with silver leaf.

Suspension Carriage Wheel.—Mr. Michael Munson, of Tomkinsville, N. Y., has invented a new wheel of rather novel construction, consisting of a metallic rim attached and screwed to a hub in the centre by a series of iron wires, each having a screw at both ends, the thread turning in opposite directions, by means of which they are screwed into the hub and rim by the same movement. The wheel can be easily constructed, is cheap, and from its peculiar construction, promises to be durable. The Scientific Mechanic promises that a wheel of this description, with iron wires one fourth of an inch in diameter, will sustain a weight of 15,000 lbs. applied to the axle. (?) Mr. M. intends to secure his improvement by letters patent.—*N. Y. Farmer.*

Celebrated French Polish.—To one pint of spirits of wine add 1½ ounce of shell-lac, ¼ ounce of gum copal, and ¼ ounce of gum arabic; all the gums to be bruised. Keep the vessel into which these are put well corked, and let it remain in a warm place for two or three days; then pour off the clear part into another bottle. Apply the polish to the end of a rubber, made by rolling up a piece of firm muslin very firmly, fastened to a stick or skewer, and covered with a firm cotton cloth, pefectly free from lint or dust, and just moistened with a very small quantity of cold-drawn linseed oil; use the rubber briskly, with a moderate pressure in a circular direction, over a space of about a square foot at a time, and replenish both as the wood dries. Go over the whole surface in this manner, and give three or four coats according to the grain of the wood. The operation must be performed in a place of moderate warmth. Gradually clear off the oil from the surface with the polish, and sometimes turn the rag, otherwise the brightness will not be perfect.

This polish imparts a superior brilliancy and clearness, is not easily scratched, and is not affected by any moderate degree of heat. It is not injured by soap, and therefore can readily be cleaned by washing with soap and water.—*Mechanics' Note Book.*

To Stain Musical Instruments.—Crimson.—Boil one pound of ground Brazil-wood in three quarts of water for an hour; strain it, and add half an ounce of cochineal; boil it again for half an hour gently, and it will be fit for use.

Purple.—Boil a pound of chip logwood in three quarts of water for an hour; then add four ounces of alum.

Sievier's Water-proof Cloth.—Indian rubber, turpentine to dissolve. With a brush apply it to the cloth once or twice, and afterwards apply a similar solution mixed with litharge or sugar of lead, or other drying material, then sprinkle wool-floss upon the varnish, press, dry, and apply a brush to lay the nap.

Water-proof Varnish for Boots, Shoes, &c.—Linseed oil, 8 parts; boiled oil, 10 parts; suet, 8 parts; beeswax, 8 parts. Mix with heat and apply hot.

Disobedience to Parents.—A young man was lately sentenced to the South Carolina penitentiary for four years. When he was about to be sentenced, he stated publicly that his downward course began in disobedience to his parents; that he thought he knew as much of the world as his father did, and needed not his aid or advice; but that as soon as he turned his back upon his home, then temptations came around him like a drove of hyenas, and hurried him on to ruin. There is no place so safe and happy as a good home.

Activity.—"I have lived," said Dr. Adam Clarke, "to know that the great secret of human happiness is this:—Never suffer your energies to stagnate. The old adage of 'too many irons in the fire,' conveys an abominable lie. You cannot have too many—poker, tongs, and all:—keep them a-going."

One glance at a room is enough to convince us whether it be under the care of an orderly person. I have frequently known the kitchen of a servant more orderly than the drawing-room of her mistress; and the dormitory of an old woman in the alms-house kept far more cleanly and methodical than the bed-chamber of a young lady.

Habits of cleanliness are beyond value, in person, in dress, in work, in books, in furniture, and in all things.

Laziness.—Laziness grows on people; it begins in cobwebs, and ends in iron chains. The more laziness a man has, the more he is able to accomplish; for he learns to economise his time.—*Hale.*

Perpetual Ink, for Tombstones, Marble, &c.—Pitch, 11 parts; lampblack, 1 part; turpentine sufficient. Mix, with heat.

A Receipt for a Wife.

As much of beauty as preserves affection—
As much of cheerfulness as spurns dejection—
Of modest diffidence, as claims protection;
A docile mind, subservient to correction.
Yet stored with sense, with reason, and reflection;
And every passion held in due subjection;
Just faults enough to keep her from perfection;
Find this, my friend, and then make your selection.

Cherry Trees.—These trees, from their beautiful figure, and from the majestic size they acquire, become at once desirable both for their fruit and as shade trees, and are also (when under proper cultivation) the pride of the farmer; but when neglected they are apt to "run out" and decay, leaving by no means a pleasant sight to either proprietor or passer by. As a general thing, the cherry fruit is borne upon spurs proceeding from wood two or three years old, therefore the principle of pruning the apple tree. Of its main and collateral branches, it is to be remarked that being stiffer than those of the apple they are not so liable to bear down upon each as riders, in consequence of which the pruning of these (cherry) trees is mostly reduced to removing ingrowing branches, and old bearing twigs and spurs. After once putting the tree in good order, the minutia of removing old twigs and spurs to keep up a supply of new bearing wood, is almost all that is required. When the tree ceases to throw out a due proportion of such wood annually it may be considered that its life is fast drawing to a close, and yet at this stage judicious pruning and culture will awaken it into a new state of life. There are some varieties of the cherry which bear fruit upon the extremities of last year's shoots, and some upon the lower ends of the like shoots—these properly belong to the next class, to be noticed another time, and their pruning will be governed by the direction then given.

Water-proof Glue.—1. Glue, 1 part; skimmed milk, 8 parts. Melt and evaporate in a water-bath to the consistence of strong glue.

2. Glue 12 parts, water sufficient to dissolve. Then add yellow resin, 3 parts, and when melted add turpentine 4 parts. Mix thoroughly together.

Plum Trees.—The plum fruit is borne upon spurs, consequently this tree is to be pruned in the same manner as directed for the apple. Plum trees are liable to become *gummy*, and also to be troubled with *black gum*. The former proceeds from the effects of a living worm, which in the course of time changes to an insect. The latter is a black, cancerous wart, and which spreads rapidly. Worms, similar to those before mentioned, are sometimes found in the black gum; yet their presence therein is purely accidental, and hence such cases are complications of the two evils. Remove all limbs infested with black gum, unless it should spoil the shape of your tree. In such case, cut the gum out, back to the quick and sound bark, but it must be thoroughly done, for, if you leave a particle of spongy or speckled bark, you might as well leave all. The wound is no worse than that occasioned by removing a limb. It will heal readily, if cut far enough back. In regard to the worm, cut him out with a good narrow-bladed knife, (our own pen-sharpener laughs—well, well, it has dislodged many a one,) cut back to the quick, as above mentioned. It will frequently happen that the amount of dead bark to be removed is great, but still better removed than remaining. The worms will inhabit the tree, in line, from top to bottom, and are apt to girdle it at the root; yet the knife, governed by patience and perseverance, will effectually remove the difficulty. Score, or slit the bark, up and down, as this tree is very liable to become hide-bound. The latter difficulty arises from a neglect of both the soil and tree.

Benefit of Pressing the Earth.—A correspondent of the *Michigan Farmer* writes.—A few years since, I was employed to make a garden. The soil was a gravelly loam. Among the beds made, was an onion bed, about 8 feet by 20. The earth for this bed was carefully spaded up to the depth of 11 inches, and with a garden rake, made very mellow. The next day the seed was sown in drills, crosswise the bed, the drills being about seven inches apart. Immediately after sowing the seed, one half of the bed was stamped down as hard as the weight of a lad of 15 years of age, by pressing once or twice in a place, would make it. The other half was left light. Shortly after the onions were up, they were weeded and carefully thinned, so as to stand about three inches asunder in the drills all over the bed. The soil during their growth, was not moved any more than was incident to the pulling up of the weeds. With regard to the result, suffice it to say that the onions which grew on the part of the bed which was stamped, came up first, grew more thriftily, and were more than double the size and quantity than those on the other half—being in fact, *as good a yield as I ever saw.*"

Manures.—We are too close upon the period for action to lose much time in disquisitions respecting the various methods of treating the animal and vegetable matter accumulated upon the farm, and intended for manures. Those who are in favor of long manure, have but to haul it to the fields, while others, no doubt, who favor the short muck doctrines, will suffer the products of the barn-yard to remain until fall. It would be our pleasure to advise a medium course between these practices. That is, we would not ferment, but decay, or crumble manure, which is readily done by means of a little alkaline and earth. One bushel of finely and freshly slaked lime, ten bushels of common earth, and thirty of barn-yard manure, intimately mixed, dampened, and well trodden will soon heat, and crumble into a fine mealy mould. In the early spring, the manure is sufficiently damp, and therefore will not require wetting. There is no need of measurement—a good practical hand will readily judge the quadtities of lime, earth and manure. If well formed, the heap will be ready in from two to three weeks' time. The same thing can be done by means of ashes, using two bushels thereof in place of the one of lime. The heap must be damp and trodden down, or the ashes will not act. And again take the proportion of *ten bushels of earth, and thirty of manure*, mix them thoroughly together, and they undergo the same change, and will, no doubt, be ready in season for planting corn or potatoes. But if you try it, do not pretend to form the heaps by layers, it will only prove to be lost time.

To protect Sheep from the Gad Fly.—In August and September this fly lays its eggs in the nostrils of sheep, where they are hatched, and the worms crawl into the head, and frequently they eat through to the brain. In this way many sheep are destroyed. As a protection, smirch their noses with tar. Lay some tar in a trough or on a board, and strew fine salt on it: the sheep will finish the operation. The tar will protect them, and what they eat will promote their health.

Butter Making.

"The annexed article (says the *Providence Transcript*, from which we copy,) is from one of our most experienced and intellectual agriculturists. Of his successful practice we can attest, as we never saw finer butter, not even in Philadelphia, than we have eaten at his hospitable mansion."

Milk Apartments, &c.—The milk cellar should be deep, well ventilated, and dry: the bottom covered with stone flagging. Bricks will absorb milk, and other liquids that may fall upon them; and will soon contract mildew, the smell of which, like the odor of cheese, vegetable, fish, or foul air of any kind, will be imparted to the cream and butter. Over this cellar should stand the dairy room, with shelves to set milk upon in cool weather; the cellar is to be used during the extremes of heat and cold. The temperature of the milk apartment, if possible, should never be above 65° nor below 45°. Set kettles should not stand in the dairy-room; neither should cheese-making, nor cleansing milk-vessels be done there but in a convenient room near by.

Cream may be kept good much longer, if it be kept in a white oak vessel, with a tight cover, and a faucet or tap near the bottom, to draw off the milk when it settles, before the customary daily stirring. The quality of the butter is much improved by this management. If the milk be not drawn off, and it be churned with the cream, the butter will be longer in coming, and it will show specks of sour curd, taste like cheese, and will soon become rancid: Butter will come quickly at all seasons of the year, if the cream be of a temperature of from 60° to 70°; to this end, use hot water in winter, and ice in summer; *but never add either to the cream, in or out of the churn.*

Salt.—Pure salt chrystalizes into perfect cubes. All other forms of chrystalization found in common salt, arise from impurities; those of a needle shape in Liverpool bag, or blown salt, indicate the presence of lime, magnesia, &c. One great cause of the failure in making good butter, may be traced to the use of impure salt, Rock salt, and the large lumps of Turk's Island, washed, dried, and finely pulverised, are preferable to all other kinds, being highly preservative, and hardening the butter, so that it will be sooner ready to work over in warm weather. The Liverpool bag or blown salt, the Salina salt, in small bags from N. York, and the fine part of every kind of imported salt, contain a great portion of impurity. Less than one ounce of pure salt, is sufficient for a pound of butter; (many put in but half an ounce;) in all cases leave out sugar and saltpetre.

In the manufacture of cheese, a preference is sometimes given to Liverpool bag or blown salt. This contains salts of lime and magnesia, which attract moisture from the air, and have the desirable effect of softening the cheese; and the pungent bitter taste which they impart to it, is an improvement, in the estimation of some.

General Remarks.—The cream should not rise more than 36 hours; it should be sweet when taken off, and sweet when churned; yet there is a degree of maturity to be acquired by keeping

The kegs, for packing butter, should be made of white oak, bilging in the form of casks, for the more perfect exclusion of air, and convenience of transportation. If the butter is not to be sent to a warm climate, or a foreign market, let the bilging kegs have moveable covers, to accommodate inspection; they should be soaked in strong brine, made also of pure salt, in order that justice may be done to the purchasers in tare, and to save the butter from being spoiled for one or two inches deep all around, from its contact with dry wood. In case the wood is anything but white oak, there is danger of its giving an unpleasant taste to the whole. For the convenience of families, the size should vary from twenty-five to fifty pounds. A keg of butter is exposed to the air for a long time, while on broach in a small family, and the bottom, in consequence, becomes rancid.

The consumer will cheerfully pay an extra price for one hundred pounds of butter, packed in four kegs instead of one. No salt should be put on the sides, bottom, or between the layers. If the kegs are made with covers, put a cloth over the top, and cover that with pure fine salt. Keep a cloth wet with strong brine over the butter, while the keg is filling, to exclude the air. The practice of washing butter is not approved of in Europe: it destroys its fragrance and sweetness by dissolving the sugar of milk, which it is said is always present in good butter. It is practiced in Holland, when the article is designed for exportation to India; then the operation is usually performed with cold strong limpid brine made of pure salt, and pure water, water that has lime in it will not answer, as the lime is readily absorbed by the butter.

To exclude the air more effectually during the process of putting down, let a little melted sweet butter be run into the cavity, where the bottom, head and staves come together, then after each layer is completed, let the dairy-woman pass her finger round so as to press the butter hard and close against the side.

Eye Water.—I have for several years manufactured the following eye water, which has been applied to sore and weak eyes of most every description with unrivalled success. The application of this eye-water has restored those who were confined to dark rooms, and removed films from the eye; the medicine is simple and perfectly safe.

Lobelia or Indian tobacco, steeped in rum, forms the eye-water above referred to. Apply from 1 drop to 8 or 10 to the eye, or wetting the lids after closing the eyes, will be all that is necessary for weak eyes, morning and evening.

S. W. Jewett.

Weybridge, Vt.—*Bost. Cult.*

Prevention of Evil Habits.—Those who are in the power of evil habits must conquer them as they can; and conquered they must be, or neither wisdom nor happiness can be attained; but those who are not yet subject to their influence, may, by timely caution, preserve their freedom; they may effectually resolve to escape the tyrant, whom they will very vainly resolve to conquer.

Johnson.

Tallow and Train-Oil, as a Salve for Sheep.—In the Highland and Agricultural Society's Transactions for 1844, pages 271-273, an article appeared, recommending the use of tallow and train-oil, in equal parts, as a salve for sheep; and, in reference to that article, a gentleman in Argyleshire, skilled in the management of sheep, writes as follows, under date the 9th July last: "The salve I used for my sheep last autumn (viz. one half tallow to an equal proportion of train oil,) has in every respect, answered the description given of it in the Society's Transactions; and one of my tenents whom, with some persuasion, I got to smear thirty of his flock with that mixture, admits that they are in better condition than any of the others; that the wool will weigh as heavy as that done with tar and butter; and that he will get the price of white wool for it. The expense last year was a little greater than tar and butter, as I paid 1s. 6d. a pint for oil, and 6d. a pound for tallow; but this year I shall get oil for 1s. a pint, and if a quantity is required, a lower price.—*Edinburgh Jour. of Agriculture.*

Warm Feet.—Many of the colds people are said to catch commence at the feet. To keep these extremities constantly warm, therefore, is to effect an insurance against the almost interminable list of disorders which spring out of a "slight cold." Firstly, never be tightly shod. Boots or shoes, when they fit closely, press against the sole of the foot, and prevent the free circulation of the blood. When, on the contrary, they do not embrace the foot too tightly, the blood gets fair play, and the spaces left between the leather and the stocking are filled with a comfortable supply of warm air. The second rule is—never sit in damp shoes. It is often imagined that, unless they be positively wet, it is not necessary to change them while the feet are at rest. This is a fallacy; when the least dampness is absorbed into the sole, it is attracted further to the foot itself by its own heat, and thus perspiration is dangerously checked. Any person may prove this by trying the experiment of neglecting the rule, and his feet will become cold and damp after a few minutes, although, on taking off the shoe and examining it, it will appear quite dry.

All the rats and other vermin caught on the farm of the Rev. A Huxtable, at Sutton Waldron, are thrown into sulphuric acid, by which they are soon converted into manure as valuable as bone dust.

Mahogany Stain for Wood.—1. Linseed oil, 2 pounds; alkanet, 3 ounces. Heat them together and macerate for six hours, then add resin, 2 ounces; bees' wax 2 ounces. Boiled oil may be advantageously used instead of the linseed oil.

2. Brazil wood (ground); water sufficient; add a little alum and potash. Boil.

3. Logwood, 1 part; water, 8 parts. Make a decoction and apply it to the wood; when dry, give it two or three coats of the following varnish: Dragon's-blood, 1 part; spirits of wine, 20 parts. Mix.

Mahogany Varnish.—Dark gum anime, 32 parts; dark oil, 100 parts; litharge, 1 part; sugar of lead, 1 part. Boil until stringy, then add, when cooled a little, spirits of turpentine, 175 parts. Mix, and strain well.

Spring Wheat.

There are many sections where spring wheats are the only variety that can be cultivated to advantage. *In all places* where snow accumulates to a great depth, the success of winter wheat is rendered uncertain, owing to the liability of its being winter-killed. In such cases, the farmer resorts to spring wheat as the best substitute at command, and in many cases it gives a return, which, for both quantity and quality, leaves no cause for dissatisfaction. Spring wheat is said to contain a much larger proportion of gluten than winter wheat, and it has hence been inferred that bread made from the former is more nutritious. According to the analysis of Sir H. Davy:

	Gluten.	*Starch.*
100 parts of the best Sicillian wheat contained - -	21	75
100 parts of spring wheat of 1804	24	70
100 parts of good Eng. wheat, of 1803, - - - - -	19	77

Preparation of the soil, quantity of seed, and time of sowing.—Spring wheat is usually cultivated on land that has been occupied the preceding year by some hoed crop—corn, potatoes, &c. Where there is no danger of the attack of the fly, which works in the head, (the *Cecidomyia tritici,*) it is best to sow the crop as early as the state of the ground will admit, or as soon as it is fairly free from frost. One good plowing is sufficient—in fact we have known excellent crops produced by working the ground thoroughly with a cultivator harrow, the feet or teeth of which penetrate the soil and pulverize it to the depth of several inches. Manure is not usually applied for this crop. Long or unfermented manure tends to rust the straw. The seed is usually sown on the furrow, and well harrowed in. The quantity sown, per acre, is generally two bushels.

Varieties.—The kinds held in the greatest estimation in this country are the Black Sea, Italian, and the Tea wheat. Of these the Black Sea is the most hardy. This valuable variety was first brought into notice in this country by Payson Williams, Esq., of Fitchburg, Mass., some twenty-five years since, and it has now become widely disseminated. It is said to have been originally brought from the shores of the Black Sea, in Asia. The impression prevailed a few years since that the kind introduced by Mr. Williams had declined in productiveness, and the Society for this reason thought it advisable to make a new importation. After one or two failures, we believe they succeeded in obtaining a kind in some respects superior to that first introduced. It should be remarked, however, that in some sections, and under good management, the Black Sea wheat has considerably improved by cultivation in this country. We have often known upwards of 30 bushels grown per acre, and in a few instances we have well authenticated statements of 50 bushels per acre having been produced.—*Mb. Cult.*

ERRATA.—Page 105, second column, 14th line from the bottom, for *infirmities*, read *impurities*.