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NEWCASTLE  FARMER.

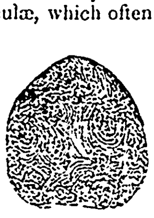
VOL. II.—NO. X. COBOURG, JUNE 1, 1848. THOS. PAGE,—Editor.

BLIGHTS OF THE WHEAT.

CHAPTER V.

The fungi described in the previous chapters are those to which the principal fungal diseases of wheat are due; and that portion of this treatise being completed, it is time to proceed to the consideration of the ravages of certain minute animalculæ and insects whose effects are known to the farmer, without his being generally aware of the real character of the causes which produce them. The blights of this kind proposed to be investigated are such as are the results of the attacks of true and extremely small parasites. For the notice of other destroyers of the wheat there is no space; nor is it necessary, since they are within the reach of common observation, and do not require the aid of the microscope to reveal them. The first insect to be brought before the reader is one of the most singular of living creatures; and were its habits not thoroughly investigated and proved, they would seem almost incredible. Its attacks are confined to the farinaceous portion of the grain, which it destroys and replaces, producing the diseases known by the name of ear-cockle, pepper-corn, or purples. A grain of wheat infected by this blight assumes the appearance of a black pepper-corn, whence the second name is clearly derived. The whole ear is altered in appearance; the chaff husks open, and the awns become curiously twisted, so that such ears are easily distinguished from the healthy crop. The grains first turn dark green, and then black; and, as has been said, look exactly like little black pepper-corns. If one of them be divided into two with a pen-knife, it will be found completely filled with a dense white cottony mass, occupying the place of the flour, and leaving merely a little glutinous matter. These contents seem to the eye like a quantity of fibres, closely packed together in parallel directions; but if a little morsel is taken on the end of a pin, and put on a slip of glass and moistened, it will soon be seen to divide, and give a milky appearance to the water. But, on submitting it to a powerful microscope, the astonished observer will soon discover that the cottony mass is a dense body of living eel-shaped animalculæ, which often wriggle about with great vivacity.

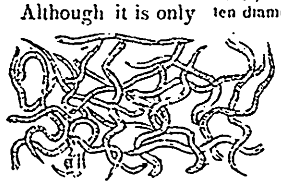
Accordingly the name given to the disease is *vibrio tritici*, the eel of the wheat. The annexed diagram is a faithful representation of a grain of wheat cut across when occupied by these *vibriones*, and the downy mass as is seen, filling the interior.



Transverse section of a grain of wheat filled with *vibrio tritici*, magnified ten diameters.

In the other drawings, the eels are seen, as they are viewed by the microscope, magnified 130 diameters, and also the egg of one of them, with the young vibrio coiled up in it, magnified 200 diameters; to which reference will be subsequently made. Although it is only

Egg with the vibrio coiled up, magnified 200 times.



The vibriones, magnified 130 diameters.

within the last four or five years that the attention of our men of science has been awakened to the real nature of this curious insect, for which we are more particularly indebted to Professor Henslow, its real character was not unknown to observers of the last century. In an interesting publication, which came to a second edition in 1764, entitled "Employment for the Microscope, etc.," by Henry Baker, Fellow of the Royal Society, this vibrio is noticed. His remarks on it are as follow: "The discovery of a certain kind of *anguillæ*, or animals resembling eels, in blighted wheat, was accidentally made by my very ingenious friend, Mr. Turberville Needham, in the summer of the year 1743, in the manner described by himself in his curious book of New Microscopical Discoveries. These animalculæ are not usually lodged in such blighted grains of wheat as are covered externally with soot-like dust, whose inside is likewise frequently converted into a black powder; but abundance of ears may be observed in some fields of corn, having grains that appear blackish, as if scorched; and such, when opened, are found to contain a soft white substance, that, attentively examined, seems to be nothing else but a congeries of threads or fibres, lying as close as possible to each other in a parallel direction, and much resembling the unripe down of some thistles, on cutting open the flower-heads before they begin to blow. This fibrous matter discovers not the least sign of life or motion, unless water be applied to it; but immediately on wetting, (provided the grains of wheat are newly gathered,) the supposed fibres separate, and prove themselves to be living creatures, by motions that at first are very languid, but gradually become more vigorous, twisting or wriggling themselves somewhat in the manner of eels in paste, but always much slower than they, and with a great deal less regularity; for in them the head and tail are constantly moving contrariwise, and alternately, with the same kind of bending or undulation in the bodies of them all; whereas the animalculæ we are now describing have no uniformity in their motion, but bend their extremities sometimes differently, and sometimes in the same direction. If the grains of wheat are grown dry by keeping, and you cut them open in that condition, the fibrous matter is very distinguishable, and, on putting water to it, will separate with great readiness, and seem like fine tubes or threads tapering at both ends; but not the least motion or symptom of life will be perceived till they have been in water for some hours; nay, frequently they will never revive or come to move at all. But if the same grains be steeped in water for some hours, or buried for three or four days in earth, till they are fully saturated with moisture, and then opened with a penknife, on taking out a small portion of the white matter carefully, and spreading it thin upon a slip of glass, the animals may be seen bundled together, and extended longitudinally, but without motion; and though, upon the application of water, they will not revive so soon as those taken from fresh grains, whose moisture has never been exhaled, yet, after abiding an hour or two in water, we have constantly found them alive and vigorous; and that notwithstanding the grains have been kept in a dry condition even for some years, of which I have a remarkable instance now before me.

"In the month of August, 1743, a small parcel of blighted wheat was sent by Mr. Needham to Martin Folkes, Esq., President of the Royal Society, with an account of his then new discovery; which parcel the president was pleased to give me, desiring I would examine it carefully. In order so to do, I cut open some of the grains that were become dry, took out the fibrous matter, and applied water to it on a slip of glass; but could discern no other motion than a separation of the fibres or threads,—which separation I imputed wholly to an elasticity in the fibres; and perceiving no token of life, after watching them with due care, and repeating the experiment till I was weary, an account thereof was written to Mr. Needham; who having by trials of his own found out the cause of this bad success, advised me to steep the grains before I should attempt to open them; on doing which I was very soon convinced of his veracity, and entertained with the pleasing sight of this wonderful phenomenon. Since then I have made experiments, at different times, with grains of the same parcel, without being disappointed so much as once; and particularly on the 4th day of July, 1747, finding some of the parcel left, I soaked a couple of grains in water for the space of thirty-six hours; then believing them sufficiently moistened, I cut one open, and applying some of the fibrous substance to the microscope in a drop of water, it separated immediately, and presented to my view multitudes of the *anguillæ* without the least motion or sign of life. But experience having taught me, by former trials, that they might notwithstanding possibly revive, I left them for about four hours, and then examining them again, found much the greatest number moving their extremities pretty briskly; and in an hour or two after, they appeared as lively as these creatures usually are. Mr. Folkes and some other friends were witnesses of this experiment."

There can be scarcely found a more interesting microscopical object than these vibriones. Mr. Baker's account of the phenomena they exhibit is as accurate as possible. Curious as the whole matter is, and well as it has been described by him as witnessed almost a century ago, modern microscopists have been as much surprised as he was by these sights, which any person possessing a tolerable instrument may readily enjoy.

The vibriones did not, however, escape the notice of Mr. Bauer, who read before the Royal Society in the year 1822, an account of his "Microscopical Observations on the Suspension of the Muscular Motion of the *Vibrio Tritici*." His excellent drawings of this insect are in the British Museum, where, by the kindness of the gentlemen to whose care these valuable specimens of art are committed, they were examined by the author. Some of them have since been used by Mr. Curtis, to illustrate his observations on the various insects affecting the corn crops, published in the sixth volume of the Journal of the Royal Agricultural Society. He considers that the vibrio belongs to the class *infusoria*, and believes with others that its eggs are taken up by the sap, and are hatched in the stalk and germen. When the grains containing the vibriones are sown with good seed, they burst in the spring, and set the animalculæ at liberty. It is stated by the best entomologists, that the eels sometimes reach the size of a quarter of an inch in length, and that, at a short distance from the extremity of the tail, they have discovered an orifice whence the eggs issue in strings. The young worms are coiled up in them, as seen in the drawing. Mr. Curtis says, "the eggs come forth in strings of five or six together, and are detached in water: the young worms can be seen through the transparent skin. In about an hour and a half after the egg is laid in water, the young worm begins to extricate itself; which it took one of them an hour and twelve minutes to accomplish." When largely magnified the head of a vibrio is easily seen, and its curious formation may be observed. It is furnished with a sort of proboscis capable of contraction or extension, like the tubes of a small telescope. The eggs being laid in water, unquestionably facilitates their being taken up by the roots into the interior of the stem; whence the young ones find their way, as soon as hatched, into the nascent ovule, before the appearance of the young ear. Although the larger vibriones which lay the eggs after coming out of the bursting cockles reach the size just mentioned, those contained in the grain are exceedingly minute; these are so small, that forty or fifty thousand are computed to be sometimes gathered into the soft stringy mass of a single ear-cockle. The large ones die soon after laying the eggs, while those occupying the infected grains retain their capability of exhibiting signs of active life after they have been immured for years in their dark and confined receptacles. Kept for six or seven years, and treated as Mr. Baker directs, they will sometimes exhibit considerable powers of motion. It is almost impossible to decide how this vitality can be preserved, but it has been attributed by some writers to the glutinous matter which has been noticed as still remaining in the ear-cockle. Still this is nothing more than a conjecture. To examine them effectually, the observer should soak the cockles in tepid water for about a couple of hours before they are divided: they will then generally be found very lively, and may be kept in that condition a good while in a little water. Indeed, it is possible to preserve them in this way for several weeks, and keep them ready to show: but if the person to whom they are to be exhibited has never seen them before, the best way is to take them at once from an affected grain, lest so incredible a circumstance as their coming from such a source should be doubted. They are rarely met with in any grain except wheat. In some parts of the kingdom, this disease prevails considerably, while in other parts it is scarcely to be met with at all. Probably the best remedy would be to soak the seed in water sufficiently warm to kill the vibriones, which cannot stand a high temperature; but it must not be hot enough to destroy the vitality of the good seed. The author has frequently shown them to farmers, and witnessed their extreme surprise. One individual, having viewed them with astonishment, met his miller in the street—"You," said he, "may fancy you know a good deal about corn, but you little know what you often grind;" and it would be well most certainly for those who are conversant with this principal portion of the food of man, if they were better acquainted with its real properties and with its diseases.

PRINCIPLES AND EFFECTS OF DRAINING.

Continued from page 98 of Newcastle Farmer.

Draining prevents the injurious effects of the stagnation of water. It does not, of course, and cannot, diminish the quantity of water which soils receive from the atmosphere; but, besides rapidly drawing off excessive supplies of it, and averting some most mischievous effects which an excess of it produces upon climate, soil, and vegetation, it prevents a malign chemical transmutation of its own properties from stagnation. The running water of streams is, in general, free from the excrementitious refuse of plants, and charged with carbonic acid, saline solutions, and comminuted alluvium; and it, in consequence, acts beneficially, for some time at least, upon fine and nutritious herbage, and occasions all the rich and luxuriant vegetation which is well known to characterize irrigated meadows. Even water which wells up in the form of springs from the bowels of the land is, in numerous instances, so highly charged with carbonic acid and saline matters as to act nutriently upon many fine and useful land-plants; and, generally, when it has an opposite effect, and produces the same kind of mischief as arises from an excess of surface water, it really ceases to be proper spring water, and is converted by the local peculiarities of soil and level into water of saturation. But stagnant water, whether from rain, from canals, from pent-up streams, or from repressed and smothered springs, is, in all instances, destitute of the carbonic acid and the alkaline mixtures which nourish vegetation, and more or less charged with vegetable excrementitious matter which is injurious to cultivated crops. No horizontal current passes across a collection of it to carry off its solutions of vegetable excrement, or to spread it out in a succession of surfaces for aeration; but, on the contrary, a slow ascending current rises vertically through it, occasioned by evaporation from the surface—a subordinate descending current falls perpendicularly downward, occasioned by a lower temperature below than above; and the consequence is, that the roots of plants immersed in it, instead of being fed with aqueous solutions of all the valuable gases of the atmosphere, are steeped and sometimes almost drowned in a liquid which presents them with scarcely a particle of nourishment, and which is drugged and polluted with accumulations of vegetable excrement. All stagnant water, no matter how limpid, possesses more or less of the disgusting insipidity which indicates the absence of carbonic acid; and very many specimens of it possess a foulness of both taste and colour which indicates unwholesomeness of condition. If draining, therefore, did no more than prevent the stagnation of water around the roots of plants—did it merely maintain such a current or circulation in water as should keep it in a fresh condition—it would exert a great and benign influence upon the vegetation of the farm. All this is true respecting stagnation in its mildest forms or initial stages; and as to stagnation in fens, morasses, and vegetating ponds and ditches, the draining of it amounts to the averting of fevers and pestilences from man and all the domestic animals, and of death and extermination from almost all kinds of vegetables except the lowest species of aquatic cryptogams.

The draining of wet land greatly raises the average spring and summer temperature of the soil, produces an effect upon the early ripening of hardy crops, and upon the hardiness and vigour of half tender plants, equal to what would result from cultivating them a number of degrees nearer the Equator; or, in some instances, it occasions so great an increase of genial warmth as practically to convert a drained field of Britain into a field of strictly kindred powers to those of an undrained field of the same composition, exposure, and elevation, in the south of France or the north of Italy. Evaporation is the only means by which the stagnating and the saturating waters of undrained land can escape; and at whatever temperature this takes place, whether high or low, it consumes, in the susception of every pound of water, as great a quantity of heat as can be evolved from the combustion of nearly 2¼ ounces of coals. Suppose the aggregate fall of rain on an acre of land to amount in a year to the depth of 30 inches, and suppose only the one-half of it to be dispersed from that acre by evaporation, the total quantity evaporated throughout the year would be 54,450 cubic feet or 1,519 tons, and this would amount on the average to 4.16 tons per day, and would absorb and carry off a quantity of heat equal to all which could be obtained from the daily combustion of about 12 cwts. of coals. Now all this enormous quantity of heat is either actually extracted from the soil on which the evaporating water lies, or is intercepted from the sun's rays, and prevented from entering the soil by the process of evaporation; so that the whole of it is truly and absolutely lost for the purposes of vegetation. The depression of terrestrial temperature consequent on evaporation, or on the want of drainage, is thus so great as almost to confound vulgar belief; and this depression must, in every instance, be proportionate to the degree in which the water of stagnation or the water of saturation exceeds the quantity of circulating water requisite for vegetation. "Soils in that state must necessarily be very cold in the spring months, and much colder at the time of the commencement of vegetation, and throughout the summer, than well-drained or naturally drier lands. If we knew the capacity for heat of any given soil, and the weight of water mixed with it in excess, over the proper complement necessary for vegetation, it would be easy to determine, very nearly, the depression of temperature caused by its evaporation. We know that the heat of a pound of water in its gaseous state—that is, as steam, would raise the temperature of about 1,000 lbs. of water one degree; so that if the specific heats of the solid and the fluid bodies were alike, the evaporation of a pound of water would keep down the temperature of 1,000 lbs. of earth one degree, of 500 lbs. two degrees, and so on." But water also throws back into the atmosphere, by radiation, a vast quantity of heat, which, but for its presence, would be received and retained by the soil. Water has been abundantly proved to be one of the most powerful radiators of heat, or one of the most rapidly cooling substances, with which we are acquainted; and during frost, steaming water will acquire a coat of ice sooner than water cold from the well, and boiling water thrown on the ground will freeze sooner than cold water. A wet surface, therefore, is altogether incapable of enjoying, for any considerable time, a genial heat in even the finest and warmest weather; for, in addition to the enormous amount which it wastes in evaporation, it possesses but for a brief period the richest acquisitions of it from sunshine till they become dissipated and lost by radiation. Nor is this all. Stagnant water is one of the very worst conductors of heat, and, in consequence, seriously obstructs the absorption of heat from the sun's rays by the subjacent soil; and it also acquires a slight increase of weight from the loss of heat by evaporation and radiation, and, in consequence, maintains within itself a constant series of displacement of its warmer atoms from below by the descent of its cooled atoms from above. The stratum of it which occupies its surface, in the cool of the evening, or at a fall of temperature during the day, cools, becomes heavier by cooling, and immediately descends, and this film of cooled and condensed water is immediately replaced by warmer and lighter portions, which speedily form another film; and thus stratum after stratum cools, condenses, and descends, each giving off a portion of its heat by radiation, and forcing upward a body of atoms warmer than itself, until. in extreme circumstances, the whole mass of water attains its maximum density, or has sunk to the low temperature of 42deg. By all these methods, then, evaporation, radiation, non-conduction, and increase of density, the water of stagnation—as well as in a large degree also the water of saturation—exerts a constant and enormous refrigerating influence upon soil.—"On the other hand, when a soil is naturally so porous, or is brought into such condition by art, that rain water can sink down into the earth, it becomes a carrier, and alert purveyor, instead of a robber of heat; and tends to raise permanently the temperature of the mass of useful soil; and this more particularly and beneficially during the vegetative season. Rain water, at that time, conveys downwards the more elevated superficial heat of the soil, and imparts it to the subsoil in its course to the drains; it leaves the soil in a fit state to receive fresh doses of rain, dew, and air, and in a better condition to absorb and retain heat, at the same time that it promotes, in other ways, its fertility and productiveness."—*Rural Cyc.*

WHAT HAS CHEMISTRY DONE FOR AGRICULTURE?

By J. Cameron, Esq , *of the Agricul. Chem. Ass'n of England.*

The explanation of the most beautiful and wonderful phenomena of nature has been the result of chemical investigation. The atmosphere which surrounds our globe has been subjected to the process of the chemist with the greatest care, and the result has been its separation into simple elements, which, when examined, are found to be the only elements fitted to fill that part in creation to which a wise providence has appointed them.

The atmosphere, although little known in comparison to other elements which occupy a prominent part in the sustentation of animal and vegetable life, is the most important of all. In supporting the vital operations of the animal and vegetable kingdoms, it serves a very important purpose, and is indispensable in the highest degree. We sometimes fancy when we glance over the wide field of nature, that there are many superfluities which could be dispensed with, if regarded in a utilitarian point of view; but however well-founded such fancies might be with regard to many things which minister to our comfort, the absence of the air we breathe would speedily put an end to all animated beings. The oxygen of the air is respired by animals, in place of which they give off a very heavy sluggish gaseous body, which has received the name of carbonic acid. This carbonic acid is found in a very small proportion in the atmosphere; and still, in this small proportion it acts a very important part in the economy of nature. It might be naturally inferred, that when so much of this substance escapes into the air from the constant respiration of animals, that it would form a very considerable bulk of that mobile fluid which surrounds our globe; but such is not the fact, although many sources send it forth into the atmosphere, exclusive of the lungs of animals. All animal and vegetable bodies which undergo decay in the presence of moisture and air, give off carbonic acid; and from many springs, and other natural sources, it is constantly passing from some other state in which it existed into that of the gaseous body, in which form it is found in the air. When any strong acid is poured upon a piece of marble or common limestone, this gas is given off: it is a compound formed of one carbon and two of the gas oxygen. It exists often in large quantity at the bottom of old wells and coal pits; and some years ago the grave-yards of the metropolis yielded so much of this gaseous substance, that a process of ventilation had to be introduced into the deep graves in order that the lives of the labourers might not be endangered by its suffocating influence. It is so heavy that it can be poured from one vessel into another; and when a light is introduced into it, the flame is immediately extinguished. It is one of the products of combustion when a body containing carbon is burned in the air, the formation of this compound is an immediate result. It is a very curious fact, that although it is formed of one of carbon and two of oxygen, which act such an important part in sustaining animal life when separate, they act, when combined, in the very opposite manner.

This law shews the beautiful harmony which exists over all the works of nature; and although we are not able to grasp within the range of our limited powers the wisdom and goodness which are displayed in all those laws which regulate the organic and inorganic world, still we can see enough to cause our hearts to ascribe with gratitude all the praise to Him who framed them in wisdom and sustains them by his power.

This gas (carbonic acid) which is given off from so many sources, acts an important part in the vegetable kingdom. It is taken up by the plants, decomposed in their interior by chemical and vital process; and the oxygen, which is so necessary to animal life, is given off into the air, and the carbon with which it was united is retained by the plant to form the materials of its body, which are destined to serve the purpose of nourishment to animals at some future period. The oxygen, as it were, is but the carrier of carbon to the plant, which forms upwards of the half of the weight of all plants. In this form the carbon enters principally into the plant, although it is maintained by some that other compounds, containing carbon, may be taken up in various ways in a state of solution from the soil, and be decomposed in a similar manner in the interior of the plant. The carbonic acid of the air, although existing in very small quantity as an element of the atmosphere, is one of the most important constituents of which it is composed with regard to vegetation. When the plants spread out their leaves in every direction during their growth, it is constantly absorbed during the day, and is then decomposed by the aid of light; but during the night it is given off by the plants—a reason why flowers and plants of any description ought to be excluded from close bedrooms during the darkness.

Many of the compounds of plants on which their principal *nourishing properties depend, are composed of carbon* (charcoal) and water, or the three elementary substances, carbon, hydrogen, and oxygen. The oils and fats, starch, gum, sugar, and various other compounds, are composed of these elements entirely, which are formed in the body of the plant to complete its structure, and bring it to a healthy maturity, and to form food for man and beast.

Those plants which have large spreading leaves extract a very large proportion of their bulk from the atmosphere, and it will naturally follow that their power of improving the soil will not be so great as the plants which possess small leaves, that present little surface to the air, from which the others draw so considerable a proportion of their food. Hence the benefit of green manuring with those plants which extract the principal part of their food from the air. When these plants are ploughed into the soil in their green state, it is adding organic matter from an inexhaustible source; and if they contain nitrogen to any extent, their decomposition is very rapid, so that the soil is enriched with food easily made available to the growing crop.

The currents of electricity which pass through the air during thunder storms, influence the growth of vegetation considerably. After the rain descends, which is generally the case after thunder, vegetation assumes a beautiful green appearance, which is ascribed to the action of nitric acid formed in the air, which combines with volatile matters, such as ammonia and other substances, resulting from the decomposition of animal and vegetable bodies on the surface of the earth, and ascending into the atmosphere, from which they are carried down again by the rains, partly in combination with the nitric acid, and thus contribute in a very material degree to promote the vigorous growth of plants. The nitrates have been long recognised by Agriculturists as compounds highly beneficial in promoting the growth of certain crops. The nitric acid which is found in the air, in the soil, and in the dungheaps, combines rapidly with the various alkaline substances with which it comes in contact, each and all of which have been found to prove less or more beneficial when applied to the soil.

The progress of chemical science in connexion with Agriculture has elucidated many valuable truths, regarding the knowledge of which practical men have been working hitherto, with few exceptions, totally in the dark. And the most convincing proof of this is the amount of information which is being daily diffused over the country by those publications got up on a cheap scale, detailing the results of the scientific experimentalist, and the successful issue of many of those suggestions arising principally from the labours of the chemist in his laboratory. The chemist has long been aware of the composition of the air; but the various functions which it performs in reference to the vegetable kingdom, are only partially known; but of this grand truth is he fully convinced, that so far as his knowledge of its nature extends, it is perfect in its adaptation.

The various ways in which the atmosphere influences the plant during the progress of its growth, form but a part of the means which nature employs in bringing forth the inexhaustible resources of the soil.

The air is one of the most active agents in the formation of the soil, and in modifying and reducing it to a state fitted to support vegetation. The solid rocks are broken up by the combined action of frost, rain, and air; and when the soil is ploughed up it undergoes a chemical change in its constituents by exposure to the atmosphere.

In the soil frequently (especially in the undersoil) substances exist which are known to have an injurious effect on vegetation—such as protoxide of iron and magnesia, if existing in any considerable proportion. But when brought to the surface, and exposed to the rays of the sun and the influence of the air, the protoxide of iron is changed into the mild peroxide by receiving more oxygen from the air; and the magnesia, which probably existed in a state of hydrate, or in some other form unfavourable to vegetable life, is soon changed into carbonate, in which state it is less liable to injure vegetation.

There is a ceaseless action going on in the surface soil, one substance deoxidising another at the expense of the air, the equilibrium of which is again maintained by the oxygen, which is returned to it by all living plants. Thus we find various links in the great chain of physical laws which contribute to our sustenance, yet all harmonising in the most regular and beautiful order; and it is the highest point which the man of science ought to aim at, the rendering them subservient to the purposes of mankind. The achievements of science are many, but they are still comparatively in their infancy when we take into account what is yet required in the various arts that minister to the countless wants of society. And if Agriculture is one of the noblest, and undoubtedly the most useful of them all, we trust the day is fast approaching when the produce of the green fields will be greatly increased by that knowledge which is radiating from the various departments of science, in order to rationalise the practice of the Farmer, on which the sustenance of society depends.

QUADRUPEDS INJURIOUS TO VEGETATION.

THE MOLE.

It has been maintained by some, that moles, by destroying worms and larvæ, as well as by loosening the soil, confer a benefit on the Agriculturist; while others believe that worms themselves are beneficial by rendering the soil more pervious, and that moles are injurious by disturbing the cultivated plants, injuring their roots, and overwhelming them by the heaps which they so frequently cast up, and which, at all events, are unseemly, especially in pastures and lawns, as well as in gardens and nurseries. The general opinion certainly is that they are much more noxious than beneficial, and thus they are assiduously hunted and destroyed, being usually caught by springs and traps set in their runs.

Whoever examines the organisation of this animal, and considers its habits, will readily perceive the adaptation of means to ends, of which it furnishes so intelligible an example. The great strength of its anterior limbs, and of the bones and muscles connected with them, together with the singular breadth and firmness of the feet; the shortness and strength of the neck, and the conical form of the head, with its mobile snout, to which, as in the hog, a peculiar cartilage gives firmness, readily account for the celerity with which it bores its way through the soil. Eyes of the ordinary kind would be useless to an animal that resides almost constantly under ground; and external ears would impede its progress, or be liable to be injured. The deficiency of the senses of seeing and hearing is compensated by the perfection of the general sense of touch, which enables it to perceive the slightest tremor of the ground. It is an extremely active animal, constantly impelled by an excitable temperament, and is almost continually excavating a passage for itself, in quest of earth-worms, which are its principal food, as well as larvæ and beetles, and throwing up the earth at irregular intervals, in the form of heaps. Its operations are conducted in the most efficient manner, for it forms a principal gallery or run, from which it drives passages on either side. In winter, its labours must be greater than in summer, for then the cold drives the worms to a greater depth in the soil. At that season, however, it is said to become for a time entirely torpid, or at least to pass a great part of its time in a kind of nest, which it has formed of grass and leaves. There is reason, however, to think, that in the lower parts of our districts it does not intermit its labours in winter. Any one who collects insects at that season, knows that great numbers of Coleoptera of about fifty species are to be found among the moss and herbage, or under stones, by walls and roads, as well as grassy banks, and that during and after snow-storms the snow accumulates and remains long unmelted in such places. In the winter of 1846–7, when the snow had disappeared from the banks and dykes about Aberdeen, the sward was everywhere to be seen perforated by the moles, which had devoured most of the insects and mollusca. They had no doubt been driven from the open fields by the frost, and found an asylum under the snow-wreaths. Shrews also find food in winter in the same manner. It is generally in the most fertile lands that moles are most abundant; but they occur also in barren pastures, and even in the more elevated valleys, although with us they are scarcely ever seen beyond the limits of cultivation. In dry gravelly soils, their runs are often so near the surface as to be traceable with ease; but in rich soil they work at a greater depth. The males, it is said, are more numerous than the females, which produce from three to six young ones, early in summer, placing them in a nest composed of grass, under a large mole-hill. It appears that several broods are reared in the season, for young ones have been found from June to September. It is principally in May and June that the mole changes its fur, which, when new, is remarkably glossy, and on the thorax more tinged with brown than afterwards. With us there is little variation in the tints of the fur, although shades of black or grey may be met with. White or cream-coloured individuals are sometimes seen, and there are places in which they are rather common.

The mole is remarkably voracious, and soon perishes if deprived of food. It is also very pugnacious, active, and energetic. Its habits have not been well investigated in Scotland, familiar though it be, and it is very doubtful whether with us it forms the regular and methodical burrows described by M. Henri le Court, as worked by the moles in France. According to him, each individual appropriates to itself a district, or space of ground, in which it forms a kind of fortress under a hillock raised in some secure place, as beneath a bank, or near the root of a tree. In this eminence, of which the earth is rendered very compact, is formed a circular gallery, communicating by several passages, with a smaller gallery placed above it by several passages. Communicating by several passages with the outer gallery, is a long principal burrow, or run, from which the animal bores its way on either side, in search of food. As it traverses this path several times each day, it is in that snares are laid for its capture.

A common way of destroying it is by means of a kind of spring, formed of a twig fixed into the ground by one end, and bent, so that the other touches the surface, while there is appended to it a loop of cord, fastened to another, enclosed in a tube of wood or iron, introduced into a run or gallery, the animal in passing through which, displaces the peg, by which the end of the twig is kept down, and the latter springing up, carries with it the mole suspended and strangled by the cord. But various other traps are used, of which it is unnecessary to give an account, as in most districts there are persons who make mole-catching a profession.

SUPERIORITY OF STEAMING OVER BOILING.

George Coats Esq. of Norton, made the following remarks on this subject:—

In the result I must say that I was forcibly struck by the decided superiority of steaming over boiling, as shewn by the difference in the appearance and improvement of the cattle; for, although they were not weighed, the superiority of those fed with the steamed food was quite apparent, proving to my mind that the system of steaming the food was much better than that of boiling the linseed, the cattle having had in each case equal quantities of the compound. I do not mean to assert that Mr. Warnes' plan does not answer well, and is superior to the old system of feeding; but, as far as my experience has gone, the process of steaming the food has answered better. I prepare the food every day, but on Saturdays a double quantity, to serve over Sunday, and find that, on the Monday morning, it still remains perfectly sweet, and the cattle devour it with the same avidity as when first made. I would not, however, advise any one to keep it longer, as I feel pretty certain, if kept above forty-eight hours, fermentation will take place, and the compound be spoiled.

The cost of the compound entirely depends upon the quantity of corn and linseed used. I consider that, for a draught horse, one-and-a-half lbs. per day of linseed is quite sufficient to maintain them in a good thriving condition; if this quantity is exceeded, it affects the kidneys, and, instead of improving, they are weaker for it. Young horses, and those that are not at regular work, may have a little more. I give my feeding cattle in their compound as much as three lbs. of linseed per day, and to my holding stock a single feed of the compound containing from one lb. to one-and-a-half lbs. of linseed; this keeps them thriving, and makes them grow well when turned out to grass.

Another advantage in this system over the old method will be found in seasons when your turnips are all done, and oil-cake dear, you are obliged to dispose of your feeding cattle at a time when you would consider it an advantage to have kept them on a little longer. To my feeding cattle I give turnips along with the compound when I have them, and if I have none, then they require to be watered; they do not, however, drink much when fed upon steamed food: it is also much better to pursue the system of feeding cattle than to force turnips on land not adapted to their growth.

In preparing the compound, the crushed linseed is boiled in the usual way, the cut straw, hay or chaff, being first well moistened with water, is put into the steamer, which has a false bottom, with holes to admit the steam from the steam chamber or cavity below, into which it is brought by pipes from a boiler of one or two horse power. In mixing the compound, a layer of cut hay or straw, about five inches thick, is put, then the mucilage or jelly of the boiled linseed is thrown upon it, with a little salt, and the whole well mixed together; when mixed, it is well trodden or beaten down. The same apparatus answers for steaming potatoes, turnips, or other food; but when used for potatoes, there is a drain from it which takes away the superfluous moisture, which otherwise would be injurious.

APPLICABILITY OF THE BOILING OR STEAMING SYSTEM TO SMALL FARMS.

Mr. PARRINGTON stated that he had long been convinced of the advantages derived from this system in large establishments, but had considered it not easily applicable to small farms:—

This difficulty (he said), I have endeavoured to overcome, and I consider that I have hit upon a plan, which, for simplicity and economy, deserves recommendation, as, by following it, the system of feeding cattle upon boiled food may be carried out by the keeper of even a single cow. I have followed this plan for some time, and will now describe it, first merely observing that it is materially different from any I have ever heard of. In preparing the food, I have a common iron furnace pot that contains sixty-four gallons of water, into which, when boiling, one peck of ground linseed is well stirred, and allowed to boil for ten minutes; then nine pecks of ground corn is gradually thrown in by one person, and stirred in by another, until the whole mass is of a stiff consistency; it is then put into troughs, and well beaten and rammed down; afterwards it is cut out with a spade as wanted for the cattle; it cuts just like moist bread, and will keep for eight days; it is, therefore, unnecessary to prepare it oftener than once a week in small establishments. It requires some care in the boiling, and the fire should be slackened to prevent the linseed boiling over and the meal burning to the bottom; from five to ten minutes is sufficient for mixing in the ground corn. The whole of the process, from the beginning, supposing the water to be boiling, does not occupy more than thirty minutes. I do not mix any cut straw or chaff in my compound, but I give the straw to the cattle in its natural state. Perhaps it might be an advantage in some places if cut straw were used; but the principal recommendation of this method is its economy and simplicity. I give six lbs. of the compound in two feeds of three lbs. each per head per day to my feeding stock, which costs 6d.; along with this I give two feeds of turnips, and a little straw at night. To my holding cattle at straw I give three lbs. per day, at a cost of 1s. 9d. per head per week; and it is a fact worthy of notice that, since I began to give them this compound, they eat at least one-third more straw; this does them a great deal of good, but if I give them a greater quantity, the benefit derived would not be in proportion to the extra outlay. I also give it to my milk cows, and it has the effect of both keeping up their condition, and making them milk longer, and more regularly, than other food.

THISTLES.

The idea that thistles do not come from seeds may serve to explain why so many bad cultivators never think of destroying them. They, perhaps, imagine that as thistles spring up nobody knows how, they may go away nobody knows when. 'What comes of itself dies of itself,' or some such maxim, must be the guide to their barbarous husbandry. If men did but know how such weeds are propagated, there would be some hope of their being eradicated. Let us try to enlighten them.

Like all other plants, the thistle is propagated by its seeds. Everybody knows that this weed produces at the ends of its branches little prickly heads of purple flowers. Inside these heads are the seeds, which when ripe are found to bear at one end a quantity of light feathery down; in dry sunny weather the heads open, the seeds expand their feathery down, are caught up by the wind, and are wafted over the country, upheld by their buoyant pinions. We have now before us one of the most common of thistles, the lance-leaved; a weed found in all slovenly ill-cultivated ground. Each flower-head contains 190 seeds; the plant, an average one, bears sixty-four heads, and therefore may produce 12,000 seeds, more than enough to crop an acre of land, at two feet apart. And what is to be especially noted is, that unless these seeds are destroyed by birds, every one will grow; for it matters not whether it falls on grass-land or garden ground, in hedge-rows or plantations, among corn or cabbages, it will immediately prepare to establish its long tough roots, as soon as moisture reaches it.

This being so, it must be admitted that the person who allows thistles to grow in his grounds is no benefactor to his neighbours. He may be a very good sort of man, ignorantly unconscious of the mischief his negligence produces, and never dreaming that thistles grow from seeds; he is not the less a social grievance.

But if the country gentleman is thus blameable, notwithstanding his unacquaintance with common facts, what is to be said of the Gardener who is necessarily aware of all that we have said, and who, nevertheless, allows all sorts of evil weeds to spring up in the grounds beneath his superintendence. We could point to men who content themselves with keeping the flower-garden scrupulously neat, and the kitchen-garden 'fairish,' but who leave the plantations to provide for themselves. We could name a great place in this country, where much planting is done every year, and where the thistles are higher than the young trees. Such mismanagement is worse than game; for a tenant may bargain for permission to kill the latter, and when they come on his land dogs and guns can keep down pheasants and hares; but who is to keep off myriads of weeds sailing through the air, come the wind from what quarter it may, and insidiously settling down among the crops where they cannot be perceived till their immediate destruction becomes impracticable. A slovenly plantation may infect a county, and often does. *We boast of our native wolves having* been extirpated; but the labour of destroying vegetable wolves remains to be performed.

It is not merely because they are offensive to the eye and useless to animals that thistles should be driven from all civilised places, but because they are pernicious to land. All that they take from the soil for their own support is stolen from the crops which surround them; wherever a thistle will grow, *something better might have been obtained.* To grow thistles instead of corn or grasses is to keep goats instead of Southdowns, for wherever they do grow they are maintained to the exclusion or damage of better plants.

We cannot hope to engage the Gardeners through the country in a crusade against thistles; we have no expectation of getting up an Anti-Thistle League, or we should zealously promote such a measure. But we do hope that the disgraceful practice of allowing such national enemies to be recruited in plantations, waste grounds, or other places where Gardeners have authority, may be at once discontinued. If people would but set about it, there need not be a thistle in Great Britain in two years; for some of the worst of them only live for that period, and must die if they do not seed; others would disappear under powerful pincers, which will tear them out of the ground in wet weather, or under the *incessant* destruction of their leaves by child But in order to render the process effectual there must be no nest eggs, no little out-of-the-way corner in which 'just two or three' thistles are permitted to flourish. The work must be clean and thoroughly carried out; and those who refuse to co-operate, made legally liable to the cost of re-weeding their neighbours' land.—*Gardeners' Chronicle.*

REMARKS ON MANURES, AND ON THE ACTION OF GROUND BONES, IN PLANTS AND THE SOIL.

By HUGH WATSON, ESQ., *of Keillor.*

Nothing is better established in Agriculture than the necessity of a due supply of good manure for raising a heavy crop. When the soil is destitute of this, whatever other labour we bestow upon it, we constantly see the crops which it bears falling off in every point of economic value. Nor is this to be regarded as wonderful, when we consider the condition of our cultivated crops. The fact cannot be too well remembered, that the specific characters of vegetables, or their natural tendencies of growth are strictly hereditary, and that every part naturally inclines to that state in which it existed when sown and grown by the hand of nature alone. Now it is a fact well known, that the cultivated size of vegetables is much greater than their natural size. Their constant tendency, therefore, is to decrease, and the falling off which a crop exhibits, when a due supply of manure, or any of the good applications of husbandry, has been omitted in its culture, is not altogether to be regarded as a diseased state, produced by starvation, cold, or wet, but a positive effort on the part of plants to return to a state of nature. Agriculture, therefore, has a double duty to perform; it has both to keep up an unnaturally luxuriant state in the vegetables, which are its objects, and to preserve their health in this state. These ends are accomplished by preparing the soil so that it shall be in a right state as to air, heat, moisture and penetrability, and contain a certain mixture of earthy and saline constituents, with a due quantity of vegetable or animal matter, or both. These substances, reduced to such a state of division or decomposition that they may be dissolved by water (aided probably by the vital action of the root) are the proper food of plants.* The kinds and relative quantities of earths and saline substances which a plant would consume, may be learned from examining the same species growing in a state of nature on its own soil—as to the soluble organic matter—on its being liberally supplied, the value of the crop will in a great measure depend, for it is the organic matter which yields the elements, whence the frame-work of the vegetable is to be chiefly constructed. It is evident, therefore, that where the vegetation is removed by art, from the field on which it has been produced, and thus prevented from mingling with the soil, the succeeding crop must be indemnified with a supply of nutritive matter, to enable it to carry even a naturally good crop; and when we consider that it is something more than a natural crop that the Agriculturist endeavours to produce, the necessity of a good supply of manure becomes obvious. In fact it is to the absorption of manure now applied, or previously existing in the soil, and to its detention in the plant in new combinations, that we owe the greatest part of the solid matter of the succeeding crop. This may seem a very unwarrantable statement, and at first sight contradictory to facts. But though it has been proved that plants in certain circumstances have the power of decomposing both water and air, and of appropriating their elements to increase their solid particles, how far they do so on the great scale, when in a state of liberty and health, still remains undiscovered. We know that the power of plants to accommodate themselves to the circumstances in which they are placed is very great, and the range of their possible functions is very wide; but we could not consider it proved that plants growing in a rich soil are nourished by the decomposition of water, because they can live for some time in water without soil; nor should we say, that because a plant shut up under a glass receiver, with a limited portion of air, for a considerable time, was constantly changing the condition of the air—therefore plants do the same, when the genial breezes of heaven are blowing over them. An ox can subsist upon sea-weed; a willow will grow planted with its roots in the air and its boughs in the soil; but these are accommodated functions, and though they shew the tenacity of life of the individuals, they ought not to be confounded with their natural and healthy functions. As to the facts of the case, an aspect of a much more tangible nature, the statement which we have made seems to be borne out by them, and we will now hazard some remarks on this head, rather in the hope of directing attention to a very interesting subject of inquiry, than from any conviction of their accuracy.

If we suppose the case of that staple manure, farm-yard dung, in reference to which long experience has enabled us to ascertain the proper quantity to be applied, better perhaps than any other, we shall find, on a general view, that the outlay of dry manure, and the income of dry vegetable matter, from the soil to which it was supplied, are nearly equal. We shall suppose that twenty tons of farm-yard manure are allowed per acre, for a rotation of four seasons, the ground being supposed in the same state as to exhaustion at the end, as it was at the beginning of the cropping. Twenty tons in four years are equivalent to five tons each season, of which we must allow more than a half for mere water retained in the spongy substance of the mass, which may be beneficial or useless according to the quantity of moisture in the soil. The actual quantity of manure, therefore, applied in these circumstances, will be at the rate of between two and three tons each season; and we shall find that the weight of the vegetable matter of a crop very seldom exceeds this amount. A green field of corn owes about seventy per cent. of its weight to water contained in its straw and grain; and when it is ripe, the moisture cannot be estimated much under ten per cent. If, therefore, we suppose the gross average weight of a white crop to be two and a half tons, or fifty hundred weight per acre, we must allow about five hundred weight for water, and nearly two hundred weight for earths and salts which have entered into the composition of the straw and grain, so that the whole weight of vegetable matter which cannot be got from the earths of the soil in a crop, probably corresponding to about four quarters of wheat per acre, will not greatly exceed two tons. If we look to the green crops, the results are still more striking. When it is stated, indeed, that twenty-five or thirty tons are carried from a field in which (though it be at this period of the rotation that the whole is applied), we suppose only two or three tons of manure to have been consumed, the idea, that to this manure they owe the chief quantity of their vegetable matter, seems preposterous. It will be found, however, upon experiment, that a large globe turnip does not contain above seven per cent. of vegetable matter, nor a yellow turnip above ten per cent., nor a Swedish turnip above fourteen per cent.; while the herbage of them all may be estimated at about ten per cent. Of twenty-five tons, therefore, of globe turnip, which we carry off our field, about twenty-three are mere water. The potato is a more solid root, and contains, according to Sir John Sinclair, whose views of its composition are very moderate, about twenty-five per cent. of solid matter, so that an average crop of eight tons per acre is, by rejecting the water of composition, again reduced to two. In the same way, were we to inquire into the average weight of other crops and rotations, it would probably be found to hold as a general principle, that their vegetable matter being derived from the ingredients of the soil, will be found (within certain limits, and other things being alike) proportional to the supply of manure, and nearly equal to it, the soil being supposed always to remain equally fertile.

* It is the opinion of some, that the earths and salts found in vegetables are to be regarded as ingredients sucked in by accident. But this is very far from being the case. They are deposited in cells prepared for them in the most delicate crystalline forms, and their disposition is probably connected with some of the most highly vital functions of the plant. In these circumstances, it is but reasonable to conclude, that a due supply of them is essential to the development of the vegetable, and it would be easy to assign many evils that would result from plants being denied them.

GENERAL RULES FOR A CURSORY EXAMINATION OF GUANO.

By Isaiah Kent, F.G.S., &c., *Analytical Chemist, Leamington.*

The substances to be looked for:—

1st, Water, ammonia, ulmic, uric, and humic acids, all of which may be classed as volatile and organic matter, separable at a low red heat.

2nd, Fixed alkaline salts, such as sulphate of soda, chloride of sodium, and alkaline phosphates; separable by the heat of boiling water from the previous ash.

3rd, Earthy salts, consisting of the carbonates and phosphates of lime and magnesia; separable by hydrochloric acid from the residue of above.

4th, Sand or silica insoluble.

A.—Calcine 100 grains in a capsule at a low red heat, until all black particles are burned away, and a white ash is left; weigh: the loss is No. 1.

Good guano should lose from sixty to seventy-four per cent. of this volatile organic matter.

B.—Digest residue of A in boiling water, which dissolves the alkaline salts; filter, dry, and weigh: the loss is No. 2.

Good guano should lose from four to six per cent. of these alkaline salts.

The phosphoric acid can be separated from this solution by adding sulphate of magnesia and ammonia, which precipitates it as a phosphate of magnesia.

C.—Digest the residue of B in hot hydrochloric acid; filter and wash well; weigh: the loss is carbonate and phosphate of lime and magnesia, precipitated by ammonia, as a gelatinous precipitate, which on being dried and submitted to heat, should amount to at least fifteen to twenty-five per cent. of the weight of the guano used.

D.—The residue, after the action of the hydrochloric acid, when dried and ignited, is sand or silica.

In good guano it ought never to exceed four per cent.

Other proofs of the goodness of Guano.—Good guano contains from twenty to twenty-five per cent. of urate of ammonia, insoluble in water; from eighteen to twenty-four per cent. of undefined animal matter; and from fifteen to twenty of earthy phosphates; leaving from forty one to forty-seven per cent. of matter soluble in water, exclusive of moisture.

Decayed or bad guano yields sixty or seventy per cent. of its weight to water, from the uric acid and animal matter having wasted, and the large quantity of moisture in it, often amounting to from twenty-five to thirty-five per cent.

Good Peruvian guano does not lose more than seven to nine per cent. at a heat of 212 deg., and this includes a little ammonia.

Further proofs of good Guano.—Fifty to seventy per cent. should dissolve in a hot solution of caustic potash, with a strong smell of ammonia.

Hydrochloric acid, added in slight excess to the filtered solution, should produce a copious brown crystalline precipitate of uric acid.

Specific gravity ought to be from 1.60 to 1.75.—*Pharmaceutical Times.*

PRACTICAL RESEARCHES ON BONES AS FERTILIZERS.

There appears to be something in the use of bones, as fertilisers, which the chemical research of several years has almost failed to elucidate. Practice seems to have, to a certain extent, defied the powers of analysis, and we are often struck with the results of their application being different, and even contrary, to what might reasonably be expected. The application of bones to peaty sands, and light soils generally, created a new era in farming; and gave to loose sands, to chalks, and to peaty soils, a power of production which no previously discovered application could accomplish. The smallness of the quantity required, the facility of their carriage, and their ready application, doubtless gave great facilities to the growth of green crops on such soils, and on high elevations; and a stimulus was given to the discovery of light and artificial manures which previously had no data on which to proceed. The composition of bones was a matter easily arrived at; and it was clearly manifested, that the application of three or four cwt. of bones per acre would, as regards a turnip crop, produce more turnips than 150 or even 200 cwt. of ordinary farmyard manure. Nay, more, the application of that small quantity of bones alone produced a crop weighing from twenty to forty tons of turnips; and what was more remarkable, an increase in the quantity of the manure did not produce any appreciable increase of crop. The chemical constituents of bones are well ascertained. Beyond organic matter, in which they may be said to vary from 20 to 30 per cent, they contain some per centage of phosphate of lime, varying from 55 to 64, and of carbonate of lime, say from 15 to 16 per cent; not to mention the small per centage of sulphuric acid and magnesia, which, in the quantities usually applied to an acre, may be considered scarcely worth naming. Assuming the composition of bones, such as they are usually obtained, to contain 60 per cent of phosphate of lime, it must be clear, that if four cwt. be applied to the acre, there will be applied something like three cwt. of phosphate of lime to the acre. We ought to remember, however, that one application of farm-yard manure restores much phosphate to the soil. The quantity, of course, varies with the quantity of excrement and urine contained in the manure; but assuming it to be merely decomposed wheat straw, and that the wheat straw contained, according to Sprengle, 340 lbs. phosphate of lime in every 100,-000 lbs.; and that three tons of straw are required to make one ton of manure, it follows that 20 tons of such manure will contain 3 cwt. of phosphate of lime. But if 10 tons only were applied to the acre, there would be but 18 cwt. 56 lbs. of phosphate of lime supplied, or only half as much as by a dressing of bones. Another difficulty arising from the supposition that the phosphates were the manurial excellency of bones is, that of all crops they appear to be most useful to the turnip plant; whereas that plant requires a smaller proportion of phosphate than most other cultivated plants. Still the difficulty occurs that burnt bones are, in some instances, as successful as those which are undeprived of their animal matter; but this, again, is counteracted, in some degree, by the fact that dissolved bones, or more properly vitriolised bones, when the whole substance is broken down and rendered soluble, are the best of all the forms of applying bones.

The main success of applying them is in producing green crops, and thus obtaining manure from the keeping of stock. We have, however, had instances where the whole of the turnips were taken off by the wire-worm before we planted the land with potatoes, and not a vestige of the turnips remained, except possibly the small portions decayed after the insect had destroyed them; whereas the barley crop was greater than we could have expected after any crop of turnips we ever had in the field previously. An instance occurred adjoining our own farm, which goes very far to show the great advantage of supplying bones, and bones alone, to a soil for a number of years, with decided success. The quantity never exceeded sixteen bushels the imperial acre, and yet for sixteen years it grew successful crops.

To begin with, the soil was blowing sand, very poor and exhausted—the whole weight of the bones did not exceed 16 cwt. in the whole period, and no other manure whatever was applied; and yet, on land not worth more than 20s. per acre to rent, four crops of turnips, eight crops of corn, and four crops of clover were obtained, being a weight certainly over, and not under, 100 tons; and the soil was, after the last of these crops, more capable of growing any crop whatever than it was before any bones were applied. Whenever the field was ploughed and pulverized, it had a semi-white appearance from the quantity of undecomposed bones on its surface—a proof that of the quantity applied, but a small portion had been consumed by these plants.

In order that the efficacy of these whole bones might be tested, we had a few handfuls picked up, which was soon done, and they were sown in a drill against some bones quite fresh from the mill. The whole came up and grew with equal rapidity, and we were unable to discover any difference in the plants; and, indeed, at the time when they were removed, we could not distinguish any advantage in either. Now, as these bones had been in the earth at least four years, and might have been much more, it appeared as if the decomposing action of the air and soil and of the vital action of the plants, was very slow; and, therefore, that the quantity required for each crop of the ingredients of the bones is comparatively small. It appears that bones, near the surface of the earth, lose mainly their organic matter, and the decomposition in such a situation liberates the gases; whereas, when buried deep, no such process takes place, inasmuch as the oxygen is excluded, and that, if buried deep, they lose their organic matter slowly; and probably more of the phosphates are carried down by the water than animal matter liberated by the air; so that bones which may be buried deep will be less injured than might be imagined.

The fact that so small a portion of the bone is required, is proved best by the effects of the acids on the bones, rendering them soluble, and thus reducing the quantity of bones by something like 75 per cent. This has been considered satisfactory evidence that the phosphates are the only source of the value of bones; but it is a somewhat hasty conclusion, for the organic matter is also rendered in a state more capable of decomposition than before by the application of the acids. Nor must the action of the acids themselves on the soil, and the vegetable matter contained in it, with which they come in contact, be lost sight of. It is almost impossible that some of the acid should not be free,—or, if not, the new combinations of the materials of which the soil is composed will alter many of the relative proportions; and any matter for which it may have a greater affinity than the lime, will alter these proportions. It is common to manure the soil, in the treatment, with sulphuric acid alone; and the changes on soils destitute of the sulphates, may be of a very valuable character, not to mention its effects in the general disintergration of the mineral matters composing the soil.

On the continent of Europe, diluted sulphuric acid is sprinkled upon the soil during the season of fallow, by means of the usual apparatus for distributing liquid manure, and is said to be attended with decided success. We have not heard of any instance of the acid being applied alone in this country,—it is generally administered in the vehicle of bones.

The lime in the soil would, if free acid were applied, become sulphate, as far as excess of acid were prevalent; the ammonia in carbonate and volatile would become fixed as sulphate; and the same changes would follow in many other particulars, and the plants and animals which feed on them supplied with the sulphur which they contain.

We applied to the soil, in a field of gray sand, subsoil yellow sand—bones in the raw and dissolved state,—the former at the rate of 16 bushels per acre—the latter at the rate of four; and, along with this, we sowed about four bushels of dissolved animal matter in the same way. The bones dissolved in acid had the preference from the first, and a great struggle seemed to exist between the dissolved animal matter and the raw bones. We weighed a number of yards in each, and the result was,—

		Stones.
No. 1,	Sixteen bushels of raw bones . . .	52.
No. 2,	Four bushels dissolved animal matter .	50.
No. 3,	Four bushels of dissolved bones . .	60.

Thus we inferred that the bone dissolved was preferable to the muscle and fat. Still, if the water of the former had been more thoroughly extracted, it is possible that the results might have been somewhat different.

The great efficacy of the dissolved bones seems partly to consist in pushing away the plants in their early stages; and so vigorous are they generally found, that they defy the attacks of insects, and even of seasons which are fatal to plants not manured with so powerful a fertiliser. The turnip plant derives much of its nutrition from water and from the air; and therefore any substance which will enable an abundant and early development of plant, will be of the greatest service, generally, to the crop. This will give very much, perhaps, the idea that the bones act as a stimulant rather than a real fertiliser; and perhaps there is some difficulty in drawing a very clear line of demarcation between a stimulant and a nutritive manure. A mere mineral manure would stimulate a soil very rich in ammoniacal and vegetable matter; but continue the process, and the addition of such manures would in time cause the plants to take up the excess of the latter, and the former would produce no effect; while, on the contrary, the soil, if abundant in mineral matter, would be stimulated by ammoniacal and carbonaceous manures as long as the mineral matters were in excess. A manure, however rich in both mineral and ammoniacal matter, would in no sense of the word be a stimulant, but strictly a "feeder" of the soil. This, to a certain extent, is bones. The animal matter contains the gases—the mineral matter contains phosphorus, lime, magnesia, soda, potash, and possibly sulphur; so that in no sense of the word whatever can bones be considered a mere stimulant.

What, then, is it to which their manurial power may be attributed? This seems puzzling; but inasmuch as they contain organic matter, they are calculated to supply the deficiencies of soils destitute of it; and as they also contain mineral matter, they also supply these to soils from which they are exhausted; while to such soils as contain both in equal degrees, they add to the stock in the soil, and render it more capable of growing any of the cultivated crops.

Doubtless, however, the great value of bones is in their supplying food for green crops. These properly and judiciously applied, cannot fail to enrich the soil; and thus the bones become absolute manure-makers on a farm, and lay the foundation of future crops in a manner which it is not easy to do in any other way.

From the facts above stated, it would appear that bones must be an excellent manure for any soil. But facts have been opposed to this theory. The privation of phosphoric acid in the wheat, and beans, and oats sold off every farm, and in the bones and flesh of the animals grown upon it, seems to apply very forcibly to strong land farms; and therefore, it would appear, bones would be a valuable restorative of this abstraction. The contrary is the fact; on clay the bones have, in almost every case, been nearly thrown away.

Practice solves the difficulty. We have seen that the bone decomposes slowly—that it gives off but a little of its principles at a time; and inasmuch as a clay soil is unfavourable to fermentation and decomposition, the valuable components of the bones are not given off, and therefore they are of little service; but it is worth while to try whether dissolved bones will not on such soils be what raw bones are to land which is dry and light.

The soils most benefited by bones are *gray sand* with a sandy subsoil. This, before bones were introduced, was very difficult to obtain turnips upon, and it was the most useless of all soils. Now it is rapidly treading the steps of the most profitable. *Gravel* is next benefited by their application, but less so than sand, and in dry seasons, when all other manures will often fail, these will secure an abundant crop. *Red, white, and yellow sand* are all vastly benefited by the application of bones, and to all such soils they are an invaluable application. *Peat* soils are specially improved by the use of bones, and crops are by these obtained upon them which are obtainable from no other source. *Chalk* soils are amongst those on which the greatest improvement has been made. Elevations out of the reach of any more bulky and solid manure are rendered at once by bones within the means of amelioration and productiveness. Most manures may be advantageously combined with them. Farm-yard manure is always a valuable auxiliary, and may be mixed or combined with them with safety in almost every conceivable way;—with guano, with nitrates, with rape-dust, or any of the artificial manures generally applied, they may be used in combination without danger or fear; but with lime they have often failed, except when the soil possess a very large share of inert vegetable matter. This neutralises the lime, and renders its application in no way injurious to the bones. It is desirable, however, to apply the lime at a period as far removed from that of the bones as possible. On the whole we may be considered within the mark, when we say, that the introduction of bones as a manure has been a boon of millions of wealth in the shape of increased production to our population.—M. MILBURN, *Scottish Quarterly Journal of Agriculture.*

THE TWO DUNGHILLS.

An old Pagan poet sung long ago:—

'I often wished I had a farm—
A decent dwelling, snug and warm,
A garden, and a spring as pure
As crystal running by my door;
Besides a little ancient grove,
Where at my leisure I might rove.'

There are many in Scotland who might have in reality what poets and others delight to sing and talk; and though their farm may be small, it may be made productive. Even a garden well formed is of some consequence; and surely a decent dwelling, snug and warm in stormy December, is worth obtaining, and if every one that has it in his power would just do as much as I have done, what a different appearance our country would have! I do not wish to brag about what I have done, but I will say it for the purpose of arousing others, that they might partake of comforts like mine, for by exerting themselves a little, their land would be more productive, their climate more genial, by being better sheltered, and their streams would be purer. I have helped to purify one, for not one drop of my liquid manure enters the purling brook that passes near my dwelling; but it is not at all times as pure as crystal for all that. There are some that would rather make a drain to dry their dunghill, and send its richness away, than drain their land of its superfluous moisture. I once belonged to that class, but I have learned better things now; learning is advantageous to the meanest capacities—even to a hedger and ditcher, like your humble servant. I have been told that many more estates have been acquired by little accomplishments than by extraordinary ones; those qualities which make the greatest figure in the eye of the world not being always the most useful in themselves, or the most advantageous to their owners.

It is something of importance for a poor man to know how to turn an intolerable nuisance into a source of both pleasure and profit. I was always fond of strawberries, and when a little sugar and cream were added to them, relished them much better; but few of them found their way into my stomach until I began to cultivate them myself. So I had a piece of ground well prepared for a few rows of strawberry plants; but I thought it would not do to plant it with the worn-out rubbishylooking plants that might be offered me, so I began and made inquiry about the best kinds, and where they might be obtained. I was recommended to take the Grove end Scarlet for a prolific bearer, and Keen's Seedling, and a few of the Prolific Hautbois; and for late thumping berries, some plants of the Elton; and, to have a tasting about the close of the year, I had, in a corner by themselves, some of the Red and White Alpine. I was highly pleased with the success that attended my labours for the plants grew well and had excellent crops; they had plenty of room to grow in, and they neither wanted food nor drink, for part of what was allowed at one time to run to waste and helped to poison the earth, air and water, came back to me in the shape of beautiful fruit, for which I returned grateful thanks to the Giver of all our mercies. But in order to make a garden give a good return, it must be well waited on. I find that it will not do to sit down contented with what we have done, but we must still be doing something more. Time has swallowed up the actions of the Antideluvians, and what we did yesterday has gone down its wide throat. We are told that there is danger in procrastination, there is also danger in imagining that we have done enough, for in my little spot of earth I find many little things to do, and the better I do them there is more profit and pleasure to A COZIE COTTAGER.

From the Albany Cultivator.

SEEDING GRASS LANDS.

MESSRS. EDITORS,—Having travelled over a considerable portion of the southern section of Michigan the past season, I was led to notice in particular, the general barren appearance of the land, excepting such as was covered with cultivated crops. In many places the field next adjoining a luxuriant crop of wheat, would be covered with thistles and briars. In fine, it seemed to me as if many of the farmers had determined to run a race, to see who should first succeed in running down their land.

Wheat each alternate year being taken from the soil without an ounce of grass seed ever being sown, or if sown, only in the most sparing manner, from 2 to 4 quarts being thought sufficient for an acre of ground. The consequence of this management is such, that land which has not been more than twelve years cleared from its primitive forest, has, if not run out, become at least thoroughly run down.

Now I would say, that from observations made during a series of years, both in the New England States, and in other sections of our common country, in which it has been my fortune at different times to be placed, I have found that the most successful farmers were those who were the most bountiful of their seed, especially of their grass seed.

Many farmers even at the east, who have had the benefit of Agricultural Societies, and the practice of skilful and judicious neighbours near them, from whom they might improve, lose at least 25 per cent. from their pasture and meadow lands, by sowing their grass seed too sparingly.

An old proverb, from good authority, which will apply well to this subject, as well as many others, declares that "if ye sow sparingly, ye shall reap also sparingly;" in no case will this hold more true than with regard to the cereal grasses and grains. If every farmer who does not sow at least from 10 to 12 quarts of grass seed per acre, would this spring sow upon one acre double the amount he usually sows, and note the result in comparison with the rest, sown in his usual manner, I am satisfied that there is not one in ten of these farmers but would increase the amount of their seed for the future.

It is somewhat difficult to give the precise amount that should in all cases be sown; much depends upon the preparation of the land, quantity of barn-yard manure applied, if any, adaptedness of the soil to grass, &c. As a general rule for mixed grass, not less than one peck of timothy or herds-grass, and from 4 to 5 lbs. of clover, should be sown to the acre; in some cases more may be profitable, oftener more than less. In low moist lands one half bushel of Red-top, and 4 quarts of Timothy, will be found an excellent mixture. Enough in all cases should be sown to completely cover the surface of the ground the first fall, and thus in a great measure keep in check the noxious weeds, and supply in their place good wholesome food, which your stock will relish much better than the hard worthless stalks of the weeds and briars.

It is natural for land that is in a good condition, or even in a medium state of productiveness, to produce something; and if you do not cover the ground with seeds of your own choosing, nature will, and generally with worthless plants. We should recollect that since the fall of man, the natural products of the mother earth are thorns and briars, while she is ever ready to repay with interest whatever we may bestow upon her bosom.

The deficiency of grass seed sown in this region (southern Michigan) is lamentable. One man, and he considered as good as the average of farmers here, lately told me he had never sown a pound of clover upon his farm since he first commenced to improve it, 14 years ago. The consequence of this management has been the loss of tons of valuable feed, the loss of the manure which that feed would have made, and the loss of the vegetable portion of the soil, which would in a measure have been kept up by the decomposition of the roots of the grass, when the land was prepared for wheat.

Lands that have been managed in this way for 12 or 14 years, will not now produce over one half of what they first did; and it would seem as if the most of the farmers in this section must soon see the bad effects of a too excessive cropping, without a rotation at least of grass well and thickly sown.

In conclusion, I will quote the old proverb—"As ye sow, so shall ye reap; if ye sow spairingly, ye shall reap also sparingly." Brother farmers, when you sow your grass seed this spring, don't forget the text, if it close the essay instead of commencing it.

Hudson, Michigan. E. D. PIERSON.

GUTTA PERCHA.

The words, Gutta Percha, have become familiar household sounds. A substance recently made known under this name, is the produce of a tree discovered to be indigenous in several of the Malay islands, and, according to newspaper reports, it is also found abundantly in the island of Chusan, in China. Our principal object in drawing attention to this tree at the present moment, is to speak of it as an article of commerce; and, as applied to the arts, it is most valuable as a substitute for leather in forming shoe-soles. Of all the discoveries and inventions which have hitherto been brought into notice for the purpose of preserving the feet from damp, nothing is comparable, either in cheapness or efficiency, to Gutta Percha. Gardeners especially, whose daily occupations occasion them to be much in the open air, and working or standing on wet ground, will find this pliable and simple substance of infinite value. The natural caution which one usually feels with respect to new things, especially when they come *very highly* recommended, prevented us from listening with much attention to what we regard as pretended excellencies. We were however induced to make the trial of a pair of 'Gutta

Percha soles,' and after the experiment of betwixt two and three months of daily wear, we think it right, for the sake of others, to say the Gutta Percha soles are, for dryness and warmness to the feet, incomparable to anything we have ever tried. In point of durability, it is equal, and, we think, superior to leather; and it has this advantage—a gardener may give his 1s. or 1s. 6d. for a pair of soles, take them home, dry the bottom of his shoes thoroughly, and then put them on himself in the following manner:—The sole of the shoe being perfectly dry, make it as rough as possible with a rasp or saw; place the pot of solution, which is sold with the substance, in a cup of boiling water, when it will melt like glue; then warm the shoe sole, and rub a thin coat of it over the whole surface intended to be covered, with the finger or an old brush, forcing it well into the fibre; let the solution dry, then hold it again to the fire, and apply it a second and third time in like manner, taking care that each coat be dry before the rest is laid on. Next warm the Gutta Percha sole before a gentle fire until it is soft throughout, and having held the shoe to the fire until it has become sticky, lay the new sole, beginning at the toe, and gradually pressing it down, taking care that no air be allowed to remain underneath. When it has become cold and hard, cut the edges with a knife, and trim to the desired shape with a rasp or warm iron. If the toes or heels wore away, the parings taken from the sole in the course of fitting have only to be made soft by heat, and laid on the worn part, after coating it with the solution; when cold, cut it level with a knife, and then stick a flat piece on, and brad it. Except when exposed to heat, the soles are as hard, but at the same time as flexible as leather, and therefore in no respect less pleasant to wear than ordinary shoe leather. If by any accident arising from heat, the soles are pressed out of shape at the edges, it is only necessary to warm them slightly, and while soft, press the parts into form, and in the course of a minute or less they will be cold again, as hard and as firm as before. The process of fixing on a pair of soles need not occupy more than ten or fifteen minutes; and in the course of this short period, the soles may be cooled, and the shoes in use.

We profess to be 'practical,' and therefore consider not out of place this minute description of what we believe to be an exceedingly valuable discovery—especially to gardeners, and indeed to all persons employed out of doors—and therefore deserving our strongest commendation, even though it may be thought to be trenching upon the lapstone and cobbler's art.—*Gardeners' Journal.*

MODE OF TREATING POTATOES IN GERMANY.

Leibig points out that the potato plant is one of those which, like the hop, suffers greatly from suppressed or impeded transpiration; that potato rot has long been known, and was even accurately described by Parmentier, who introduced the potato into France; but the peculiar atmospheric condition to which he ascribes the disease, had never till of late years occured over whole countries, but only locally. He considers the real cause of the disease to be an atmosphere loaded with moisture and cold, these being the conditions most unfavourable to evaporation; and he shows that in 1845 and 1846, when the disease overran Europe, damp, cold, and rainy weather followed heat and drought, just at the period of the most luxuriant growth of the potatoes. This state of the atmosphere he considers to be the same as that which cause influenza in the human subject, by suppressing the cutaneous transpiration.

He further shows that the very life of a plant depends on the resistance it offers to the destructive influences of the atmosphere, and that the life and health of plants depend on the equilibrium of external causes, only one of which, the state of the soil, is much in the power of the agriculturalist. One day, or a few degrees of cold, may be decisive as to the life or death of a plant. The fungi and putrefaction are the consequences of the death of the plant, not the signs of the disease. It is, therefore, of the utmost importance to strengthen the plant so as to enable it to resist the external influence tending to destroy it. Such are the general views of Liebig as to the nature of the potato disease; and it appears that Dr. Klotzsch has come to similar conclusions.

Dr. K. shows that, as cultivated for its tubers, there is a great loss of nutritient matter if it be allowed to form flowers and fruit; and he concludes, that if this be prevented, the nutritient matter will be sent in the direction of the tubers and roots, and thus the plant will be strengthened and enabled to resist disease. He proposes, therefore, when the plants are from six to nine inches above the ground, to pinch off the ends of the stems and branches for half an inch only downwards from the point, and to repeat this four weeks later. In the experiments already made by him, in which the alternate rows were treated in this way, the result was, that the rows not so treated were straggling and sickly, and had scabby tubers liable to rot; while the rows so treated were bushy, luxuriant, darkgreen; with very numerous tubers, clean, and free from all disease whatever. The process is said to cost only 1s. 6d. per acre in Germany. The Prussian government has agreed to give Klotzsch the sum of 2000 dollars (about £300), if, at the end of three years, provided the disease returns, it shall be found effectual. On these conditions he has published it, that it may be tried as extensively as possible. The details will be found in the appendix to Liebig's work already mentioned.

ON THE CULTIVATION OF CARROTS.

Carrots have not hitherto been considered as an article of culture in the system of Scottish husbandry, although they are occasionally grown on some farms for the use of horses. In some parts of East Lothian they are extensively cultivated; more especially in the neighbourhood of Aberlady, where large crops of them are obtained, from which the Edinburgh market is supplied. The soil around Aberlady is a deep sand, on which this plant grows luxuriantly. But the carrot will grow on any soil that has been well pulverised and manured: the richness of the soil is not of such consequence as depth and freeness from stones. Having had some experience in their culture, and the opportunity of seeing large fields of them cultivated, I may be allowed to offer a few remarks with regard to their management.

In the first place, I shall advert to the preparing of the ground; secondly, to the sowing and hoeing: and thirdly, conclude with a few remarks as to their value.

1st. The land should be deeply ploughed before winter, and as soon as weather permits. In the spring months it should be properly harrowed, and all the weeds carefully taken off. Dung should then be spread on the surface, and covered in with a light furrow, and afterwards rolled; the drills should then be formed from 20 to 22 inches apart, or the land may be prepared as for turnips, and drilled from 30 to 34 inches apart, and two rows sown on the drill. April is the month for sowing, as early sown crops are found to be most productive.

2nd. The seeds of the carrot are small, and apt to adhere to each other, which renders sowing somewhat difficult; therefore the seed should be mixed with mould or sand previous to sowing, and regularly watered, to bring them into a forward state of vegetation. Seed thus prepared are able to contend with the rapid growth of annual weeds. In five or six weeks they will be fit for hoeing: the first hoeing is to cut the weeds; then the plants must be singled by the hand from six to eight inches apart. Other two or three hoeings will be required; but that must be guided by the state of the soil and season: the whole expense of cleaning will average 30s. per acre.—The carrots will be fit for storing by the 1st November, and if properly stored, will keep quite fresh to the end of June.

3rd. Carrots when cut are excellent for feeding pigs; and as a substitute for oats to horses they are every day gaining ground. By the quantity of sugar they contain, they are probably very rich and stimulating to the stomach of that delicate animal. The produce of carrots, where properly managed, has been as high as from nine to ten hundred bushels per acre; and I have, in this part of the country (Aberdeenshire), measured from six to seven hundred, which I consider a very good crop.

I shall now conclude by stating, if the Farmer was aware of the benefit one acre of carrots would be for his horses, he would commence preparing his land in good earnest, and be amply repaid for his trouble.—*Banks of Urie, March* 15, 1848.

Newcastle Farmer.

COBOURG, CANADA WEST, JUNE 1, 1848.

The general character of the present Spring has been congenial to the Agriculturist, and but little labour has been retarded by the difficulties arising from severe protracted frosts or an abundance of moisture. The snow rapidly left the surface before the breaking up of the frosts, and comparatively little rain has fallen, and never of many hours' duration, or partaking of a violent stormy character. Many descriptions of soil which have frequently been unapproachable in the middle of April, have this season been in excellent working order; and no delay has been experienced in getting the crops into the ground, except that arising from a fear of a recurrence of frosts, or a superabundance of rain, neither of which has occurred, and there is no doubt the Spring work will generally be completed in good time, except among the negligent and idle, who are always doing their March work in May.

There had arisen a fear that the meadows would be bare, and certainly the promise was merely for a short scanty crop, but the late genial warm showers have been of a character ("slow and sure") to produce the most beneficial results both on pasture and Spring-sown grain, which will shortly evince, where sown on soils *suitable* to its nature, a most vigorous growth; and it is this suitability, and a proper adaptation of the soil to the crop and the crop to the soil, that the farmer has to make himself thoroughly versed in. Much has been learned by experience, but more has to be gained by the aid of chemical science, which has most opportunely been offered to aid him in his pursuits. The European Continent and the British Isles are progressing in the science of Agriculture by its aid, and in all the principal Counties and Districts agricultural chemists are being established for such an analysation of the various soil, as shall at once define its nature and capabilities, the crops peculiarly fitted to it in its present state, and the description of manures capable of rendering it of more extended culture, and preparing it for the production of other crops than those now adapted to its natural state.

Mechanical labour, the use of improved implements for the most perfect execution of the varied operations, the fallowing of land, especially for the destruction of weeds where such abound, doubtless effect a great deal, but they add little to its internal resources; these have to be supplied, or we may as well expect to gather grapes from thorns or figs from thistles, as to expect a harvest of the most needful and beneficial fruits of the earth, from a soil which is naturally devoid of one or more of the component parts of the crop sought to be obtained. Climate and season we cannot alter, but the soil may be mollified and its very nature changed, by those operations and appliances which are offered to all who have the desire and determination to enquire, and the will to act with energy and promptitude.

Since writing the above, we have read an article in the *Scottish Farmer* on the culture of the Turnip, the concluding part of which we give as a corroboration of our views:—

By applying a manure, rich in the phosphates, but deficient in the alkalies, the turnips produced from it would contain a larger than ordinary proportion of albumen, and a deficiency of starch, gum, and sugar, and consequently induce the animals feeding upon them to exhibit a greater increase in the size of their muscles, than the formation of fat. While, on the other hand, those grown from a manure deficient in the phosphates, but replete with the alkalies, would contain a larger amount of starch, gum, &c., and a deficiency of albumen, and induce the production of fat in the animal frame, more than the formation of flesh. I beg that my meaning in this respect be properly interpreted. I do not mean, that by any treatment we could devise, we could cause the quantity of the albumeneous or fleshing constituents of the turnip, literally to exceed in weight or quantity that of the other carbonaceous matters; but that we are capable of varying their relative proportions in regard to each other to a considerable extent, by applying manures of a peculiar nature to the soil, is certain. For example, the organic composition of Swedish turnips grown upon farm-yard dung, and upon guano, is found to differ considerably, as the following table will show. Thus, 100 lbs. of Swedes grown upon

		Dung.	Guano.
Contains	Water - - - - - - -	80.02	87.93
"	Oil or fat - - - - -	0.25	0.16
"	Gum - - - - - - -	0.27	0.19
"	Sugar - - - - - - -	5.37	1.64
"	Pectic acid and albumen	1.24	0.71
"	Meta pectic acid - - -	3.0	6.77
"	Cellular fibre - - - -	1.22	1.81
"	Saline matter - - - -	0.68	0.7

I will here only remark, that the plants produced from the farm-yard manure, exhibit a decided superiority over those grown from guano, as regards their feeding qualities. But as I will have occasion to speak of this again, when considering the nature of the mineral composition of guano, I will leave it for the present, and make a few observations on the elementary constitution of the organic principles of the turnip. Now the elements of which these nutritive principles, of which I have been speaking, chiefly consist, are oxygen, hydrogen, nitrogen and carbon, with a little saline matter. These bodies all exist in great abundance in water and the atmosphere, with the exception of the latter. And one of the powers with which nature has gifted the vegetable kingdom, is that of absorbing and assimilating by means of their leaves from the atmosphere, these gases, which along with others derived from the decomposition of water, contribute to build up the chief part of their organic structure. And the turnip being a plant rendered by nature capable of discharging this function to a great extent by means of its large system of leaves, I am partly of opinion that they alone are able to collect from the atmosphere as much ammonia and carbon as they require; while the oxygen and hydrogen are furnished in abundance by every shower that falls. But no appreciable quantity of such bodies as constitute the mineral food of plants, can ever be derived from such sources; therefore they must be obtained either from the soil, or from such manures as are applied to it. Hence, in making choice of our manures, we need not be so particular in employing those capable of furnishing those organic elements, as they are called, as those replete with the mineral constituents of plants. But at the same time I will not deny but that the presence of a manure capable of supplying an abundance of ammonia to the roots of the turnip, will, in certain stages of the plant at least, cause a more vigorous growth, and a greater development of those organs, whose office it is to collect such matters from the atmosphere, and even increase the supplies from that source. But while it conduces towards the general development of the plant, it must also necessitate the assimilation of a larger quantity of inorganic matter; and if the manure thus replete with ammonia, does not itself afford a proportionate abundance of these matters, they must be obtained at the expense of the soil. And if the soil is also comparatively destitute of them, the growth of the whole plant will be stunted, and the larger portion of the organic matters of the manure be rendered useless; as the absence of any one of the inorganic principles essential to the growth of plants, will be sufficient to cause the formation of a diseased structure, or altogether to arrest their development. You might as well conceive a man capable of subsisting on salt beef alone without water, in the deserts of Africa, as conceive that a turnip can be grown without the phosphates or the alkalies.

Farm Horses.—The farm-horse demands, neither in the training nor in the feeding, that nicety which is required in the case of the horse designed for rapid motion or irregular labour. He requires merely to be maintained in good order, never to be worked beyond his power, and never to be allowed to fall, in condition, below the work which he is to perform. The stable for the farm-horse, as for every other, should be spacious and well ventilated. It is a great error to suppose that horses require a close, warm stable, to preserve them in health. To keep them fully sheltered, and free from the action of any cold current, is all that is requisite. The horse is well suited to bear an equal temperature, but not sudden changes produced by artificial means. Farm-horses regularly worked have been known to be kept throughout the coldest winters in mere sheds, not only without injury, but with greater benefit to their health than if they had been too closely confined. Next to ventilation in importance, is cleanliness of the stable. No filth should be suffered to acumulate, but every day the stable should be cleaned out, with the same attention for the farm as for the saddle-horse. In the farm-horse stable, every ploughman should have a small fork, a curry-comb, a brush, a mane-comb, and a foot-picker. Light should be admitted into every stable, to a certain extent.—But in the case of farm-horses, which are only in the stable during the hours of rest and feeding, less light is necessary than in the case of the saddle-horse, which passes a great part of his time within doors. The light required for the farm-horse stable is that which is sufficient to allow the workmen to perform their duties in the day-time. Sometimes there is a room adjoining the stable for holding the harness, but it is perfectly convenient and sufficient in practice to have the simple furniture of the farm-horse hung on pins in the wall behind each pair of horses.—*Low's Practical Agriculture.*

Hybridism of Plants.—As among animals two distinct species of the same genus will produce an intermediate offspring—such as the *mule*, which is the offspring of the horse and ass—so among vegetables two species belonging to the same genus can be made to produce a *hybrid;* that is, a new plant possessed of characters intermediate between its parents. This power of hybridising is more prevalent among vegetables than animals; for the different species of almost every genus of plants are capable of producing this effect, if the pollen of one species be put upon the stigma of another. The union, however, can only take place between nearly allied species, occurs rarely among plants in a wild state, but is quite common among cultivated species. According to modern botanists, the character of the female parent predominates in the flowers and organs of fructification of the hybrid, while its foliage and general constitution are those of the male parent. Hybrids have not the power of perpetuating their kind like naturally-distinct species; for, though occasionally fertile in the second and third generations, they have never been known to continue so beyond the fourth. But though incapable of propagating themselves beyond a very limited period, the pollen of the parent species may be made to fertilise them, or their pollen to fertilise the parent; but in either case the new offspring gradually merges into the original species.—Thus nature has wisely set a limit to the intermingling of species, by which they are preserved from ultimately running into confusion and disorder. In an economical point of view, hybridism is of great advantage to man. By a knowledge of its principles he has been enabled to modify the characters of natural species, so as to adapt them to his special purposes; and thus have arisen most of those beautiful sorts and varieties of blossom which now adorn the flower-garden. So, also, by crossing varieties of the same species, our grains, fruits, and kitchen vegetables, have been brought to a high state of perfection. The size of one species has been assiduously amalgamated with the durability of another; the beauty of a third with the flavour or odour of a fourth; and so with other qualities. The principles of hybridism will be yet more extensively applied; and it is not too much to expect that the perfection of our field and forest produce will yet rival that of our orchards and gardens.

The Advantages of Salt and Lime Combined.—I rejoice to have it in my power to offer a striking confirmation of the benefits likely to accrue from the use of salt and lime. Sir Charles Burrel permits me to publish the following statement contained in a letter which I have had the honour of receiving from him on the subject of this pamphlet:—'Sir Charles Burrel was particularly struck with the allusion in the Lecture to common salt, and its effect in strengthening the straw of wheat, having by the adoption of salt commixed with thrice its amount of quick lime, experienced very beneficial results to his wheats grown on a clay subsoil in the Weald of Sussex, the crops having equalled those from farm-yard dung on an average, upon an extensive farm; and the remark has continued to be made, that, the straw is *brighter* and not given to be root-fallen, and the ears of the wheat of good size, containing as good a sample as that raised from dung. This proved a sufficient topdressing for a crop of oats and seeds grown after the wheat so manured. He thinks it right to add that his land, from the too frequent use of lime, had become lime sick, and little good reaped from it; but mixed with salt he found far greater benefits than from lime or salt alone.' The mode of mixing the salt and lime is that recommended by John Bennett, Esq., M.P. for Wilts:—'Lay unslaked lime three inches thick, and thereon one inch of salt, repeating the layers till the bed is six feet high. It is left for ten days, and then turned like a common mixen, and this is repeated four, five, or six times, till it is completely pulverised; and in due time sixty bushels per acre are spread, like lime, previous to sowing or drilling wheat.'—*Huxtable on the Science and application of Manure.*

Use of Clay on Sandy Soils—Two Crops on the same Land at once.—The report of the committee on farms for the Hartford County Ag. Society, states that Mr. George Olmstead, of East Hartford, has greatly improved a piece of sandy land, which formerly produced very scanty crops, by mixing with it earth of a clayey nature. He is confident it has well paid him for the expense. The same report states that Mr. Olmstead has practiced cultivating two crops on the same ground at the same time, with advantage:—He plants, on early soil, potatoes in rows four feet apart; and after hoeing two or three times, he plants an early variety of corn between the rows. He believes that by this mode his ground yields him a much greater profit than when planted with but one crop.

UNDER-DRAINING.—B. F. Jewett, near Utica, lays two scantlings in the bottom of his ditches, 5 or 6 inches apart, and covers them with a slab. In quicksand, a slab should also be laid on the bottom. The ditch is then filled with earth.

TO DESTROY SORREL.—Manure well early; plow deep early; harrow well; plant corn 3 or 4 feet each way; pass the cultivator through every ten days, till the middle of summer; then sow 12 lbs. of clover seed per acre, and pass the cultivator again. Clover will take the place of the sorrel.

MULCHING FRUIT TREES.—A correspondent of the Horticulturist planted 150 trees in an orchard in very good but rather dry soil. All were planted with equal care, but a third of them were *mulched*, or the surface of the ground when planted covered with 6 inches of litter. Those thus treated all lived; but 15 of those not mulched died in the hot dry weather of midsummer. It is not stated that the soil was kept clean and mellow around them; which will often save the life of trees, when they would die of neglect.

TWO HINTS FOR FARMERS.—At the annual meeting of the Ross Agricultural Society last week, T. Batson, Esq., said, "There are two matters of a practical nature which, with your permission, I should like to introduce to your notice. The first is the system of steaming food. I believe that this year it will be impossible to calculate the great advantages that will be gained by the use of the steaming apparatus. I have myself been able to steam hay perfectly white with mould, which afterwards cattle and sheep would eat in preference to the best hay that could be cut from the middle of a rick. At this moment I am using steamed turnips for pigs; and I have pigs on my farm which, for the last month, have been increasing in weight at the rate of 20lbs a week. This, perhaps, is not very extraordinary; but I think you will not find many instances of pigs increasing in weight to such an extent, and it shows what the system of steaming is calculated to effect.

SUBSOILS IMPREGNATED WITH IRON.—Professor Johnston says on this point:—"In many parts of the country, and especially in the red sandstone districts, the oxide of iron abounds so much in the soil, or in the springs which ascend into it, as gradually to collect in the subsoil, and from a more or less impervious layer or *pan*, into which the roots cannot penetrate, and through which the surface water refuses to pass. Such soils are benefitted for a time, by breaking up the pan where the plough can reach it; but the pan gradually forms again at a greater depth, and the evils again recur. In such cases the insertion of drains below the level of the pan is the most certain mode of permanently improving the soil. If the pan be now broken up, the rains sink through into the drains, and gradually wash out of the soil what would otherwise have only sunk to a lower level and have again formed itself into a solid cake. It is not less commom, even in rich and fertile districts, to see crops of beans, or oats, or barley, come up strong and healthy, and shoot up even to the time of flowering, and then begin to droop and wither, till at last they more or less completely die away. So it is rare in many places to see a second year's clover come up strong and healthy. These facts indicate, in general, the presence of noxious matters in the subsoil, which are reached by the roots at an advanced stage of their growth, but into which they cannot penetrate without injury to the plant. The drain calls in the aid of the rains of heaven to wash away these noxious substances from the soil, and of the air to change their nature, and this is the most likely, as well as the cheapest, means, by which these evils can be prevented."—*Maidstone Gazette.*

IMPROVING THE BREED OF ANIMALS.—"Sir,—If the following suggestions are of any use to your correspondent 'Improver,' he is quite welcome to them. It is now pretty generally agreed upon by breeders that the best mode of improving animals is to 'go out' once, and then return to the pure breed: If a proper selection is made of the animal resorted to, the result of the '*cross*' will very generally be productive of greater strength, and a more hardy constitution than that possessed by the *pure* breed, particularly where breeding from too near affinities has been practiced. Now, with respect to the particular object of your correspondent. If he is not afraid of *some* increase in size, let him resort to the pure shorthorn. If he is fearful on this point—and in deciding upon it he must bear in mind the far greater value of the animal for the butcher; then perhaps he cannot do better than go to the Ayrshire, of which, in passing, it may be observed that they are strongly suspected of carrying Alderney blood in their veins. The Irish 'Kerrys' are probably quite out of his reach, or these possess the important qualities of small size, hardihood, good milkers, and fattening rapidly when required. I am, Sir, yours respectfully."—*Ib.*

WHAT OUGHT THE YOUNG FARMERS TO DO?—"Sir,—It will not now be denied that the production (or manufacture) of food is a most important science; all are agreed on the point. I would wish to raise a voice of warning to farmers, both old and young. There is no doubt that agriculture in this part of the kingdom is in its infancy; the most productive modes of cropping and managing land are scarce heard of. Farmers are complaining that they know not what to do with their sons; they are seeking places in towns, such places! where their health and happiness are at once wrecked, where they have to compete with thousands. And all this, while that noblest of all sciences, agriculture, is but half learned. I say most deliberately, that 'he who would promote the happiness and success of his son, should bring him up to skilled agriculture.' Depend on it, in a year or two, you farmers will have a hard race with free-trade in corn and cattle, and then nothing but good, profitable farming will save you. There is yet time to raise up a body of young farmers worthy the name—men who do something besides shooting, coursing, drinking, and cigar-smoking. For boys, there ought to be good agricultural training schools where useful knowledge to farmers is taught. The young men should at once study their profession, and visit the best managed farms; a hundred miles is nothing now; by proper application they might double the produce of their fathers' farms profitably. But perhaps all this is in vain "they will keep on as their fathers did before them,' and by and bye the capitalists will start farming companies and then these 'slow coach' farmers will become labourers. I am, Sir, yours, A MAN OF KENT."—*Ib.*

THE TRAPPERS OF THE ROCKY MOUNTAINS.

Keen observers of nature, they rival the beasts of prey in discovering the haunts and habits of game, and in their skill and cunning in capturing it. Constantly exposed to perils of all kinds, they become callous to any feeling of danger, and destroy human as well as animal life with as little scruple, and as freely, as they expose their own. Of laws human or Divine, they neither know nor care to know. Their wish is their law, and to attain it, they do not scruple as to ways and means.—Firm friends and bitter enemies, with them it is "a word and a blow," and the blow often first. They may have good qualities but they are those of the animal; and people fond of giving hard names call them revengeful, bloodthirsty, drunkards (when the wherewithal is to be had,) gamblers, regardless of the laws of *meum* and *tuum*—in fact, "white Indians." However, there are exceptions, and I *have* met honest mountain men. Their animal qualities, however, are undeniable. Strong, active, hardy as bears, daring, expert in the use of their weapons, they are just what uncivilized white men might be supposed to be in a brute state, depending on his instinct for the support of life. Not a hole or corner in the vast wilderness of the "far west" but has been ransacked by these hardy men. From the Mississippi to the mouth of the Colorado of the west, from the frozen regions of the north to the Gila in Mexico, the beaver-hunter has set his traps in every creek and stream. All this vast country, but for the daring enterprise of these men, would be even now a *terra incognita* to geographers, as indeed a great portion still is; but there is not an acre that has not been passed and repassed by the trappers in their perilous excursions. The mountains and streams still retain the names assigned to them by the rude hunters;

and these alone are the hardy pioneers who have paved the way for the settlement of the western country. Trappers are two kinds—the hired and the free; the former being merely hired for the hunt by the fur companies, while the latter is supplied with animals and traps by the company and receives a certain price for his furs and peltries.—*Adventures in Mexico and the Rocky Mountains.*

Perils of the Trappers.—A little before sunset I descended the mountain to the springs; and being very tired, after taking a refreshing draught of the cold water, I lay down on a rock by the side of the water and fell asleep. When I awoke the sun had already set; but although darkness was fast gathering over the mountain, I was surprised to see a bright light fickering against its sides. A glance assured me that the mountain was on fire, and starting up, I saw at once the danger of my position. The bottom had been fired about a mile below the springs, and but a short distance from where I had secured my animals. A dense cloud of smoke was hanging over the gorge, and presently a light air springing up from the east, a mass of flames shot up into the sky, and rolled fiercely up the stream, the belt of dry brush on its banks catching fire burning like tinder. The mountain was already invaded by the devouring element, and two wings of flame spread out from the main stream, which roaring along the bottom with the utmost speed, seized upon the roots of the trees, and their trunks, and spread amongst the limbs, whilst the long waving grass underneath was a sea of fire. From the rapidity with which the fire advanced, I feared that it would have reached my animals, and hurried at once to the spot as fast as I could run. The prairie itself was yet untouched, but the surrounding ridges were clothed in fire, and the mules, with stretched ropes, were trembling with fear. Throwing the saddle on my horse, and the pack on the steadiest mule, I quickly mounted, leaving on the ground a pile of meat, which I had not time to carry with me. The fire had already gained the prairie, and its long dry grass was soon a sheet of flame; but, worse than all, the gap through which I had to retreat was burning. Setting spurs into Panchito's sides I dashed him at the burning brush, and though his mane and tail were singed in the attempt, he gallantly charged through it. Looking back, I saw the mules huddled together on the other side, and evidently fearing to pass the blazing barrier. As, however, to stop would have been fatal, I dashed on, but before I had proceeded twenty yards, my old hunting mule, singed and smoking, was at my side, and the others close beside her. On all sides I was surrounded by fire. The whole scenery was illuminated, the peaks and distant ridges being as plainly visible as at noonday. The bottom was a roaring mass of flame, but on the other side, the prairie being more bare of cedar bushes, the fire was less fierce, and presented the only way to escape. To reach it, however, the creek had to be crossed, and the bushes on the banks were burning fiercely, which rendered it no easy matter; moreover, the edges were coated above the water with thick ice, which rendered it still more difficult. I succeeded in pushing Panchito into the stream, but in attempting to climb the opposite bank, a blaze of fire was puffed into his face, which caused him to rear on end, and his hind feet flying away from him at the same moment on the ice, he fell backwards into the middle of the stream, and rolled over me in the deepest water. Panchito rose on his legs, and stood trembling with affright in the middle of the stream, whilst I dived and groped for my rifle, which had slipped from my hands, and of course sunk to the bottom. After a search of some minutes I found it, and again mounting, made another attempt to cross a little further down, in which I succeeded, and followed by the mules, dashed through the fire and got safely through the line of blazing brush.

Nottingham Houses never Burnt.—At Nottingham, where gypsum abounds, the floors of all houses were, till late years, universally formed by an almost exactly similar process to that employed at Paris—stout reeds, however, being strowed over the joists as a basis, instead of split battens. The practice of Nottingham, adds small coal and cinders to the plaster of paris (gypsum) in making the mortar, and the surface is at once trowelled over to finish. In this manner is produced an almost indestructible floor, capable of any surface, and so secure a protection against fire, through its imperviousness to air, that notwithstanding its unceiled and exposed joists below, houses in Nottingham are said never to be burnt, whilst the floors are said to be free alike from damp and from vermin.

Chapped Hands.—To keep your hands from chapping during the winter, wash them as often as you please, but rub them "bright dry" each time; don't leave a particle of moisture for the cold to act upon.

I'LL FARM LIKE MY FATHERS BEFORE ME.

When my landlord says, "John,
You must really get on,
Just see how your neighbours are striving;
We must be improving,
And onward keep moving;
Depend that's the right road to thriving."
"Sir, I pay when I can;
I'm a hard-working man;
At elections you know you get o'er me;
Let them do as they may,
I prefer the old way,—
I'll farm like my fathers before me.

"There's Berwickshire Dick—
Of the fellow I'm sick—
They say that his crops are so charming;
And there's East Lothian Will,
He is worse and worse still;
They boast,—*how* they boast of his farming!
Everything is so good,
And so well understood;
It's all just to chafe and to bore *me*;
But I care not a jot,
For I value them not,—
I'll farm like my fathers before me.

"There's nothing but toiling
At draining, subsoiling,
And grubbing old hedgerows and fences;
It is all very neat,
When the thing is complete,
But dreadful to think what expenses;
Should I spend on the land,
I cannot understand
How cash it again would restore me;
I shall therefore take care
Aught that I get to spare,
I'll keep like my fathers before me.

"To the markets they ride,
In the flush of their pride,
As if they were pinks of creation;
On the best they will dine,
And sit over their wine,
And talk about crops and rotation;
But how they contrive
To get RICH—man alive!
That certainly RATHER *gets o'er me!*
But I care not a jot,
For I envy them not,—
I'll farm like my fathers before me.

"There's such new-fangled ways
About dung now-a-days,
Whole islands have gone to destruction;
It's absurd to suppose
That so tiny a dose
Can greatly increase the production.
About liquid manure
I am not quite so sure;
But *trouble* and *tanks*, I abhor ye!
'Twas my father's old song—
'Jack, thou'lt never do wrong
To farm like thy fathers before thee.'

"Improvements in breeding;
And new modes of feeding;
'Bout science they'll preach you a sermon;
They may boast of Liebig,
But I care not a fig,
He's nought but some cunning old German.
They talk about gases
Like thundering asses,
Such nonsense shall never get o'er me;
I have just this to say—
I prefer the old way,
I'll farm like my fathers before me."

Annan, Nov. 1, 1817. John Palmer.

Miscellaneous.

LIKE THE EVERGREEN, SO SHALL OUR FRIENDSHIP BE.

Some liken their love to the beautiful rose,
And some to the violet sweet in the shade;
But the Flower Queen dies when the Summer-day goes,
And the blue eye shuts up when the Spring blossoms fade!
So we'll choose for our emblem a sturdier thing,
We will go to the mountain and worship its tree;
Then a health to the Cedar—the Evergreen King,
Like that Evergreen so shall our Friendship be!

The perfume it carries is deeply concealed,
Not a breath of rich scent will its branches impart;
But how lasting and pure is the odour revealed
In the inmost and deepest recess of its heart!
It groweth in might and it liveth right long;
And the longer it liveth the nobler the tree;
Then health to the Cedar—the true and the strong,
Like the Evergreen so shall our Friendship be!

It remaineth unseared in the deluge of light,
When the flood of the sun-tide is pouring around;
And as firmly and bravely it meeteth the night,
With the storm-torrent laden, and thunder-cloud crowned;
And so shall all changes that Fortune can bring,
Find our spirits unaltered and staunch as the tree;
Then a health to the Cedar—the Evergreen King—
Like that Evergreen so shall our Friendship be!

Eliza Cook.

Signs of Rain.—It has been generally observed by meteorologists of the present day, that rain is indicated when the sun rises pale and sparkling and soon becomes covered with clouds—when it rises among ruddy clouds—when it sets under a dark cloud—when the edge of the moon is ill defined—when the moon appears as if seen through a mist—when the stars are not as bright as usual—when the sky is of a deep blue colour—when distant objects are seen clearly, and as if near at hand—when sounds from a distance, as the tolling of bells, &c., are heard distinctly—when there is no dew after a hot day—when there has been a superabundant hoar-frost—when a cloud increases in size—when a cirro stratus occurs on high as a thin covering through which the sun is visible, and the cumulo stratus, as a massive cloud, is at the same time seen on a lower level. And that fair weather may be anticipated when the sun sets red or cloudless—when the edges of the moon are well defined, and the horns, best seen on her fourth day, are sharp—when the stars shine brightly—when the smoke rises in the air—and by the web of the spider being thickly wove on the hedges and pastures. To some extent, I place reliance on the above remarks—at least, so far as to enable me to affirm that the appearances before mentioned as denoting rain, will, if not followed by rain, almost invariably be succeeded by damp weather. But that which is of most importance is the knowledge of whether the vapours are increasing or decreasing in density; for the same state of the atmosphere is assumed whether they are on the increase or decrease. I think every one who has attended to the state of the atmosphere will agree with me in considering that the prognostics above alluded to, as indications of rain, will be succeeded by a dense state of the atmosphere, but that it is not absolutely necessary that this state should be heavy enough for rain to fall.—*Lowe's Atmospheric Phenomena.*

How to clean a Fowling Piece.—Sir Astley Cooper seemed to be innately philosophically disposed, and always had some object of practical utility in view. In his scientific inquiries, he had a remarkable faculty of applying his knowledge to the daily concerns of life, and delighted in suggesting improvements for matters which might almost appear too trifling to attract his notice. I remember upon one occasion saying in his hearing, "I must send my gun to town to have it cleaned, for it has become so much leaded that it is unfit to use." "Pooh!" said he, "send it to London! there is not the least occasion for it. Keep a few ounces of quicksilver in the gun-case, and then you can easily unlead your gun yourself. Stop up the touch-holes by means of a little wax, and then pouring the quicksilver into the barrels, roll it along them for a few minutes. The mercury and the lead will form an amalgam, and leave the gun as clean as the first day it came out of the shop. You have then only to strain the quicksilver through a piece of thin wash leather, and it is again fit for use, for the lead will be left in the strainer." I have since adopted this plan, and with perfect success.—*Life of Sir Astley Cooper.*

Rheumatism, &c.—A person troubled with the rheumatism, lumbago, or even the gout, will find great relief by taking a wine-glass full of brimstone and milk, the first thing in the morning, and one on going to bed, for a week. If brimstone was a guinea an ounce, its value would be more appreciated.

A Short Sermon for Young Men.—Text: *Owe no man anything.*—Keep out of debt. Avoid it as you would war, pestilence, and famine. Shun it as you would the devil. Hate it with a perfect hatred. Abhor it with an entire and absolute abhorrence. Dig potatoes, break stones, peddle in tin-ware, do anything that is honest and useful, rather than run in debt. As you value comfort, quiet, independence, keep out of debt. As you value good digestion, a healthy appetite, a placid temper, a smooth pillow, sweet sleep, pleasant dreams, and happy wakings, keep out of debt. Debt is the hardest of all taskmasters, the most cruel of all oppressors. It is a millstone about the neck. It is an incubus on the heart. It spreads a cloud over the whole firmament of a man's being. It eclipses the sun, it blots out the stars, it dims and defaces the beautiful blue of the sky. It breaks up the harmony of nature, and turns to dissonance all the voices of its melody. It furrows the forehead with premature wrinkles, it plucks the eye of its light, it drags all nobleness and kindness out of the port and bearing of a man. It takes the soul out of his laugh, and all stateliness and freedom from his walk. Come not under its accursed dominion. Pass by it as you would pass by a leper, or one smitten by the plague: touch it not. Taste not of its fruit, for it shall turn to bitterness and ashes on your lips.—Friendly, I say to each and to all, but especially to you young men, keep out of debt.—*London Mercury.*

Analysis of Soils.—The following is a method of analysing soils for ordinary agricultural purposes: Weigh a convenient quantity of the earth to be analysed, say 1,000 grains dried in the open air; dry the same before a fire on paper, so as not to scorch the paper; re-weigh, and the difference will be the moisture. Roast the residue; re weigh, and the difference will be the organic matter. Pour a quantity of muriatic acid on the remainder; when stirred and settled, pour it off, and add oxalate of ammonia; the precipitate will be the lime; mix remainder with water, and stir it well; when a little settled pour off the turbid mixture, and the suspended contents are argillaceous, or clayey, and the deposit silicious, or sand.

Time Dead Beat.—*Intelligence of an Occurrence* 40 *minutes before it happens.*—In a letter received by a gentleman of Manchester, from a friend in Indiana, United States, is the following passage relative to the electric telegraph in that state:—"That wonderful invention, the magnetic telegraph, passes through our country from the Eastern cities, communicating intelligence almost instantaneously. News has been transmitted from Philadelphia to Cincinnati, a distance of 750 miles, on one unbroken chain of wires. Of course, as Cincinnati is ten degrees west of Philadelphia, or forty minutes of time later, the news is that much ahead of time."

Chloroform applied to Pig Killing.—A few days ago, Mr. Horace Watson, a druggist, near Grimsby, wishing to give "his greasiness as little uneasiness" as possible *en route* to the salting tub, caused our friend the butcher to administer *quantum sufficit* of chloroform. "Grunt," naturally fond of sleep, was soon in the land of forgetfulness, when our hero (of the blue frock) very conveniently extracted the requisite portion of vital fluid, leaving the pig, after being scalded, cut up, and salted, apparently none the wiser for what had passed.

Why is a mouse like clover? Because the cat'll (cattle) eat it. Why is a thought like the sea? Because it's a notion—(an ocean.) Why is a whirlpool like a donkey? Because it's a neddy—(an eddy.)

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