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THE

NEW-BRUNSWICK AGRICULTURIST.

JUNE, 1841.

Printed at the Brunswick Press, by William L. Avery, St. John, N. B.

THE

NEW-BRUNSWICK AGRICULTURIST.

SAINT JOHN, JUNE, 1841.

VOL. I. No. II.

Introductory Observations.

(Continued from page 4.)

Do the objections, which have been urged against the agricultural capabilities of these Provinces, originate in the errors of the objectors? Some of them do not; but the return of many intelligent farmers, after an absence sufficiently long to form an estimate of the superiorities of other countries, is a convincing proof that many of the objections are unjust: and we may support this reply to the question by a reference to the prosperity of those Farmers, who have devoted themselves with economy and industry to the cultivation of their farms. Few countries enjoy advantages, without some concomitant disadvantage—vivid descriptions are apt to produce impressions upon the imagination, similar to the pleasing landscape which the artist sketches upon paper; all that is attractive is presented to the eye, while the disagreeable realities are only known by actual experience. The bright colourings of other countries have been contrasted with our long winters; but the many blessings and advantages of our colonies are too seldom and not fairly reviewed, when opposed to the objectionable circumstances of other, and apparently more favoured climates. Ample experience has established undeniable evidence, that the hardy settler who entered the forest, with no other aids than his axe, his hands, and a determined heart, has converted the soil of the wilderness into a productive farm, and that many such individuals are now in the possession and enjoyment of comfortable competencies. There are few countries, in which Farmers live more comfortably, than in New-Brunswick and Nova Scotia. It is true, the winters are long, and the springs are late; but vegetation is exceedingly rapid, and many very abundant harvests have followed the most unpromising seed-times. Legislative enactments and protecting duties may assist our agricultural interests, but the Farmers must put their own shoulders to the wheel of improvement. The acquirement of scientific knowledge and the diffusion of it, is the groundwork of that improvement—it cannot take place without it. The apathy which has prevailed too generally in both Provinces, amounting to the actual rejection of information, is one of the greatest hindrances with which our colonial agriculture has to contend. It disheartens those who associate themselves, with the laudable desire of ameliorating the condition of it, and it perpetuates the errors of prejudice and usage. If our farmers desire to learn, they must incline to read. They must not meet the suggestions of science and the experience of other countries with the reply—"that such practices may do elsewhere—but we cut down the forest—we cleared away the stumps, and we know best what will answer in new countries." For with all this Provincial sufficiency, how many of

them pay proper attention to the formation of composts, the use of lime, the possession of improved agricultural implements, and to those rural arrangements, which imply good husbandry and economy of time in all countries, and are essentially requisite in this. Farming hitherto has been a *hand-to-mouth* business in our Province. The necessities of the husbandman have operated against his prosperity, and compelled him to dispose of his produce, as soon as it was saleable, to meet the pecuniary demands upon him, or to supply some want in his establishment. This hurried sale prevents him from commanding a price. In the fall, and early part of the winter, there is a general rush to the market, which becomes glutted. The seller must sell: the purchaser knows it, and puts his value upon the article. The farmer is at his mercy, and must pocket the loss; whereas, if his circumstances were such as to enable him to keep his produce, and choose his time for sale, his annual profits would be much greater. The prices of meat, potatoes, and hay, in the fall and spring of the year, illustrate the truth of this assertion. This necessity and forced sale may be considered one of the greatest drawbacks to the profits of agriculture. It is not referrible to climate, season, or soil, but to the straitened circumstances of the settlers, many of whom buy their farms, stock, and implements of husbandry, upon credit, and must sacrifice their produce in the manner already mentioned, to liquidate such debts. When these difficulties have been surmounted, the farmer feels his independence, and makes that independence the promoter of its own increase. His business no longer drives him with loss, but he drives it with advantage: he may go to the market with his produce, and like the merchant with his goods say, such is *my* price, and I must have it, or I will wait until I get it.

Some few years past, John Young, Esquire, the friend of agriculture in Nova Scotia, published his letters of Agricola, which were subsequently republished in a distinct volume. His praiseworthy exertions stimulated the farmers for a while, and although the excitement soon subsided, he nevertheless effected improvements, which continue as the memorials of his zeal. We have said that there was a prevailing indifference among too many of our farmers respecting *Book-knowledge*, and scientific agriculture. In justification of the remark we would ask, if our farmers, generally, possess Young's work, which was written for the Provinces, and how many copies of the excellent agricultural periodicals published in England and the United States are in circulation throughout the country. Young's work, although published in the Colonies, has been quoted by eminent agriculturists in Scotland, a country already rich in science, experience, and improvements. The diffusion of knowledge in its various departments for the instruction of all classes of people, constitutes an era of philanthropy in the literature of Great Britain. Books, magazines, pamphlets, and papers, suited to the general taste, comprehension, and pecuniary ability, have been published upon the principle of general improvement, and that knowledge is power. The agriculturist has not been forgotten, and the state of agriculture in Great Britain is a convincing proof that the seed has been sown upon a grateful soil—that the lesson has been received, and that information has given strength, which has been advantageously employed. In our Provinces we must adopt the same measures, if we wish to enjoy the same ad-

vantages, and a desire for knowledge, with the means of gratifying it, will be the greatest improvement, which our Provincial Societies can achieve. We have said that the exertions of Mr. Young produced good effects. These were soon succeeded by the establishment of Temperance Societies, and we have had ample opportunities of witnessing their beneficial influences on men and places. It must be confessed that much valuable time has been destroyed in taverns, and at the other haunts of intemperance, which has prostrated its victims in the country, as well as in the city, and has desolated the cottage, the barn, the barn-yard, and the farm. We know from observation, and from decided testimony, that the abuse of ardent spirits has injured the cause of agriculture, and although a great reformation has taken place in this respect in many places, attended by conspicuous advantages, still there is an extensive field open for further improvement.

The spirit of inquiry which was excited by Mr. Young, produced a visible alteration for the better in the agriculture of Nova Scotia; and many gentlemen in Windsor, Cornwallis, Annapolis, and other parts of the Province, pursued it upon scientific principles. But notwithstanding this partial amelioration from the influence of example upon others, the agriculture of the Provinces, as has been observed in the address at the formation of the society, is characterised by "deficiencies and inferiorities, which cannot be satisfactorily referred to the indigence of the people or to the unfavourableness of the climate." It wants science, system, experiments, improved implements of husbandry, the formation of societies, and a correspondence among the members of them. It wants the active zeal of the Farmer, encouragement from the townsman, and the fostering patronage of government. It wants excitement from enlightened, influential and experienced agriculturists, many of whom are to be found in both Provinces. The labours of the talented writer already mentioned, have cleared away many obstacles; and if the friends of rural economy would unite in their efforts to give renewed impetus to the cause it would prosper, for as Mr. Young has observed, "*There is no niggardliness of nature, if man would do his part.*" "Perfect agriculture," says Leibeg, "is the true foundation of the riches of states. But a rational system of agriculture cannot be formed without the application of scientific principles; for such a system must be based on an exact acquaintance with the means of vegetables, and with the influence of soils, and action of manures upon them. This knowledge we must seek from chemistry, which teaches the mode of investigating the composition, and of studying the characters of the different substances, from which plants derive their nourishment."

Agriculture in our Provinces, subjected as it is to the disadvantages incidental to new countries, and pursued in general by persons with very limited means, should be conducted on a small snug scale. Its character has been prejudiced by the well meant but injudicious experiments of gentlemen, who have spent fortunes in rural establishments, entirely out of measure with the means and abilities of the country; establishments, including machinery, and rural arrangements, which would have been worthy of admiration even in Great Britain, and, which with field improvements, effected at a heavy charge for labour, rendered the outlay very great, whils the returns were disproportionably small. Loss and disappointment followed, and

the farm and farming were brought into disrepute in consequence of the imprudent enthusiasm of the Farmer. Such injudicious proceedings have created an unfavourable influence against agriculture in these Provinces, and have prevented many gentlemen from retiring into the country, after they had retired from mercantile and other pursuits in the town. They have heard of five and ten thousand pounds having been invested in agriculture, and sunk in the investment, when as many hundreds would have purchased a desirable retreat, and a proportionate expenditure upon it, would have made the speculator comfortable, and have promoted the interests of agriculture, and the character of the country. We know several instances confirmatory of these observations.

MANURES.

Continued from page 7.

MANURES comprehend the following, viz. farm yard manure, liquid manure, night soil, ashes, saline manures—as common sea salt, salt petre, and the nitrate of soda—lime, marl, and gypsum—and we may add for the information of the new settler near hard wood forests, that the decayed leaves and vegetable matter forming a thick layer on the surface of the soils in such woods, is an excellent manure, well worth collection, especially by those whose stock is small, and who have consequently but a small quantity of stable manure. We would urge the great importance of attention to this matter, as a small quantity of stable manure, the ashes from the fire place, a few parings of sods and the night soil of the house mingled with a quantity of this vegetable matter, would greatly increase the agricultural ability of the new settler and cottager.

Farm yard Manure.—We have already mentioned that a pit should be dug for the manure, adjoining the stable—that it should be 18 inches deep—that the bottom of it should be lined and clayed to prevent leakage and loss—that it should be so constructed that the urine of the stable should flow into it, and that it should be enclosed from the weather. We again urge the importance of this arrangement, and the great advantage and profit that would result from it. The bottom of this pit should be strewed with loose earth and straw to the thickness of 9 or 12 inches; this will absorb the liquid portion of the manure that settles to the bottom—we would recommend this pit merely for the reception of the winter collection, and not as the bed for the future compost, and for the following reasons—if the compost were made in contact with the barn, which in ordinary instances of the dung-heap is injured by it, the process of fermentation would increase that injury by accelerating the decay of the building—the gases which escape during putrefaction would vitiate the purity of the air in the stable, and the winter manure not undergoing the necessary change in time for spring use, would be unfit for agricultural purposes for the reasons which have hitherto been adduced—therefore—we would recommend the present pit merely for winter purposes in our Provinces—and that a general compost pit be dug in a suitable and convenient situation for the reception of all the different articles for manure making. It has been recommended that this pit should be three or four feet deep, secured at the bottom in the manner already mentioned, and strewed with a layer of earth and straw. This pit should also be covered with a shed, and protected from the weather—a low roof, erected upon a few

stout posts, would answer. Such a covering, while it protected the manure, would also protect labourers in rainy weather, who might be at work on the compost, when interrupted in out door business by the wet. This pit should have an opening at one end, that a cart might back into it, for the purpose of easier loading. All kinds of animal and vegetable manures should be deposited, layer upon layer, in even surfaces upon the compost heap, and care should be taken to mix the dung from the cow-house, stable, and piggery, so that the excrements of well fed animals may be incorporated with the poorer manure—and the greatest benefit will be derived from conveying the liquid refuse of the barn yard and pouring it over the mass. When it becomes requisite to cart out manure in the fall to save time in the spring, it is advisable to deposit it in a hollow situation, to strew some loose earth previously at the bottom, for the absorption of fluids, and then to cover the whole with a few inches of earth to prevent the escape of the fertilizing gases. After the dung has been carted to the field, it is well to turn it over once or twice to hasten the putrefaction of any undecomposed patches in it. "It may be of use to know that the dung required for fallows for wheat in autumn, may be less putrified than that for turnip crops." As straw is the basis of farm yard dung, care should be taken, when reaping it, to cut it as close as possible to the ground, as a few inches of straw left in the field would, if collected, make a material increase to a compost heap. "It is calculated, that for every ton of straw, three tons of barn yard dung may be obtained, if properly managed." The manure should be well pulverised before it is applied to the land; in this state, it incorporates more thoroughly with the soil, and fertilizes every particle of it. The ground itself should be free from weeds and stones When it is scattered over the earth it should be immediately ploughed in, as every moment of exposure to the air is attended with loss of strength and property. It is better to apply manure in small quantities, at short intervals, than in larger quantities at long intervals.

Liquid Manure.—The urine of cattle is a very powerful agent in the formation of rich composts. The farmers in Belgium have been in the habit of using it a long time; and the superiority of this manure has given a degree of pre-eminence to their agriculture, notwithstanding many disadvantages under which they labour. Mr. Charles Alexander, an intelligent farmer near Peebles in Scotland, was one of the earliest to discover the advantages of urine as a manure, which he did by a number of conclusive experiments, the result of which proved that the urine of fourteen cattle, kept five months on fodder and turnips, amounting to about eight hundred gallons, fertilized two hundred and eighty-eight loads of loam, which was deposited in a pit, upon which the urine flowed from the stable, so that, it manured seven acres of land, about forty loads to the acre, in a thorough manner. Mr. Alexander used this manure for ten years; he found it equal, both in effect and durability, to the putrescent manures: in fact, that the loam thus saturated with urine was equal to the rotted cow dung. Mr. Jackson observes: "Since the period of these experiments, a better knowledge of composting from urine has prevailed. It is now well known that in all cases, moss, earth, peat, or any vegetable substance, is better than mere earth. If earth alone

be employed, the process amounts to little else than a saturation, and nearly the same end could be gained by throwing rank urine upon the fields. If moss or any other vegetable matter be employed, then the urine acting on the fibrous mass promotes fermentation and decomposition, and thus an additional value is given to the product. Mud dragged from the bottom of bogs or ditches, and replete with aquatic plants, or any other vegetable material, is, therefore, preferable to simple earth."

The Flemish Farmers go to great expense and trouble in constructing brick cisterns for the reception of urine, to which they give a decided preference; so much so, that they throw water over their dung heaps, and collecting the liquid manure, throw it over their fields. But although the urine, when mixed with earth and vegetable matter forms such an excellent manure, the English and Scotch Farmers condemn the practice of making a solution or wash from the dung heap by the assistance of water. Turnips increase the secretion of urine: cattle fed upon them will pass about two-thirds of the weight of the turnips in urine, so that six cows will enrich earth and vegetable matter sufficient to top dress an acre of grass land. The urine of all animals, diluted, forms a nutritious manure for plants. Sir Humphry Davy was of opinion, that it contained the "essential elements of vegetables in a state of solution," he thought that the putrefaction of the urine destroyed the soluble animal matter, and that, therefore, it should be used when fresh; but that even in this state it was a powerful manure. Mr. Johnstone, of Hillhouse, thought that when the urine was diluted with water, either accidentally or intentionally, that the process of putrefaction increased its fertilizing properties. Sir Humphry Davy agreed that the urine should be diluted before it was used, because he thought that it contained too much animal matter, "to form a fluid nourishment for absorption by the roots of plants." Mr. Johnstone allowed the urine to flow over his dung heap: he collected it afterwards. The dung he used for potatoes and turnips, and the liquid manure generally to clover grass. He applied it at the rate of 2,400 gallons to the acre; and in a swarth of grass, not watered, he cut a quantity weighing 20 lbs. and in a similar swarth, watered with liquid manure, he cut a quantity weighing 48 lbs.; these were cut some time before the grass was ripe. He found the early spring months the best time for its application. Liquid manure is equally valuable in the garden. The Chinese purchase it even by the pint for their fruit trees. The Italians found it beneficial to their grape vines. It is an excellent manure for gooseberries and strawberries, applied just before the bursting of the bud in spring. It is very profitable also applied to potatoes, which, when this is used, need no other manure. "To the cabbage and colewort tribe it is equally valuable." "We would impress on every cultivator of the soil," says Mr. Jackson, "that it is for his own interest to collect this valuable liquid by every possible means; and as he has the experience of other countries to guide him, he need have no fears of applying it.

Night Soil, which implies the excrementitious discharges from the human body, is used in many countries as one of the most powerful manures. It is in common use both for the garden and fields in China, and is exported largely from Paris to Flanders and the Low Countries. The disagreeable fetor of it is cor-

rected by mixture with ashes, and in this manure, it forms a most powerful and excellent top-dressing for grass lands. In Essex, in England, it is used mixed with five times the quantity of fresh earth. It causes a most rapid growth, particularly of the straw of wheat. It does not last long; the soil generally losing its virtues the following year. In London it sells for 15s. a load, of 90 bushels.

ASHES.

Coal ashes and cinders by themselves are of little service, but mixed with night soil and animal and vegetable matters, they make a good munure for turnips, and in cold poor clay soils they fertilize it, and bring good crops of wheat, barley, oats, and grass. Soot has been employed as a top dressing for grass, particularly the rye-grass, on light, gravelly, or lime-stone soils. The strength of the soot will depend upon the quality of the fuel from which it is formed. It has been sown with wheat and oats, to prevent the destruction caused by the "wire-worm." It is not durable in its effects, which only continue for the one season.

BONE DUST.

All kinds of animal and vegetable matters can be used as manures; some, however, are preferable to others; but it is the duty of the farmer to employ all that are within his reach, and he may then select and appropriate particular manures for particular purposes. Bone dust has now become a very important manure: it owes its virtues to the earthy salts, which form principal ingredients in it.

Bones ontain about 33 per cent. of animal matter, and 67 of earthy substance. The animal matter consists principally of gelatine and marrow, or fatty matter. The earthy substance consists of Phosphate of Lime, 51 parts; Carbonate of Lime, 11 parts.

These constitute most important ingredients in an agricultural point of view; they contain, however, a small proportion of Phosphate of Magnesia, and the Fluoride of Calcium, with some fractionals of Soda, Silica, Alumina and Oxides of Iron and Manganese, in the 100 parts. Bone dust answers best in light soils, and in dry seasons. It is found particularly good as a manure for turnips and for fertilizing waste lands! 100 bushels of it are found equal to 40 cart loads of farm yard manure. Its effects upon the soil are durable: it is asserted that they continue even longer than a whole rotation of crops. It is excellent on pastoral farms. In Scotland and England it is greatly appreciated, and some extraordinary instances of its productiveness are recorded. The following is given as the ordinary rule for its application:

1. On dry lands, lime stone, chalk, light loams, and peats bone, are a highly valuable manure.

2. That they may be applied to grass with great good effect.

3. That on arable lands they may be laid on fallow for turnips, or used for any other subsequent crops.

4. That the best mode of using them when broad cast, is previously to mix them up in compost with earth, and let them lie and ferment.

5. That if used alone, they may be either drilled with the seed, or sown broad cast.

6. That bones which have undergone the process of fermentation, are decidedly superior in their immediate effects to those which have not been fermented.

7. That the quantity should be about 20 bushels of dust, or 10 of

large bones; increasing the quantity if the land be impoverished.

Respecting this, however, it may be observed, that some Farmers have found that they were particularly beneficial upon a clay loam, scarcely 12 inches deep, with a subsoil of grey sand mixed with coarse clay on a bed of good clay marl. The effect of bone manure upon pasture land has been surprising. It improved "the condition of the cows so materially, that about twice the quantity of Butter was made from them than from cows grazed on land of a similar quality, but not boned. The time for laying it on the land as a top dressing to grass, whether seedling or pasture, is generally recommended to be early in the spring. Seeing that the fertilizing quality of bones is improved by fermentation, it has led to the supposition that they may be usefully applied in compost with earth, and other substances: by this mixture, it has been found from experiment, that they soon become decayed and pulverised." Many intelligent and experienced Farmers prefer this way of using them; they mix 50 bushels of bones with five loads of burnt clay or good earth per acre, "by which dressing, the crops between fallow and fallow except clover, appear to be increased one fifth in value.'

The bone dust is prepared by grinding, in a similar manner to our Plaster of Paris.

The employment of bone dust is becoming so general in Great Britain, that when the consumption exceeds the supply, it is presumed that bones will be imported from South America, Africa, Australia, and many Asiatic countries.

Manures should be distributed over lands in a generous, but not lavish manner, for the extremes of too much and too little are both injurious. The land should be kept in "good heart," for it has been supposed that the rust of wheat is in many instances attributable to an over quantity of manure. Repletion, in the vegetable as well as in the animal system, promotes disease. When land is too rich, "the crop becomes affected with parasitical Fungi which develope themselves in the blades of the plant, and ultimately destroy vegetation."

SALINE MANURES.

Common salt, in moderate quantities, has been found beneficial on arable land; it promotes fertility, prevents smut, preserves seed from vermin, and is particularly good for grass crops—from 12 to 16 bushels per acre, scattered over pasture land, improve it, and tend to destroy snails, slugs, and the eggs of insects. From 20 to 30 bushels per acre, on fallow lands, are sufficient to incorporate with the soil during the subsequent processes of ploughing and harrowing. Saltpetre has been found also very beneficial, and its effects upon wheat and oat crops have been very visible. Some agriculturists in England purchase it by the ton for farming purposes.

The nitrate of soda has been used, but as the price of such manures operates against the employment of them in these provinces, it is unnecessary to enter more fully into the consideration of them. In our next number we shall consider the use and application of Lime, which is one of our most valuable manures, and one which abounds in the Provinces.

Address delivered by Dr. Bayard, at the formation of the Agricultural and Horticultural Society of the City and County of St. John.—*(Continued from page 11.)*

Soil, Culture, Climate, and Season, exercise a powerful and

peculiar influence upon vegetable life and action; and the agriculturist should be acquainted with the varieties and composition of soils, so as to adapt them to their intended vegetable productions; agricultural chemistry has contributed greatly towards this department of knowledge. The influence of soil may be exemplified by many well known facts: thus strong smelling plants taken from a rich, and transplanted into a sandy soil, lose their odour, and do not again recover it, by transplantation into a richer one, and no management could effect the flowering of the "*Ricotia Ægyptiaca*," until Linnæus suggested the advantage of mixing some clay with the earth in the pot. Plants taken from their native and peculiar soils have suffered a change in the shape of their leaves, and the quality of their juices. The medicinal properties of plants have been most surprisingly altered in this respect; thus a plant transplanted into three different soils has produced three entirely different effects upon the animal body. Climate, as we all know, influences powerfully both animal and vegetable life. A particular knowledge of this fact as applied to agriculture is important in the selection of foreign plants; we should select those we require from climates assimilated as nearly as possible to our own. "Plants which in a temperate climate are merely shrubs, have been developed into trees upon the hot and humid plains of Africa and Asia; whilst in the deserts of Nubia, or on the frigid plains of Siberia, vegetable life is confined to stunted shrubs and humble mosses." Cold suppresses, in some instances, not only the colour of the flower, but the colour of the leaf. I may here mention the curious fact, although it is irrelevant to agriculture, that the inhabitants of Rome are unable to sustain the strong scent of flowers in their climate without experiencing great oppression, in some instances causing fainting, and realizing, as Dr. Paris observes, the line of the Poet:

"Die of a rose, in aromatic pain."

But great as is the influence of those agents already mentioned upon vegetable matter, still *cultivation* produces the greatest change in the appearance as well as in the properties of plants. It can convert single into double flowers; and it is asserted upon the authority of Buffon, "*that wheat is a factitious production, raised to its present condition by the art of agriculture*," which by suppressing the growth of one part of a plant, and forcing that of another part, will in process of time entirely change the natural habits and properties of it. This is illustrated in the common potatoe, in which cultivation has directed that succulence and nutrition to the roots, which were formerly possessed by the berry, or apple. This power of altering the habits of plants, has suggested the suspicion, that by destroying in some instances their ability to perpetuate the new species, we have lost them altogether. Mr. Knight, an eminent Botanist, is of opinion that the *Tuberes* of Pliny, is a lost species of this kind, being the intermediate grade between the almond and the peach; or in other words, a swollen almond, or an imperfect peach; which, if true, will explain the statement of COLUMELLA, that the peach possessed deleterious qualities when it was first introduced from Persia into the Roman Empire. The peach is formed from the almond; the flesh of it being formed from the dry looking matter enveloping the almond. Dr. Paris, speaking of such changes, beautifully observes, "If there be any who

feel sceptical upon the subject of such metamorphosis, let him visit the fairy bowers of Horticulture, and he will there perceive, that her magic wand has not only converted the tough and coriaceous covering of the almond, into the soft and melting flesh of the peach; but that by her spells, the sour sloe has ripened into the delicious plumb; and the bitter crab of our woods, into the golden pippin; that this again has been made to sport in endless variety, emulating in beauty of form and colour, in exuberance of fertility and in richness of flavour, the rarer productions of warmer regions, and more propitious climates. In our culinary vegetables the same progressive amelioration and advancement may be ·d. Thus has the acid and disagreeable *Apium Graveolans*, (or *Smallage*,) been changed into delicious celery, and the common Colewort, by culture continued through many ages, appears under the improved, and more useful forms of Cabbage, Savoy, and Cauliflower."

I may here observe that agriculture is indebted for many of its valuable and important discoveries to the delightful and interesting science of botany, which leads its votary from the feverish agitation of worldly pursuits to the contemplation of the beautiful economy of nature, teaching him to distinguish one plant from another, and imparting a knowledge of its properties. It is a science in which all is elegant and delighful, and as Smith observes—"Its pleasures spring up under our feet, and as we pursue them, reward us with health and serene satisfaction; whether we scrutinize the deep recesses of woods in wintry months, when the numerous tribes of mosses are displaying their minute, but highly interesting structure: whether we walk forth in the early spring, when the ruby tips of the hawthorn bush give the first signs of its approaching vegetation, or a little after, when the violet welcomes us with its scent, and the primrose with its beauty; the yellow blossoms of the morning, that fold up their delicate leaves as the day advances—others that court and sustain the full blaze of noon, and the pale night-scented tribe which expand and diffuse their sweet fragrance towards evening, will all please in their turns." Natural science advances the improvement of the arts, increases the comforts and luxuries of life, and leads to discoveries of the most useful nature. By it Linnæus was enabled to detect the time when the *Cantharis Navalis*, a destructive insect, underwent its metamorphosis, and deposited its egg. This insect annually destroyed in the Swedish dockyards, timber to the amount of many thousand pounds. But after the discovery of Linnæus, the timber during the season of change and depositing of the destructive egg was immersed in water, and thus protected from its ravages. The same great philosopher, by the assistance of his botanical knowledge, discovered the cause, and the means of preventing a very fatal disease among the cattle in the north of Lapland, and which for many years was considered irremediable. The *Bread fruit*, by the scientific skill of Botanists, has been introduced into the West Indies; and while this science, which gives charms to the solitude of the forest, and increased beauty and interest to the wild mountain and cultivated valley, ministers to the enjoyment and necessities of man, it leads its delighted pupil to examine and admire the economy of that infinite Architect who gave man an organized structure and vital principles,

and life and organization to the blade of grass, to which he has been aptly compared. Botany investigates the anatomical arrangement of plants and the laws which regulate them; and in this investigation it discovers the chain of gradual connexion between the humblest moss in the vegetable, and man, the highest grade in the animal kingdoms, a chain so wonderfully interwoven, that natural philosophers experience difficulty and doubt in drawing a satisfactory line of distinction between the highest order of vegetable life, and the lowest order of animals; and I am sure that it will not be uninteresting to give you a few general and brief remarks, respecting the connexion between animals and vegetables, and the supposed line of demarcation between them, although the digression may be irrelevant to agriculture; for all may not be aware of the gradual progression of one kingdom into the other, and many of my hearers think that they could readily draw the distinction between an animal and a vegetable. * * * *

[*We omit this digression, and refer the reader to the article "Botany," in the former number, page 16, as it is similar to what is now omitted.*]

Botany is a science intimately connected with horticulture; and although we cannot expect our labouring agriculturists to devote any portion of their time to the study of it, it is a requisite study for the horticulturist, if he wishes to pursue his vocation with advantage. But if those who have leisure and means within their reach would devote a portion of them to this pursuit, it would amply reward them, with the pleasurable information they would receive from it; whilst they might benefit, in this new country, society, and especially the agriculturists, by their discoveries. But to return—

It is well to discover and point out defects, but it is better to discover and point out the remedy for them; with this view, we contemplate the formation of an agricultural society, which it is to be hoped will expose the bane and apply the antidote. Every man in the community should contribute towards its accomplishment and success; because every man in the community will experience the beneficial influences of it upon agriculture. It has been said by an eminent writer, Rousseau, "that when science is transplanted from the mountains and woods into cities and worldly society, it loses its genuine charm, and becomes a source of envy, jealousy, and rivalship." It has come to our city for assistance and support; it demands our merited contributions. It is our duty to extend them, that it may return to the country with increased charms and usefulness. There is no occupation in life more worthy of protection than agriculture; and there are no individuals to whom we are more indebted for the necessaries and comforts of life than to agriculturists.

If we wish to enlarge the borders, and to promote the prosperity of the city, we must advance the science, and protect the interests of agriculture; for a country remarkable for its agricultural prosperity, will also be remarkable for its villages and towns—the interests of both being so intimately interwoven with each other. If we feel disposed to benefit the cause of agriculture, we must send instruction not only into the houses of more affluent farmers, but into the log cabin of the hardy and industrious settler. There are many ways through which knowledge may be diffused; and if those who are not occupied in the actual cultivation of the ground, manifest an interest and exert themselves in pro-

moting it, it will give an impetus to the cause, and stimulate the zeal and exertions of the husbandman himself. Experience has testified that the people of Saint John only require to be convinced of the utility of an undertaking to give it their patronage and support. Witness that Joint Stock Institution, whose labourers are ploughing the ocean for their own and the benefit of the city. Witness the comparative success of the Mechanics' Institute; and the flattering attendance this evening, of those who are willing to hear the merits of an appeal, worthy of an abler and more convincing advocate, to whose inability and imperfect efforts, rather than to the weakness of his cause, must be attributed the failure, if I fail to interest you in its favour. I may here remark, that a public school of agriculture has been established, and has been for some time in successful operation in Temple-Moyle, in the north of Ireland. It embraces not only the theoretical but the practical parts of agriculture; and after detailing the system adopted in this excellent establishment, the editors of "*The Labourer's Magazine*" observes, "We have long been strenuous advocates for the establishment of agricultural schools in all parts of Ireland, feeling assured that they would ultimately be the means of breaking down those absurd prejudices which have been hitherto the most insurmountable obstacles with which agriculture had to contend." Although we cannot at present contemplate an undertaking so great and perfectly patriotic and praiseworthy as the Templemoyle school, we may do something towards following at an humble distance—and I would suggest in furtherance of the object of instruction the establishment of a paper, exclusively agricultural, published monthly, containing all the interesting agricultural matter of the Provinces, and enriched with scientific extracts, from the best agricultural publications in Europe and America.

The Agricultural Society should hold its meetings in rotation, in different sections of the country; and after the immediate business of the meeting is concluded, a lecture, or paper, written for the occasion, upon some agricultural subject, should be read by a member in turn. This would have a tendency to collect many within a reasonable distance together; and in this manner information would be diffused, though *not* in copious showers, *at all events*, (if I may be allowed the metaphor) in those irrigating dews, which would contribute to refresh and fertilize the land. The advantage of such a method of instruction is most satisfactorily illustrated by the attendance at the Hall of the Institute.

But, Gentlemen, as an agricultural society without sufficient funds may not inaptly be compared to troops upon the field without suitable ammunition, I hope if by and bye we make an appeal to your liberality for assistance, you will give our Treasurer a contribution—five shillings, or as much more as you please, from each family in our city, who could well spare it, would make up a sum which would enable the society to convince the Farmer that our zeal is not mere sound, and that our good will is more substantial than the fabled blessing, which consisted entirely of words, that were not worth a sixpence.

Let us this evening form a Joint Stock Company for the benefit of agriculture: the earth will afford a munificent return. Let us contribute our efforts to remove the scandal which has been so unjustly thrown upon our Province. Let us assist in rendering the agricultural

products of it sufficient for the demands of the people, that we may no longer be giving a premium to the industry of Farmers in the United States, by the importation of articles which our own Province could supply; and let us endeavour to develope the utility and charms of a pleasing profession, that it may present attractions to those who may hereafter select it as the pursuit of their lives.

AGRICULTURAL CHEMISTRY.

We shall devote a portion of our Periodical in each number to copious extracts from the recent and valuable work on Organic Chemistry, in its application to Agriculture and Physiology, by Justus Leibeg, M. D., &c. &c. &c., Professor of Chemistry in the University of Giessen, and edited from the manuscript of the author, by Lyon Playfair, M. D., and re-edited, with Introduction, Notes, and Appendix, by Dr. Webster, Professor of Chemistry in Harvard University.

This work has received unbounded applause in Great Britain, and many experienced and Philosophical Agriculturists consider its publication as a new era in the art of agriculture. At an anniversary meeting of the Royal Society, its President, the Marquis of Northampton, addressed Professor Daniels, who was the representative of Leibeg at that meeting, in the most flattering and complimentary manner, and when awarding him one of the *Copley Medals* of the Society, acknowledged the benefits which he had conferred upon science by his practical and useful discoveries.

Animals and Vegetables are organised bodies: the object of Organic Chemistry is to discover the chemical conditions, which are essential to the life and perfect development of animals and vegetables, and generally to investigate all those processes of organic nature, which are due to the operation of chemical laws:

The primary source, whence man and animals derive the means of their growth and support, is the vegetable kingdom:

Plants on the other hand, find new nutritial materious only in *inorganic* substances.

Carbon and nitrogen are the principal constituents of plants, and as we shall have occasion to use these terms frequently in our extracts from Leibeg, we shall give a brief explanation of them, including also hydrogen and oxygen.

Carbon in its purest state forms the diamond; but charcoal is the form in which it is most commonly found. Ivory black is an impure charcoal, prepared from bones, and often called animal charcoal. Lamp black is the charcoal deposited from oil, resin, and other compounds containing this element, during combustion. Plumbago, or black lead, is a compound of charcoal with a very little iron. Charcoal is solid, black, porous, and brittle. It is inflammable, producing carbonic gas when heated in air, or oxygen. It takes fire spontaneously when put in large heaps. It is insoluble in water—it destroys colouring matter, and the offensive taste and odour of putrescent animal, or vegetable matter. It absorbs large quantities of gases, especially of ammonia. It is prepared from wood by heating, excluding the air. Wood is composed of carbon, oxygen, and hydrogen, with a small portion of earthy or saline matters. By heat the oxygen and hydrogen are expelled, carrying along with them part of the carbon, and forming inflammable gases, water, acetic acid, tar, pyroxillic spirit, and kreosote. The excess of carbon forms the charcoal which remains. All animal and ve-

getable matters form a portion of charcoal, when they are subjected to a strong heat. The union of carbon with oxygen in proper proportions forms carbonic acid, or the Fixed Air of Dr. Black, who discovered it. This is condensed into a liquid by a pressure of 38 atmospheres at 32°, and is gaseous, transparent, colourless, cannot support combustion, or respiration, is absorbed by an equal bulk of water, and subjected to pressure and combined with an alkali forms the common carbonic acid water. It is found distributed freely throughout nature in the form of carbonates with lime, magnesia, iron, &c.; it exists in many mineral waters—in the air at all heights and situations excepting near the surface of the ocean. It is produced by respiration, combustion, and numerous chemical processes. The choke-damp of mines and the heavy gas oftentimes so prejudicial in breweries, wells and pits, are carbonic acid gas.

Carbon unites freely with hydrogen, giving rise to various compounds.

Nitrogen.

This gas is also called azote, or azotic gas, from a Greek word, signifying "without life," as it is incapable of supporting either respiration or combustion. It exists in the gaseous form unless when in combination with other substances. It is transparent, colourless, insipid, and incombustible. It forms about four-fifths of the atmospheric air, which is a combination of nitrogen and oxygen in proper proportions, holding in suspension some carbonic acid and other gases. Nitrogen exists in almost all the products of the animal kingdom, and enters into a number of important combinations. With hydrogen it forms ammonia, and with carbon forms cyanogen, which is one of the ingredients in Prussian blue, and Prussic, or, hydrocyanic acid.

Hydrogen.

is an element, which is extensively distributed over the face of nature. It exists in almost all the products of the animal and vegetable kingdoms, and forms a ninth part of the water of the globe. It is always obtained in the form of a transparent, colourless gas, when not combined with other substances, and is remarkable for its levity and inflammability; it is the gas obtained for the inflation of balloons in consequence of its lightness. Hydrogen is obtained by the decomposition of water, which is a compound of hydrogen and oxygen. It burns with a pale flame, affording a feeble light; hydrogen unites with a variety of substances, forming interesting compounds.

Oxygen.

This term is derived from two Greek words, signifying "making sour," as this element was formerly supposed to be the basis of acidity; this however is incorrect. Oxygen was formerly called *vital*, *empyreal*, and *dephlogisticated air*. It is gaseous, transparent, inodorous, uninflammable, and supports combustion most brilliantly. The compounds of oxygen, when not acids, are termed *oxides*: the ingredient combining with oxygen is said to be *oxidised*, or, *oxydated*: the process is called *oxidation*. *Deoxidation* signifies the separation of oxygen. Oxygen is the most abundant of the elements, forming upwards of one half of the globe. It exists in air, water, most earthy substances, and in almost all the products of the vegetable and animal kingdoms. The principal oxidating agents are the air, water, oxacids, and salts containing them, as nitrates and chlorates. The principal deoxidating agents are carbon, hydrogen, phosphorus and potassium. It is obtained or prepared from oxide of manganese, the nitrate of potass (salt petre), or any of the salts of

nitric or chloric acid. Oxygen is largely consumed in numerous natural and artificial operations, as respiration, vegetation, combustion—in the preparation of oxides, acids, salts, and other compounds.

Carbon enters into the composition of all plants, and of all their different parts, or organs, combined with different proportions of oxygen and hydrogen, or hydrogen with little or not any oxygen; these different combinations form woody fibre, starch, sugar, gum, volatile, or, fixed oils, wax, resin, &c.

Nitrogen is an element of vegetable albumen and gluten. Vegetable albumen bears a great resemblance to animal albumen, of which the white of an egg is an example; gluten is a tough substance remaining after the starch of wheat has been washed away—it is the nutritious part of wheaten flour. Nitrogen is a constituent in the acids, and of what are termed the indifferent substances of plants. It forms by weight a very small proportion of plants, but it is never entirely absent from any part of them. Even when it does not enter into the composition of a particular part or organ, it is always to be found in the fluid which pervades it.

The developement of a plant requires the presence of substances containing carbon and nitrogen, and capable of yielding these elements to the growing organism; it requires the presence of water and its elements, and it requires the presence of a soil to furnish the *inorganic* matters, which are likewise essential to vegetable life. The fertility of every soil has generally been supposed by vegetable physiologists to depend on the presence in it of a peculiar substance, to which they have given the name of *Humus*—which is a Latin word signifying earth, or soil. This substance, the *humus*, believed hitherto to be the principal nutriment of plants, and to be extracted by them from the soil in which they grow, is itself, the product of the decay of other plants. It is described as a brown substance, easily soluble in alkalies, but only slightly soluble in water. It has received various names, according to its different external characters and chemical properties, as, *ulmin humic acid*, *coal of humus* and *humin*.

The modifications of *humus*, which are soluble in alkalies are called *humic acid*, whilst those which are insoluble are called *humin*, and *coal of humus*. Berzelius, a Swedish Chemist, called the former *extract of humus*, and the latter, *Geine*, (from a Greek word, signifying earth) also *Apotheme* and *Carbonaceous humus*. Chemists have been in the habit of designating all products of the decomposition of organic bodies, which had a brown, or brownish black colour, by the names of humic acid, or humin, according as they were soluble or insoluble in alkalies: although in their composition and mode of origin, the substances thus compounded might be in no way allied. Leibeg continues to observe—"not the slightest ground exists for the belief that one or the other of these artificial products of the decomposition of vegetable matter exists in nature in the form, and endowed with the properties of the vegetable constituents of mould; there is not the shadow of a proof that one of them exerts any influence on the growth of plants either in the way of nourishment or otherwise." The opinion that the substance called *humus* is extracted from the soil by the roots of plants, and that the carbon entering into its composition serves in some form or other to nourish their tissues is so general and firmly established, that hitherto any new argument in its favour has

been considered unnecessary:—the obvious difference in the growth of plants according to the known abundance or scarcity of *humus* in the soil seemed to afford incontestible proof of its correctness."

"*Yet this position when submitted to a strict examination, is found to be untenable, and it becomes evident from most conclusive proofs, that humus in the form in which it exists in the soil does not yield the smallest nourishment to plants:*" "The adherence to the former incorrect opinion has hitherto rendered it impossible for the true theory of the nutritive process in vegetables to become known, and has thus deprived us of our best guide to a rational practice of agriculture. Any great improvement in that most important of all arts is inconceivable without a deeper and more perfect acquaintance with the substances, which nourish plants, and with the sources, whence they are derived; and no other cause can be discovered to account for the fluctuating and uncertain state of our knowledge on this subject up to the present time, than that modern physiology has not kept pace with the rapid progress of chemistry."

Respecting the theory that *humic acid* was absorbed by plants in the form of some salt containing the largest proportion of *humic acid*, as for instance the *humate* of *Lime*, or through the agency of rain water, whereby the quantity of Carbon which can be conveyed into plants in any conceivable manner by means of humic acid must be extremely trifling in comparison with that actually produced in vegetation:—

"Other considerations of a higher nature," continues Dr. Leibeg, "confute the common view respecting the nutritive office of *humic acid* in a manner so clear, and conclusive, that it is difficult to conceive how it could have been so generally adopted."

Fertile lands produce Carbon in the form of wood, hay, grain, beets, and other kinds of growths, the masses of which differ in a remarkable degree. Dr. Leibeg ascertained by measurement that 40,000 square feet of forest land with an average soil, bore 2,650 lbs. Hessian weight, of Fir, Pine and Beech wood; that 40,000 square feet of meadow land bore 2,500 lbs. of hay—that 40,000 square feet of corn land gave from 18 to 20,000 lbs. Beet, or, 2,580 lbs. of Rye Straw, and that the

2,650 lbs. gave 1007 lbs. of Carbon.
2,500 " " 1008 " " "
20,000 " " 936 " " "
2,500 " " 1020 " " "

The Carbon contained in the leaves and fine roots of the Beets was not included in the above calculation. He therefore concludes from those incontestible facts, "that equal surfaces of cultivated land of an average fertility produce equal quantities of Carbon," although the growth of plants from which it is obtained are very different.

"Let us now enquire, whence the grass in a meadow, or the wood in a a forest receives its *Carbon*, since neither manure or Carbon have been given to it for nourishment! and how it happens, that the soil thus exhausted, instead of becoming poorer, becomes every year richer in this element!

A quantity of Carbon is taken away every year from the forest, or, meadow in the form of wood, or, hay, and, notwithstanding, the quantity of Carbon in the soil augments, it becomes richer in *humus*.

It has been said that the Carbon taken away in the produce of cultivated lands is replaced by manure. But such lands yield no more Carbon than the forest or meadows, where it is not replaced. "It cannot be

considered that the laws for the nutrition of plants are changed by culture; that the sources of carbon for fruit or grain, and for grass or trees, are different."

It is admitted that manures favour the developement of plants; but they do not furnish Carbon, for manured lands do not yield any more than those lands which have not been manured, therefore, "the Carbon must be derived from other sources; and as the soil does not yield it, *it can only be extracted from the atmosphere.*"

The origin of *carbon*, and the origin of *humus*, are questions intimately connected. *Humus* arises from the decay of plants; "no *primitive humus*, therefore, can have existed, for plants must have preceded the *humus*." "Now whence did the first vegetables derive their carbon, and in what form is the carbon contained in the atmosphere? These two questions involve the consideration of the most remarkable natural phenomena—which by their reciprocal and uninterrupted influence, maintain the life of the individual animals and vegetables, and the continued existence of both kingdoms of organic nature."

These questions refer, 1st, to the invariable condition of the atmosphere, as respects the proportion of oxygen in it; and 2dly, to the consumption and appropriation of carbonic acid, produced during the respiration of animals, and the process of combustion; and the enquiry will disclose the wise and wonderful economy of nature in the composition of the atmosphere, the respiration of animals, and the respiration of vegetables. In this process animals absorb oxygen from the air, which effects a necessary and most important change upon the blood in the lungs, converting venous into arterial blood, and fitting it for its various offices in the animal economy. Oxygen is absorbed during each inspiration, and carbon is thrown out from the animal body, as useless and injurious to it, during each expiration. Vegetables require carbon, and in the process of respiration effected by their leaves, which are the vegetable lungs, they absorb carbon from the air, and give out oxygen to it, and in this manner each contributes to the necessities of the other, and by their reciprocities assist in preserving and continuing the wholesome and important constitution of the atmosphere. We shall resume this interesting inquiry in our next number.

In our future extracts from Leibeg, we shall condense his opinions respecting the *assimilation of carbon; vegetable mould; the decay of woody fibre; growth of plants; origin and action of humus; action of carbonic acid; assimilation of hydrogen; origin and assimilation of nitrogen; the inorganic constituents of plants; the art of culture and use of humus; the influence of food and light on plants; the object of agriculture and the fertility of soils; fallow crops; theory of the use of the interchange of crops; manures—their composition, essential elements, and effects;* concluding with the *chemical processes of fermentation, decay, and putrefaction.*

DAIRY HUSBANDRY.

(Continued from page 24.)

THE Farmer, in the selection of his stock, should bear in mind the difference of form between a cow intended for the dairy, and one intended for the shambles. The dairy cow should be long and thin in the head, with a brisk, quiet eye, lank in the neck, narrow across the shoulders, broad across the haunches, no

tendency to become fat, udder large, full, but not protruded much behind, the teats pointing outwards and downwards, equal in size, rather long and tapering. She should be tame and gentle, with life, spirits, and a moderate degree of hardiness of constitution; these requisites, essential in the character of a good dairy cow, are found in the Ayrshire breed. The cow intended for fattening should resemble the ox. A cow with a high back bone, large head, small udder, and shewing a tendency to fatten, is a bad milker. Every Farmer should pay particular attention to get a good breed, and then to rear the best calves for himself, and not for the butcher. The sure way to have good milkers is to pay proper attention to the condition of the young stock, to keep it in a thriving state, so that all the functions of the animal shall be healthily developed, which is not the case when it is kept neglected and impoverished. In confirmation of this Mr. Jackson observes: "Instead of young stock being brought up in a half starved state, producing all the marks which distinguish bad milkers, they should be reared in good pasture; and provided with turnips or other green food in winter. This will make them good milch cows, having the shapes and qualities mentioned as characteristics of good milkers, and when they come into milk, they will produce most copious secretions of that fluid. It is poor feeding that makes so many calves turn out bad cows."

The practice of many of our farmers both in Nova Scotia and New Brunswick, verifies the latter part of the foregoing observations; for it is by no means uncommon to feed young stock upon the coarsest hay, and to g · them through the winter as cheaply, and with as little trouble as possible, and as for calves, their poverty is almost a proverbial expression. A proper shelter from the severity of the weather in winter, some green food, and the *best* of hay for young stock, would be important improvements in the dairy husbandry of many of our farmers.

Dairy stock should at all times be kept on food best calculated to increase the secretion of milk, as well when they are dry as when they are giving it.

Natural pasturage always produces the sweetest milk and butter, although less in quantity than the produce of cows, when they are *soiled*, which is considered the most economical, and consists in feeding them with cut grass and green food, either in a yard or in the stable. Soiling is resorted to by many farmers, in some instances as a substitute for pasturage, when they have not a sufficiency of it, and at other times, to collect and secure the manure of the cattle. In the heat of the day, and when the flies are troublesome, milch cows would be benefitted by shade and soiling, especially if the pasturage is short. By this means the cow would be kept in a state of comparative quiet, which would favour the secretion of milk, and the farmer would secure an increased supply of manure, which otherwise is lost. If quiet is an advantage, we may here censure the improper as well as cruel practice of driving milch cows to the barn yards in the evening with the assistance of dogs. The cow is worried and irritated, and frequently driven at full speed with a distended udder. This must unquestionably vitiate the secretion of milk, and in some instances lead to inflammation of the udder and teat, to the injury of the animal and loss of the owner. In Holland, where the greatest attention is paid to dairy husbandry, the cows, "when fed in the house, invariably have

their drink of water mixed with oil cake, rye, or oatmeal. Salt should always be given to milch cows; it improves the quality and increases the quantity of milk. Turnips increase the flow of milk, but they give it a disagreeable flavour. Steaming or boiling the turnips will correct this unpleasant effect, which may also be removed by putting a little dissolved saltpetre into the milk, immediately after it is drawn. Linseed, peas, and oatmeal, produce rich milk. Bran and grains make good winter feed. Brewer's grains occasion a large flow, which, however, is poor in quality. Dairy cows should be fed frequently: three or four times a day in the summer, and five or six times in the winter; giving a little at a time, so that they may eat it clean.

When cows are kept near towns, merely for the sale of their milk, without any regard to the richness of it for the purposes of butter making, the method of feeding is somewhat different. At a celebrated dairy near Glasgow, the food for dairy cows consisted of hay, straw, grass, green barley, the Swedish and Aberdeen turnip, mangle-wurtzle, carrots, and cabbages, ground oil cake, bruised beans and other grains, distillers' wash, bran, chaff, &c. made into a warm mess with water at a temperature a little below blood heat, and given to the cows three times a day. The mess should be varied, so as to prevent indifference in the appetite of the animal. It is found that *quantity* of food is requisite for the secretion of quantity of milk; and that quality of food, although the richest, would not make as much milk as a larger quantity of an inferior quality—"as rich food by itself neither fills the stomach nor is easy of digestion, the general rule was to give as much good wholesome stuff to each cow as it could eat clean up, always taking care to avoid the risk of a surfeit; for if the cow loathes her food, she will neither milk nor fatten." Young grass, particularly young succulent clovers, are apt to prove injurious to cows: and when they are very luxuriant, "it is well to mix them with a proportion of old hay or straw, adding a good quantity of salt to prevent the cows from swelling or blowing." When the herbage is wet, a greater proportion of dry ingredients may be used. When thus mixed it must be allowed to remain from 12 to 24 hours, frequently turning it to prevent heating. As the grass ripens, it may be cut and given by itself, but young and wet clover should never be given without a mixture with dry provender, by which means the cattle feed freely, without the risk of injury. In the Glasgow dairy establishment, when the grass became scarce, as the season advanced, turnips were substituted—the turnip crop was thinned, which improved those that were left, and afforded a supply of tops and roots, which were steamed together, and formed an excellent food. Turnips, when given either raw or boiled, should always be sliced. In this manner it prevents the risk of choking the animal, and when thus boiled they cool sooner than when the turnip is boiled entire. In the dairy establishment alluded to, the turnips cooked in this manner became "a *complete* substitute" for grass, after the season of the latter.

Grains when continued too long as an article of food, have a tendency to injure the cow, occasioning grain sickness. The best way to prevent this, is to mix a little boiled linseed, or cut wheat straw, with the grains; and cows should not be kept more than eight or ten months on them at any one time. The yellow and

Swedish turnip, steamed with hay and other mixtures, has formed an excellent succulent food for milch cows during winter and spring, until the return of grass. The Edinburgh cow keepers feed their cows with bran and other messes, at 5 o'clock in the morning, at 1 in the afternoon, and at 7 o'clock at night. Grass in summer, turnips and potatoes in the winter, being given in the intervals. The grass is laid upon the straw, which absorbs the moisture, and is eaten after the grass; and in winter straw or hay is given after the turnips, &c.

In these Provinces it is a custom with many farmers to give their milch cows a warm mess of Indian meal and water, but this grain has a tendency to lessen the secretion of milk. *(To be continued.)*

THE HORSE.

(Continued from page 14.)

Litter.

The Litter of a horse should be frequently removed, for when it gets moistened with urine, putrefaction takes place rapidly, and the vapours of ammonia, or hartshorne are disengaged, which are apt to injure the eyes and the lungs of the animal. No heap of fermenting dung should be left in the stable during the day. The stall should slant gently, so as to allow the urine to flow from it; care however should be taken to prevent a slant sufficient to cause an uneasy posture with the horse, as this constant strain on the back sinews has been the unsuspected cause of lameness. This position upon too great a slant has caused contraction of the heel, by throwing too much and constant weight upon the toe. Gratings and traps leading the urine into reservoirs have been made for horses by those who are very cautious in this matter. It is well to keep a little litter under the feet during the day: The prejudice against this upon the principle that it heats the hoof is incorrect—there should be just sufficient to take off the hardness of the stall. The horse derives comfort from such a practice, and the farmer derives gain, as this litter, moistened with urine is so much added to the compost heap. Straw forms the best litter, as it does not ferment so soon as other substances which are occasionally used. Litter should never be allowed to accumulate under the horse—this is sometimes done, and the animal lays upon a wet fermenting mass, endangering his health.

Light.

Light in a stable is a matter of the utmost consequence, although it is too often neglected. A horse confined for any length of time in a dark stable, will become either a starter, or subject to disease and inflammation of the eyes. Let a man go from a dark cellar suddenly into the light and judge by his own feelings what the horse must frequently suffer, when removed suddenly from darkness to the bright light of the sun. On the other hand there should not be a bright and glaring light constantly on the horse's eyes.—The light should be moderate, and if the stable is rather dark, frequent whitewashings are of service equally for light and purification. The farmer's stable should not be too light; and as all of our readers may not be aware of the influence of light upon the feeding of the horse, we shall transcribe the following fully from the work already quoted. The stable is the resting place of the horse, and the animal retires to it to feed and repose. "Something approaching to the dimness of twilight is requisite to induce the animal to compose himself to sleep. This half

light more particularly suits horses of heavy work, and who draw almost as much by the weight of carcass which they can throw into the collar, as by the degree of muscular energy of which they are capable. In the quietness of a dimly lighted stable they can obtain repose, and accumulate flesh and fat. Dealers are perfectly aware of this. They have their darkened stables in which the young horse, with little or no exercise, and fed upon mashes and ground corn, is made up for sale. The round and plump appearance, however, which may delude the unwary, soon vanishes upon altered treatment, and the animal is found to be unfit for hard work, and predisposed to every inflammatory disease. As a general rule, dark stables are unfriendly to cleanliness, and the frequent cause of the vice of starting, and of the most serious diseases of the eye."

Grooming.

The less of this for a farmer's horse the better, with the exception of rubbing off the hard mud; for regular grooming, by removing the dandriff and lessening the coat of hair, renders the animal more liable to cold. But to the high fed, clothed, and stabled horse, grooming is important; for good rubbing and brushing to this animal, answers the purpose of exercise, by causing a free circulation in the vessels of the skin. Heat and dressing produce a fine skin. Heat, however, injures the health of the horse. Dressing excites the circulation and energies of the vessels of the surface. Rubbing is the best and safest method of obtaining a fine coat. Horses should never be cleaned and dressed in the stable, when the weather admits of their being out by the door. In the former case the dust mingles with and vitiates their food; in the latter case the air braces the constitution of the animal. Horses should not be punished either with the curry comb, or hard, sharp brushes, when their skins are tender; in this case a soft brush is preferable. A hair cloth is best for thin skinned horses. Hand rubbing the legs, especially of tired horses, is very requisite: it revives the animal, it removes enlargement, relieves stiffness, produces warmth, and promotes the appetite; for after this process the animal attacks his food, and afterwards lies down to rest.

Exercise.

This applies more to the high fed stabled horse, than to the Farmer's, as this animal, like his master, has exercise sufficient for appetite and health. Every horse should have daily exercise. The horse that feeds high, and stands idle for three or four days, must suffer: it disposes him to fever, grease, or unsoundness of feet; and if after such idleness he should be ridden fast or far, the danger of disease, especially of the lungs, is increased. A stable fed horse should have two hours regular exercise every day; either under the care of the master, or with some trusty attendant. Regular exercise is of the utmost consequence in the training of a racer. A trained horse will accomplish the work with ease, which would fatigue and induce inflammation in an idle horse. It is a mistaken custom to keep a horse four or five days idle in a stall to prepare him for a future journey. This preparation renders him more liable to fail. Exercise should be proportioned to the age of the horse. A young animal requires more than an old one, but it should not be violent. The exercise should be moderate on quitting the stable; it may be quickened after a while, but the horse should return slowly to his stall.

Bleeding.

This operation is performed either by a fleam or a lancet: a fleam is best in the hands of persons not acquainted with the use of the lancet, which latter is preferred by professed veterinary surgeons. A small piece of hard wood, something like a round ruler, is requisite to strike the fleam. Some people, in bleeding a horse, cord the neck tightly to cause the swelling of the vein; this is objectionable, for the stoppage of the return of blood from the head through both jugular veins, produces congestion of blood in the brain of the animal, and in some instances might do much mischief. The vein selected for bleeding passes along the neck on the upper margin of the windpipe, and is called the jugular vein. Previously to opening it, cut the hair off close to the skin over the intended opening, press the finger on the vein until it sweils, or let an assistant press it; place the fleam over it, and then strike it firmly with the stick—the blow should not be violent, least it drive the fleam through the lower coat of the vein, which has occurred, and caused inflammation of the vessel. A large fleam is always preferable to a small one, as the blood flows to most advantage through a large opening, especially in all inflammatory affections. A handkerchief should be thrown over the eyes of the horse when the vein is struck, to prevent him from staring at the sight of the stick. The finger should be kept below the orifice on the vein to keep it distended, and the head slightly turned to the opposite side. It is sometimes of service to put something in the mouth of the horse to make him work the jaws, which increases the flow of blood by the pressure and working of the muscles. The jugular vein divides into two branches, about two inches from the angle of the jaw, the best place for opening it is about two inches below, this, or four from the jaw bone. Veterinary surgeons direct that the fleam should be placed in a straight line, directly over the centre of the vein, but not exactly touching it, so that the point may enter more readily when struck; but all veins bleed more freely if the fleam or lancet is placed in a slightly slanting direction. When a sufficient quantity of blood is drawn, a sharp pin should be passed through the skin, so as to bring the edges of the orifice in their natural and exact position, a thread or hair may then be passed around the pin in a figure of 8 manner. In thus tying up the vein, care should be taken that the skin is not pulled too far from the vein, whereby the blood escaping between would make an awkward, and sometimes troublesome swelling. The operator should guard against piercing the vein with the pin, an accident which might cause inflammation in it. After bleeding, the horse should be tied up for a few hours, to prevent him from rubbing the wound. The blood should be received in a vessel of known measurement, so as to regulate the quantity drawn, although in severe inflammations, the quantity drawn must be regulated by the pulse, and the effects produced by it. The blood should flow into the centre of the vessel, for if it strikes the side it alters the appearance of the blood, after standing, and prevents it, in some degree, from showing its true inflammatory character. Mr. Weiss, of the Strand in London, has lately invented an excellent spring lancet for bleeding horses, which every farmer and horse-owner should possess. After bleeding, the point of the fleam or lancet should be carefully wiped and dried, as the least moisture from blood would

quickly corrode and injure it. The point of the instrument should be very sharp, as a dull fleam may do mischief. In local inflammation blood may be taken from any of the superficial veins. In suspected diseases of the shoulder, fore-leg, or foot, the plate vein may be opened. This vein comes from the inside of the arm, and runs upwards directly in front of it, towards the jugular vein. In affections of the hinder extremities, blood is sometimes drawn from the saphœna, or thigh vein, which runs across the inside of the thigh. In foot cases it may be taken from the coronet, or much more safely from the toe, not by cutting out as the farmer does a piece of the sole at the toe of the frog, which sometimes causes a wound difficult to heal, and followed by festering and even by canker, but cutting down with a fine drawing-knife, called a searcher, at the union between the crust and the sole, at the very toe, until blood flows, and, if necessary, encouraging its discharge by dipping the foot in warm water. The mesh-work of arteries and veins will be here divided, and blood is generally obtained in any quantity required. The bleeding may be easily stopped by placing some tow in the little groove that has been cut, and tacking the shoe over it.

Inflammation of the Lungs.

Causes.—Sudden exposure to cold —continuance in the cold when the horse is sweating—large draughts of cold water when the horse is warm; hard driving; vitiated air, especially from dung, in close stables, or the vapours of hartshorn from fermenting urine; any sudden check of perspiration.

Symptoms.—The attack is sometimes sudden—at other times preceded by fever. Pulse oppressed, indistinct and rather quicker than usual. The legs are cold, nostril expanded, the head thrust forward, the flanks have a peculiar heaving, a quick hurried motion, indicative of pain, a half or short breathing, as a full breath would cause pain. The inside membrane of the nose intensely red, more vivid in the inside corners of the nostril, even though it should be paler higher up. The countenance anxious, a mournful turning of the head and eyes to the flank, the horse stands stiff, with his fore legs apart, that the chest may be expanded, an unwillingness to move, stands up day and night for a length of time; and if he lies down, he quickly rises again, from the difficulty of breathing when down. In some cases, the symptoms are more treacherous, the horse is somewhat off his feed, his coat stares, legs cold, breathing slightly quickened and shortened, at other times the horse exhibits the common symptoms of cold, catarrh or fever, then comes the foregoing distinguishing symptoms. The cold leg and ear, the quickened breathing, the disinclination to lay down, and the anxious countenance, should always excite alarm. As the disease advances the pulse becomes oppressed, irregular, indistinct, and at length almost imperceptible—the legs and ears assume a clayey deathly coldness, the nostril and breath become cold, the bright colour of the nostril either fades away, or becomes a livid purple—the animal grinds his teeth, he still persists in standing, although he staggers from weakness; he will sometimes hold on the manger with his teeth, till at last he falls, and after a few struggles dies.

The disease may prove fatal in twenty-four hours, or it may continue for a few days. In some cases, the inflammation terminates in mortification and putridity, which are then known by the stinking and offensive discharge from the nose. Sometimes

there is a general apparent improvement in the symptoms, appetite and countenance of the horse, but he still seems unwilling to lie down, he seems frightened if his head is suddenly raised, the coat continues staring, there is a yellowish discharge from the nose, days or weeks may pass on, when at length the horse shivers, the former symptoms return, and he now quickly dies, owing to dropsy, or a large accumulation of water in both sides of the chest, destroying the animal by suffocation. Inflammation of the lungs, when not quickly cured at the beginning is very apt in protracted cases to injure the animal, causing thick wind, chronic cough, roaring and broken wind.

Treatment in our next.

(*To be Continued.*)

COMMUNICATION.

(For the New-Brunswick Agriculturist.)

For several years past I have observed the grass in pasture and meadow lands filled with a frothy matter resembling spittle. This has abounded in such quantities, that it has moistened my feet through my shoes; as much so as if the grass had been wet with rain. Upon examination I found that this froth on the blade of grass contained several small grasshoppers; that it was their nest and protection, and that if they were removed from it when small, and before they were fitted by nature to leave it, they soon died. Every person who has seen the ravages of grasshoppers upon grass and many other vegetable growths during summer, must be aware of the destruction they cause; therefore we should endeavour to prevent the mischief by the destruction of the cause of it. I will, therefore, suggest a very simple contrivance, which I have found successful in a small way; and as the frothy matter prevails early in the season, and before the grass has attained any height to prevent the use of the means proposed, they may be put in practice with ease and certainty. In short, sweep the grass land infested with the grasshopper, with a coarse brushwood broom, constructed for the purpose. The twigs of such a brush being from 16 to 20 inches in length, might be fastened in a frame-work resembling a harrow, made large enough to be drawn by a horse—which in a few hours, with a boy and such a brushwood harrow, would pass over acres of grass land and destroy this insect upon it. Indeed, for want of a better broom, some brushwood of dried thorn, or the like, drawn by a horse, would answer the purpose.

The eggs of these insects, I suspect, are deposited during the preceding Fall, by little white moths, which abound at that season in such places. Those who have time and curiosity for such investigations, would do well to take a sod of grass upon which the eggs are deposited in the fall, and preserve it, that they might watch the developement of the insect, from the egg to the grasshopper.

A Friend to Farmers.

We hope to gratify our readers next month with a description of fruit trees and the cultivation of them in Nova Scotia, by the Hon. C. R. Prescott, a gentleman to whom Horticulture in our Provinces is indebted, for his zeal in the cultivation of fruit trees, in which he has spared neither exertion nor expense, and who has always manifested a praiseworthy readiness to propagate his own knowledge and experience, and to supply the farmer and gardener with scions for engrafting from his valuable collections.

It is to be regretted that, with such facilities for establishing a first rate nursery of fruit trees for sale, some skilful gardener has not devoted himself to the pursuit; good fruit trees, the growth of Nova Scotia, would command a preference, not only in that Province but in New Brunswick, in consideration of climate. The increasing horticultural spirit in Nova Scotia, and the same spirit and existing deficiency of orchards in New Brunswick, will create a demand for fruit trees, sufficient to encourage any horticulturist in the immediate establishment of a nursery. The orders which are annually sent to Boston and New York for trees are premiums upon foreign industry and enterprise, and evidences of colonial neglect and apathy.

ROTATION OF CROPS.

We shall give the philosophy of the interchange or rotation of crops, from Leibig's excellent work on vegetable chemistry; and make copious extracts respecting the practice of it from Jackson's agriculture, so that our readers will have the latest and best authority to direct and assist them in this important department of husbandry, which has been too much neglected in our Provinces; for we have often seen similar crops, year after year, dwindling upon the same field. It may be said, that this constant cropping, regardless of fallow or interchange, is only practiced by the ignorant. We reply—those are the persons whom we wish to instruct. We write for such, and not for farmers, who know all that is requisite; and from whom we are willing to receive instruction, that we may diffuse it throughout the country.

Long experience has proved that the growth of annual plants is rendered imperfect, and their crops of fruits less abundant, by cultivating them in successive years on the same soil; and that notwithstanding the loss of time, a greater quantity of grain is obtained, when a field is allowed to be uncultivated for a year, for during this rest, the soil regains much of its fertility.

Certain plants, as peas, clover, and flax, thrive on the same soil only after a lapse of years.

Hemp, rye, and oats, may be cultivated in close succession, when proper manures are used. Some plants improve the soil; others impoverish and exhaust it.

Fallow turnips, cabbage, beets, summer and winter barley, rye, and oats, impoverish the soil.

Wheat, hops, late turnips, hemp, and flax, entirely exhaust it.

The most powerful manures, even when abundantly supplied, will not always produce abundant crops when continued on the same soil for several years successively.

It is found that a field thus unfitted by successive croppings for any farther growth of the same crop, has not, consequently, been unfitted for all others; hence a system of *rotation* has been established, to obtain the most abundant crops with the least expenditure of manure. Different plants require for their growth different constituents of soil. A soil composed of several different constituents may afford growth to one set of plants, requiring one of those constituents this year, and the next year it may suit another kind, requiring constituents different from the former; and in this manner plants may be alternately cultivated in it, and maintain the fertility of the soil, quite as well as if it were left to rest, or fallow. Experience has proved this fact; from which it would appear that all plants give back to the soil in which they grow,

different proportions of certain substances, which answer as food for succeeding plants. Some physiologists suppose that the roots of plants absorb soluble matter of every kind from the soil, and that some of this being unfit for the nutrition of the plant, is again thrown out by the roots as excrement. They assert, and they are supported in the assertion by analogy, that no excrement ejected by a plant can be again received into the constitution of that plant, and therefore, that the more such ejected matter abounds, the worse the soil becomes for the particular kind of plant that threw it out. This excrementitious matter, however, may be absorbed as food for a different set of plants; and hence is the great benefit from interchange, or the rotation of crops. Leibig observes—"A great number of facts appear to give a high degree of probability to this view. Every gardener knows that a fruit tree cannot be made to grow on the same spot where another of the same species stood, or at least, not until after a lapse of several years."

Some plants thrive best when growing beside one another; others, again, prevent the developement of those beside them, whence it was concluded "that the beneficial influence in the former case depended on a mutual interchange of nutriment between the plants, and the injurious one in the latter on a poisonous action of the excrements of each on the other, respectively. The experiments of Macaire Princeps proved that the roots of many plants emitted extractive matter; that the excretions were most abundant during the night; that the characters and properties of the excrements of different plants are different from one another: and that some plants expel excrementitious matter of an acrid character, whilst other plants throw out mild substances. "Theoretical considerations on the process of nutrition, as well as the experience of all agriculturists, leave no doubt that substances are excreted from the roots of plants, and these matters form the means by which the carbon received from *humus* in the early period of their growth, is restored to the soil."

Let us now enquire whether these excrements, thus expelled, are capable of being absorbed as food by other plants.

The excrement of a carniverous animal contains no nutritious matter for another animal of the same species, but an herbiferous animal, a fish, or a fowl, might find in it some undigested matter, which they could digest, having different digestive organs. Various substances may pass unchanged through the alimentary organs of an animal. These are excrements, and not excretions, and might be digested in the digestive apparatus of another animal. Similar conditions must subsist in the vital processes of plants.

This excrementitious matter undergoes a change, and is eventually converted into a substance, which supplies the place of *humus*, by being a constant source of carbonic acid. The composition of the soil influences the decay of this excrementitous matter. It is quickest in calcarious; and more slow in heavy clay, or loam soils.

"The same plants can be cultivated with advantage on one soil, after the second year, but in others not until the fifth or sixth, merely on account of the change and destruction of the excrements, which have an injurious influence on the plants being completed in the one, in the second year; in the others, not until the ninth.

"In some neighbourhoods clover

will not thrive till the sixth year; in others; not till the twelfth: flax in the second, or third year. All this depends upon the chemical nature of the soil, and it has been found that the time in such cases, cannot be shortened by the most powerful means. The destruction of the peculiar excrements of one crop must have taken place, before a new crop can be produced.

"A soil lying fallow owes its earlier fertility, in part to the destruction, or conversion into *humus* of the excrements contained in it, which is effected during the fallow season, at the same time that the land is exposed to a farther disintegration;" or separation of its particles. The overflowing of lands by water answers the purposes of fallowing, "because the waters of rivers and streams contain oxygen in solution," which enables them to effect the most complete, and rapid putrefaction in the excrements contained in the soil, which it penetrates, and in which it is continually renewed.

"Silicic acid," which is a compound of Silicum and oxygen "is the first solid substance taken up by plants. It appears to be the material from which the formation of the wood takes its origin."

"When we grow in the same soil for several years in succession different plants, the first of which leaves behind that, which the second, and the second that, which the third may require, the soil will be a fruitful one for all the three kinds of produce. If the first plant for example be wheat, which consumes the greatest part of the silicate of potash in the soil whilst the plants which succeed it are of such a kind as require only small quantities of potash, as turnips, potatoes, &c. the wheat may be again sowed with advantage after the fourth year; for during the interval of three years, the soil will by the action of the atmosphere be rendered capable of again yielding silicate of potash in sufficient quantity for the young plants.

"The same precautions must be observed with regard to the other *inorganic* constituents, when it is desired to grow different plants in succession on the same soil.

"The nutriment of young plants, consists of carbonic acid, contained in the soil in the form of humus, and of nitrogen in the form of ammonia, both of which must be supplied to the plants.

"The sowing of a field with fallow plants, as clover, rye, buckwheat," &c. and ploughing these into the soil, when they are nearly in blossom, contribute to the supply of humus.

The *Sainfoin*, or Lucerne grass, affords the most productive supply of humus—the roots ramify extensively; absorb but little inorganic matter, and excretes organic matters abundantly into the soil—the plants, until they have reached a certain period of their growth, retain all the carbonic acid and ammonia which may have been conveyed to them by rain or the air, through their roots and leaves. They prevent the escape of ammonia from the soil, by completely covering it in." Hence it would appear, that Lucerne must form one of the best fallow plants with which a field can be sowed. The principles which regulate the rotation of crops, "are the artificial production of humus, and the cultivation of different kinds of plants upon the same field, in such an order of succession, that shall extract only certain components of the soil, whilst it leaves behind or restores those which a second or third species of plant may require for its growth and perfect developement."

The seeds, roots, and leaves of plants, must gradually remove some

of the constituents of the soil; and although the quantity of humus may be increased by artificial cultivation, still we must replace the substances which have been removed, to preserve the fertility of the soil; and this is effected by *manure*.

(To be continued)

THE COLONIAL FARMER, edited by Mr. T. Smith, and published by Mr. R. Nugent, Halifax. We have received the first number of this paper, devoted to the agricultural interests of Nova Scotia, New Brunswick, and Prince Edward Island; and as the editor and proprietor have evinced their praiseworthy zeal in the cause of agriculture, we hope their efforts may be rewarded with corresponding encouragament. We have already expressed our sentiments respecting agricultural periodicals. They have done good in other countries—they will do good in our Provinces, if they are properly supported. The literary seed is now sown: its growth, success, and fruition, depend upon the agriculturists. If they cultivate and protect it, it will prosper; but if it fails, we must deplore the intellectual, as well as the physical difficulties which oppose the progress of agriculture in our Provinces; for we repeat that the Press has been, and is, in other countries, and can be, and will be, if encouraged, in these colonies, a powerful engine in agriculture. The "*Colonial Farmer*" is not embellished with plates, agreeably to the prospectus of it, as the House of Assembly in that Province refused any appropriation in its favour, and the proprietor is unwilling to meet the additional expence, until he finds himself sufficiently supported. Respecting the continuance of his paper he observes: "The *Colonial Farmer* being now fairly before the public, we have concluded not to publish another number until our prospectuses, now scattered over the Provinces, are sent in. When this is done, we shall be better able to judge what amount of support we would receive, and can then determine whether to go on with the work or not." We recommend it to the favourable consideration and protection of the Farmers of New Brunswick.

We beg leave to remind "*A Friend*," of his promise to favour us with his opinion of the short horned cattle as the best breed for these Provinces; and we, at the same time, repeat our appeal to the agriculturists throughout both Provinces for communications upon Farming matters; or for questions upon such matters, and to which it may be in the power of the Editor to return answers, extracted from approved agricultural works, or obtained from other satisfactory sources.

IMPLEMENTS AND MACHINES.

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1. FOR OPERATIONS ON THE SOIL.

Ploughs, 2 horse, Iron swing, from the most approved makers. 80s. to	£5	0	0
Extra mounting for do. *per set*,	0	18	0
Draft bars, or swing trees, for do.	0	10	6
Bachop's new iron Plough Yoke for 3 horses,	1	1	0
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Ploughs, Subsoil, of sizes from 200 to 400 lbs. 100s. to	8	10	0

This Implement, invented by Mr. Smith of Deanston, for the purpose of breaking up the subsoil without bringing it to the surface, is now extensively used, and attended with the most beneficial effects.

Soam chains for ditto, 7s. 6d. to	£0	10	0
Draft bars, for ditto, for 3 and 4 horses,			
Do. do. for do. with six horses,	1	2	0
Do. do. Deanston new equalizing with pulleys & chains, 60s. to	3	10	0
Plough, deep Furrow or Trench, wooden, on the model of the one used by Mr. Smith for turning up and mixing the soil to full depth, which had, in the preceding rotation, been penetrated by the subsoil plough,	4	0	0
Do. do. of Iron, 140s. to	8	10	0
Do. M'Ewan's, new draining, 2 sizes, 168s. to	11	0	0
Draft bars, and chain, for do.	4	4	0
Harrows, Rhomboidal and others of the most approved construction, 46s. to	2	10	0
Do. do. extra sized wooden or Brake, for 4 horses, with draft bar,	5	0	0
Do. do. Grass, wooden,	2	10	0
Do. do. do. iron, 70s. to	4	4	0
Rollers, cast iron, of sorts 240s. to	17	0	0
Do. wooden, complete, 100s. to	10	0	0
Finlayson's improved Harrow or Grubber, of sizes, 130s. to	10	0	0
Spades, of sorts, for ditching, &c.	0	4	0

(To be continued.)