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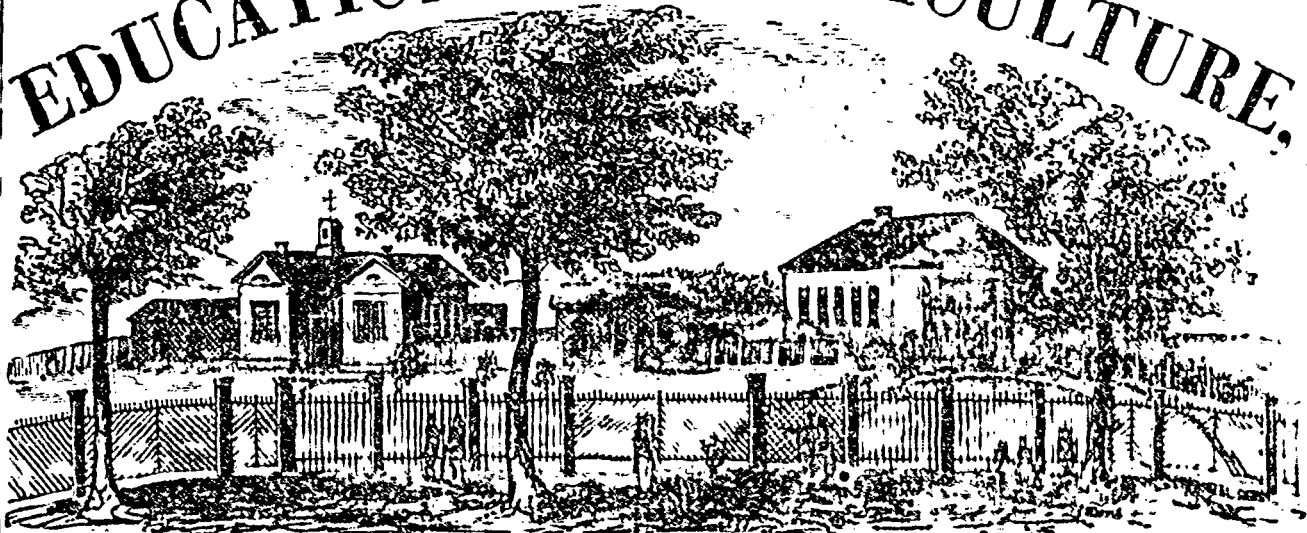
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THE JOURNAL OF EDUCATION AND AGRICULTURE.



PROVINCIAL NORMAL, AND MODEL SCHOOLS, TRURO, N. S.

FOR THE PROVINCE OF NOVA SCOTIA.

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No. 9.

EDUCATIONAL.

I.—THEORY OF EDUCATION.

PHYSICAL EDUCATION.

IN a former exercise the general subject of Education was discussed under its three grand divisions; Physical, Intellectual, and Moral Education. We shall now consider the first branch, Physical Education, somewhat more at length.

That it devolves upon some person or persons who may have the charge of children, to see to it that their physical organs be not injured by improper treatment, but be strengthened by every possible means, will be readily granted by all. Many will say, however, that this responsibility rests entirely with the parent, that the teacher has nothing to do with the physical or moral elements of the constitution, that his province is confined to the intellect, in other words, that no importance attaches to the bodily condition of the child while in school. This is an erroneous and a dangerous opinion. The child, when at home and under the immediate charge of his parents, is, true to the impulse of nature, always on the move. Except when asleep, he is not perhaps five minutes at one time in the same position.

He gambols about, indulging in all kinds of sport, running, jumping, singing and shouting. This is the very thing that nature requires and impels him to do. But when the child is sent to school, he is generally confined five or six hours of the day to the school room, and this at an age when all his bodily organs are most susceptible of injury. If, as too often happens, he is perched up on a bench nearly high enough to form a comfortable seat for Goliath without any support to his back, and made to sit there in a close room for two or three hours without relief, who, on entering that school room, and perceiving the vitiated condition to which the atmosphere must be reduced, and the nervous uneasy motion of the little feet in their vain attempts to find a resting place, and the inclination of their bodies which must follow, who, we ask, would not be instantly forced to the conviction that the constitution of every child in that school room was being speedily undermined! Those concerned in the education of youth cannot neglect the means for preserving bodily health without serious consequences to the body itself. But, again, the connection between the body and mind is so close that the state of the one materially affects the other. Hence the cultivation of the intellect cannot be successfully carried on unless care is at the same time taken to keep the bodily organs in a healthy tone of action.

In considering this subject we shall discuss the different systems of organs in their turn, and the means to be adopted to preserve in them healthful and vigorous action.

I. The Nutritive System of Organs. These organs are divided into three classes, the Digestive, the Circulatory and the Respiratory. It will be sufficient for our present purpose to state that the food which is consumed by man undergoes the processes of chymification and chyfication. All the elements originally existing in the food fitted for nutrition are now concentrated in a fluid called *chyle*. This fluid is then discharged into the *vena clara*, at which point digestion ceases and circulation begins. The chyle having entered the *vena clara* mingles with the blood and is conveyed along with it to the heart, thence to the lungs, (where it undergoes a certain change which we will speak of presently,) thence back to the heart, whence it is diffused to all parts of the body through canals called arteries. After performing its duties in the various parts of the body it is taken up by the veins and conveyed back to the heart, when it again commences this circulatory process, which is constantly going on. Such are the leading features of circulation. We have mentioned that the blood undergoes a certain change in the lungs. This leads us to consider respiration, which more particularly concerns the educationist. The blood, which is taken up by the veins, is of a dark colour, and has not only given out all its nutritive elements, but has also collected substances which are injurious to the system, the most important of which is carbon. In its passage it receives the chyle which is not yet in a condition to become part and parcel of the body. It proceeds to the lungs, where it comes in contact with the inhaled atmospheric air, with the oxygen of which its carbon unites and is expired in the form of carbonic acid gas. The blood now becomes of a bright scarlet colour, and is assimilated or is fitted to supply the waste which is constantly going on in the body. The degree of perfection with which the assimilative process is carried on in the lungs depends greatly upon the elements contained in the inhaled atmospheric air. In a pure state atmospheric air consists of seventy-nine parts of nitrogen to twenty-one of oxygen. But, if the oxygen exists in a greater proportion than this, the effect is an increased circulation and an unnatural activity in the whole system. If nitrogen preponderates, a lethargy or sluggishness is produced. Similar effects result from the presence of carbonic acid gas. Now in the assimilative process a great portion of the oxygen unites with the carbon of the venous blood and forms carbonic acid gas, which is poisonous. If this gas is not allowed to escape and fresh supplies of oxygen admitted the most disastrous effects follow.—The death of the victims in the Black Hole in Calcutta is an instance of this. It is absolutely necessary then, both for the health of the body and the activity of the intellect, that every school room be properly ventilated. In securing this object we must attend to the size of the room and the proper mode of ventilation. Each individual requires one hundred and fifty-two cubic feet of atmospheric air for healthy respiration for three hours, so that a room intended to accommodate fifty-six scholars should be thirty-eight feet by twenty-five. In admitting supplies of fresh air, draughts upon the body should be particularly guarded against. This can be done by having the ventilators in the upper part of the wall. The vitiated air is best carried off by openings in the ceiling overhead, as being heated it is lighter and consequently ascends.

II. The Supporting System of Organs, the Bones. The bones are composed of earthy and animal substances. In young persons the animal matter preponderates, and accordingly the bones are much more flexible, and, of course, more liable to be deformed or put out of shape than in those more advanced in

life. The great object is to keep all the bones straight, and accordingly the seats and desks should be proportioned to the size of the scholars, so that every one may sit at ease with his feet resting upon the floor. A support should also be provided for the back. Every scholar should likewise be made to sit with the trunk of his body erect, and to stand in an erect position, that the spine may retain its natural shape.

III. The Cutaneous System of Organs, or the Skin. The principal function performed by these organs is that of exhalation, which is of two kinds, known by the names of sensible and insensible perspiration. These processes are performed by innumerable pores in the skin. It has been proved that of eight pounds of food received into the system five are thrown off by means of these pores. The substances thus exhaled are highly injurious to the system. The action of these pores is deranged by the presence of any foreign matter, and the secretions being thus confined within the body produce serious results, such as severe colds, &c. It is of great importance, then, that the cutaneous system of organs, by means of ablutions, friction, &c., be kept in a healthful and vigorous condition.

IV. The Muscular System. The great law of the muscles is that of contraction and relaxation. When one set of muscles is in a state of contraction the corresponding set of muscles is in a state of relaxation. Nature requires that no class of these organs should be kept in either of those states for any considerable time. In preserving this part of our system in a proper tone the means to be employed by the teacher are physical exercises, which are of two kinds, those performed in the school room and those beyond its walls. The latter are to be attended to during recesses, and the teacher himself should take the lead in them. They should be of such a nature as to impart freedom and grace of motion, strength to the various sets of muscles, expansion of the chest, &c. Those within the school room should be, as far as possible, mingled with the mental exercises. They may be of various kinds, as singing, marching, certain motions of the bodily parts, &c. The latter consist of motions which exercise all the muscles, such as throwing the shoulders back, extending the arms forward, raising them above the head, bringing them down with force by the side, standing on tiptoe, &c. The following rules should be observed in these exercises:—

1. They must be stimulated by nervous and mental excitement.
2. They should be varied as much as possible. Unless this be attended to they become monotonous and fail to secure the attention, and, of course, the desideratum of the first rule cannot be obtained.
3. They should be proportioned to the age, size and strength of the pupils.
4. They should be performed in the most favourable hours of the day.

V. The Nervous System of Organs. The brain, with its branches of nerves extending to all parts of the body, is the agent by which every mental function is performed. If this system of organs be not kept in good working order the action of the mind is proportionally affected. Thus one-tenth part of the arterialised blood goes to the brain. If this blood has less than its due share of oxygen, lethargy is the consequence, if more than the necessary portion of this element undue excitement is produced and disease speedily follows. One great law of our constitution, which must be particularly attended to in connection with this subject, is that no two sets of organs can perform their functions vigorously at the same time. Thus, if

a person is in the habit of engaging in severe study immediately after partaking of a hearty meal, the result is either dyspepsia or nervous disease. The minds of young persons should never be overtaxed. It may not be amiss to observe *en passant* that the best time for study is the morning, as the brain can then without injury monopolize the stimulus which at other periods of the day may be required by the bodily organs.

The benefits to be derived from a due observance of the foregoing principles are *direct* and *indirect*. The indirect are those affecting the body itself, which have already been briefly referred to, and cannot certainly be regarded as unimportant.

The indirect benefits are subdivided into those which bear upon Intellectual Education and those which bear upon Moral Education. By paying a proper regard to the laws which govern the body much closer attention is secured, and that for a greater length of time, so that a much greater amount of intellectual labour is obtained. Thus, if the teacher observes that his scholars are becoming restless, let him engage them for a few minutes in any of the exercises already mentioned, and he cannot fail to secure a greater amount of attention when the studies are resumed. Again, by taking the direction of the physical exercises both in school and out of it, of which children are always more fond than of intellectual employment, he pursues the very best method of winning his way to their hearts. How much better is this than the old system, in which the teacher came in contact with the pupils only in instilling into their memories what were to them meaningless vocables, and the only physical exercise in which he took the lead was flagellation.

The benefits with regard to Moral Education are equally great. By means of these exercises the child acquires habits of obedience, which greatly facilitate the enforcing of moral precepts. Again, no better opportunity can be afforded the teacher for observing the peculiar traits of character displayed by those under his charge than the exercises engaged in during the recesses. By attending to this he is enabled to treat in a judicious manner the different minds which it is his duty to mould.

D. McD.

[The above Essay on Physical Education is composed by one of the Pupil Teachers at present attending the Normal School, and appears just as it was handed in to the Principal a few weeks ago, without the slightest correction.—BORROR.]

INTELLECTUAL EDUCATION—CONSCIOUSNESS, HOW CULTIVATED AND IMPROVED.

CONSCIOUSNESS is generally regarded as that power by which we become cognizant of the operations of our own mind.—As the perceptive faculties constitute the medium by which we hold intercourse with the external world, the eye by which we roam through the field of nature and obtain a knowledge of those facts or truths which form the staple of all our future reasonings and combinations and generalizations, by which the latent energies of mind are excited and directed, and without which, in all probability, they would have remained in a state of dormancy and inactivity; so this power is the eye by which we range over the world within, observe its various phenomena and functions, and receive that instruction by which we can proceed from particulars to great general principles and fixed laws. It has been disputed by some able modern metaphysicians whether there is any distinct power apart from the mental

state of which it testifies, who maintain that consciousness is nothing more than an ingredient or an attribute of the sensation or perception. Now, without entering at all upon this or such like learned disquisitions, which would be entirely repugnant to the object we have in view, we maintain, what we believe is universally admitted, that there is a certain state or power of the mind which testifies to its thoughts or emotions, and without which we would not know that these thoughts or emotions existed at all. This condition or power of the mind called consciousness is always accompanied with the idea of self-existence, whether it be a sensation or a perception. In reference to the latter of these, the consciousness of a perception brings along with it not only a conviction of the existence of the object perceived, but also of the subject that perceives, and it may be, the emotion accompanying. Now it is quite clear that I may at will direct my mind to either of these objects of thought, the external object, or the internal mental act, or to the emotion which the object occasions. I look upon a magnificent, gorgeous landscape, and I resolve to contemplate it in all its aspects and in all its bearings. I call forth every effort of my mind in surveying it in all its parts, and I cease not till I satisfy myself that I have inspected it thoroughly, and that its image is indelibly fixed in my memory. Here my consciousness is accompanied by an act of the will. I resolve to direct every effort of my mind to this scene, to the exclusion of every thing else, so that I discover features and characteristics which I never perceived before.—Not that any effort of my mind can change the image formed on the retina, or exert any influence on the laws of light, to which this image is subjected. The whole difference of this from an act of ordinary consciousness, consists in its greater intensity, by which every impression made on the organ of sense is brought more directly before the mind. This condition of mind, when directed to an external object, is properly called *attention*. Or, on the other hand, I may turn my attention to my state of mind in this act of perception. "Ordinary consciousness testifies to the existence of these states," says Wayland, "without any act of the will; nay, it is not in the power of the will to arrest this continuous testimony. But we sometimes desire to consider some particular mental state, as the act of perception or memory; or some emotion, as that of the beautiful or sublime. It is in the power of the will to detain such mental state, and hold it up before us as an object of thought. When, by volition, we make our own mental states objects of observation, we denominate this act *reflection*. As the etymology of the word indicates we turn the mind backwards upon itself, so that it contemplates its own states and operations, very much as in the case of attention it concentrates its effort upon objects of perception."

This power, the power of concentrating our thoughts on any particular object or subject, is a matter of vital importance alike to the professed student and the man of bustling activity. Indeed, unless this habit is acquired, unless we obtain a command over our varied powers and faculties, and by an effort of the will can direct these to certain aims and ends, the most brilliant talents, the highest endowments will prove of but slender benefit to the possessor in the great realities, the practical pursuits of life. And what is the grand end of all education, but to train and discipline the mind, so that in all its intellectual, emotional and moral processes, we shall be able to control and direct its energies to any particular object, or subject, or train of meditation, we may wish at the time or in

the circumstances, and to keep it chained there, aye, and until we have exhausted the subject or arrived at some definite conclusion regarding it. And this brings us to the real practical point, viz., what is the education best fitted to develop or draw out this power or condition of the mind, or what are the means that ought to be employed for the purpose of increasing the power of the will over the other faculties?

And here we might enlarge on the relationship subsisting between the mind and the body, the influence exerted by the latter over the former, and the necessity of preserving the body in a sound and healthful condition, in order that the mind may have full and free scope for exercise, and the will possess complete control over the varied mental affections. We might here too speak of the advantages derived from punctuality, that is, from doing every thing at the time and in the place fixed;—how great the achievements accomplished by men of literature and science when they duly appropriated their time to different pursuits or fields of usefulness, and adhered, firmly and steadfastly, to the plan they had adopted. Another means by which the power of attention over the other faculties of the mind is cultivated is the use of the pen—by committing our views to writing upon any given subject, after we have pursued a certain line of study, or diligently perused any book, these views obtain a definiteness or precision which they would not otherwise possess.

But on these and similar themes we cannot dilate. The grand specific, after all, is the exercise of the will itself. "The more constantly," says Wayland, "we exercise it the greater does its power become. The more habitually we do what we resolve to do, instead of doing what we are solicited to do by indolence, or appetite, or passion, or the love of trifles, the more readily will our faculties obey us. At first the effort may yield only a partial result, but perseverance will render the result more and more apparent, until at last we shall find ourselves able to employ our faculties in such manner as we desire. If, then, the student finds his mind unstable, ready to wander in search of every other object than that directly before him, let him never yield to its solicitations. If it stray from the subject, let him recall it, resolutely determining that it shall do the work that he bids it. He who will thus faithfully deal with his intellectual faculties will soon find that his labour has not been in vain." And what, it may now be asked, is the educator to do, that the young under his charge may be trained and disciplined to this use of the will,—to the formation of that habit by which all the powers shall bend to its dictate? This is the most important question the conscientious teacher can propose to himself, involving as it does the very essence of his vocation, the whole matter not of the quantity but of the quality of the education imparted. The rage of the day is in an entirely opposite direction. It is not asked, What is the mode pursued in the communicating of this or that branch of knowledge, so that the particular faculty employed shall be strengthened and developed? but, What is the amount or variety of the subjects taught, what is the progress made, what is the information possessed? We have no wish to depreciate great and extensive acquirements. But these, however valuable in themselves, are never to be compared to the training or disciplining of our faculties, by which we may be fitted and prepared for the right discharge of all the duties of life, and for coping with all the vicissitudes and trials that are before us. And in order to accomplish this to any considerable extent, the teacher must see to it, that in imparting knowledge to the minds of his pupils, that knowledge is imparted in such a way as that their minds

are suitably exercised and strengthened; and more especially as to the point now under consideration, that whatever is learned, is learned thoroughly and at the time fixed. It matters not as to the branch of knowledge communicated, whatever is done, should be done well, clearly understood and accurately mandated. Let the progress of the scholars be what it may, let the nature of the instruction be of greater or less importance, it should be the paramount concern of the teacher to see that there is no imperfection, no superficiality in the recitation. Iteration, reiteration should be his motto, aye, and until every thought is written as with an iron pen on the tablets of their memory, incorporated into the very framework of their mind, made part and parcel of themselves. By this means, in the course of a few years, will the power of the will over the other faculties of the mind, become habitual, and the great and important purposes of a thorough education be subserved. The habit of attention to any particular subject being acquired, the mind will naturally rise to higher and nobler pursuits; from the study of the world without to the world within; from a knowledge of facts to great general principles or laws; from the materials already accumulated to the discovery of new and original truths; from the known to the unknown; from the visible to the invisible; from the finite to the infinite.

II.—PRACTICE OF EDUCATION.

ENGLISH READING OR ELOCUTION.

THERE is, perhaps, no branch of a common school Education so little attended to as that of English Reading. The teachers themselves, in too many instances, are but poor readers, and it need not be wondered at that they fail to awaken an interest in the subject in the breasts of their scholars. The celebrated Horace Mann thus writes, in reference to this branch of learning in the United States:—"I have devoted especial pains to learn, with some degree of numerical accuracy, how far the reading in our schools is an exercise of the mind in thinking and feeling, and how far it is a barren action of the organs of speech upon the atmosphere. My information is derived principally from the written statements of the School Committees of the different towns,—gentlemen who are certainly exempt from all temptation to disparage the schools they superintended. The result is, that more than eleven-twelfths of all the children in the reading classes in our schools do not understand the meaning of the words they read; that they do not master the sense of the reading lessons, and that the ideas and feelings intended by the author to be conveyed to and excited in the reader's mind still rest in the author's intention; never having yet reached the place of their destination. It would hardly seem that the combined efforts of all persons engaged, could have accomplished more, in defeating the true objects of reading." And Page, one of the most impartial writers on American education, assigns this as one of his reasons why so many cease to read as soon as they leave school. It costs them so much effort to decipher the meaning of a book, that it counteracts the desire for the gratification and improvement it might otherwise afford. And yet there is no branch of education on which so much depends,

whether we regard it in the light of our own improvement or of our own usefulness. Indeed, there is scarcely a sphere of life where its benefits may not be felt,—the mechanic, the housewife, the merchant, the schoolmaster, and the lawyer,—in the pulpit, at the bar, and in the senate. How valuable, then, the attainment of a good elocutionist.

In what does good reading consist, and what are the means to be used for its acquirement?—are the points to which we would briefly solicit the attention of our readers.

The essential qualities of good reading may be all classified under the three-fold division of audibility, distinctness, and impressiveness.—As to the first of these, there is little need of saying much. Here we are liable to fall into two extremes, to read either upon too low or too high a key. The latter used to be the more common practice in the olden time—bawling and vociferating at the highest possible pitch. To avoid both these faults, the first thing the reader ought to do, is to measure with his eye the distance of the person furthest away from him, and whom, it is intended, his voice should reach, and to enunciate accordingly, beginning rather upon a low key and rising gradually, till the proper degree of loudness is ascertained.

The next quality of good reading, and one of still greater importance than the preceding, is distinctness. This consists in pronouncing every syllable and every word distinctly. For this purpose the mouth must be well opened, and the consonants rested on; the sing-song monotonous tones avoided, and care taken never to slur one word into another. Every syllable and word must be enunciated clearly and distinctly.

The remaining quality of good reading is impressiveness. By this is meant our reading in such a manner as that the legitimate impression is produced on the minds of our auditors. This is the end of all good reading, of all genuine oratory.—And how is it effected? By personating the author, or by reading with such tones of voice and such external gesticulation as shall exactly correspond with the sense or meaning of the passage read. Our readers will remember what has already been advanced on the subject of sounds, whether of the human voice or of instrumental music; how they not only deepen, but alter the whole tone of the mind, and that to this mainly is owing the power of eloquence. This is the highest quality of good reading, and implies both a clear apprehension of the passage read and a refined and cultivated taste.

But we cannot enter further into this subject; it is more to our purpose that we direct attention to the means that ought to be employed for the furtherance of this important end.

1. And the first means that ought to be resorted to for this purpose is the exercising of the lingual organs of the young, and that from the very commencement of their educational career. We enter into no anatomical disquisition here respecting the muscles or sets of muscles that constitute man an articulate speaking being—suffice it simply to say, that there are certain muscles which, being operated upon by various stimulus, in obedience to the dictate of the will, perform the functions of speech. These muscles, in order to serve the end intended, must be exercised in the same way as any other portion of the muscular system. And the best, the only effectual mode of doing this, is by the teacher requiring his younger scholars day by day to enunciate the various elementary sounds of the English language. The method of teaching the alphabet by the power or sound of the letters instead of the names, which has been already described in the pages of our

journal, forms the best possible preparation for this work. But in addition to this, or, at least, as soon as the children are capable of pronouncing monosyllabic words, they should be required to devote a short period, say five or six minutes every day, to practice in the elementary sounds. By perseverance in this course will all the muscles employed in language be strengthened and fitted for the work for which they are intended. Then will there be no fear of slurring one syllable or word into another, and the two qualities of good reading be secured,—audibility and distinctness.

2. Another means for the accomplishment of the end in view, is simultaneous reading. In this exercise the scholars of one class read the same lesson at one and the same time. The way in which this exercise ought to be gone through is, for the trainer to read clause by clause, the class not accompanying, but immediately following, reading each word slowly and separately, as if it stood alone, and in the precise tones of the master or trainer. This simultaneous process assists in securing the following important objects: First, *The saving of time, as all may read what any one reads.* Secondly, *The most perfect concord as to tones of voice, as in the case of singing—the sympathy of numbers producing this effect.* This last point, however, should be frequently tested, by calling upon one here and another there, and sometimes a dozen or half-a-dozen at a time, to read alone equally slowly and in the same tones of voice. If the children according to his method do not read slowly and distinctly, the fault must be in the master, not in the scholars. But we shall enlarge on this subject when we come to speak more pointedly of the characteristics of the Training system.

3. Before the lesson is read, there should be a thorough analysis of every difficult word, or, at least, of every word with which the class is unacquainted. It is impossible that any individual or class of individuals can read well, if they have not a clear and accurate conception of the primary and principal secondary meanings of every word in the passage to be read. The whole stress of the passage may rest upon one word or technical term, and if no one can read properly without understanding the meaning of the passage, then it is clear that the first thing to be done with a view to this is the analysis of the words.—Every compound word consists of a root which is modified less or more by a prefix or affix, or both. And the first thing, therefore, is to find out the root, and then the modification thereof, either by the prefix or affix. Such a process will produce intelligence in reading.

4. Another and an important means to be used to make a good English reader, is a pictorial representation, by the master, of the leading idea or ideas contained in the lesson to be read. To read so as to convey to the mind of our hearers a vivid impression of the facts or truths intended to be communicated, we must ourselves possess a clear understanding and a deep impression of the same, we must be baptized into the very spirit of our author, we must personate him for the time being. And the most effectual way of doing this is to present to the mind's eye of the pupils a picture or an emblematic illustration, borrowed from some object or transaction with which they are perfectly familiar, of the leading idea or lesson contained. The scholars thus seeing with their mind's eye the thought or thoughts embodied with the same clearness as they see any object or scene with the bodily eye, they read the passage with the most perfect ease and intelligence and taste, and cannot fail to awaken corresponding emotions in the

breast of their auditors; and thus they reach the very perfection of reading, and that is, when the listeners suppose you are actually speaking to them, not *en masse*, but individually. In order to do justice to this means, however, the teacher himself must be a model of good reading and thoroughly prepare himself on every succeeding lesson he prescribes to his pupils.

THE WAY TO SPOIL GOOD READING FOR LIFE.

If we hope to have our children rendered good readers and speakers, we must not place them under untrained boys or raw lads, however cheaply procured, and afterwards, when spoiled by improper early training, send them to an accomplished elocutionist, who may polish and gloss over all the inarticulate and uncouth sounds and manners they have acquired, and which have been formed into habits; but we must secure the very best elocutionists that can be found for the situation of teaching and training beginners. We ought to place the young under the most accomplished masters—not merely apprentices—in every branch as well as elocution. "Learn early, learn well." Older persons are not so easily knocked out of good or bad habits as juniors are. What is the present practice? Why, perhaps we have an accomplished master, who, by means of natural good taste and long experience, has attained a high point in his profession—he takes what are called *the advanced classes*, in reading as well as in other branches, and employs some untrained young man, or perhaps a monitor for the younger class, and when this youth has cut and carved, and misshapen the materials, the finishing master gets the articles to repair and polish the best way he can.

Stowe.

III.—OFFICIAL NOTICES.

The Superintendent of Education intends to lecture on the subject of Education at the following places and on the dates affixed:—Chester, April 7; Bridgewater, Do. 8; Lunenburg, Do. 9; Mill Village, Do. 11; Liverpool, Do. 12; Milton, Do. 13; Shelburne, Do. 14; Barrington, Do. 15; Argyle, Do. 16; Tusket, Do. 18; Yarmouth, Do. 19; Bear River and Montapton, Do. 21; Clare and Weymouth, Do. 22; Sandy Cove, Do. 23; Westport, Do. 25; Digby, Do. 26; Hillsboro, Do. 27; Clements and Annapolis, Do. 28; Granville and Bridgetown, Do. 29; Lawrencetown, Do. 30; Wilmot and Aylesford, May 2; Kentville, Do. 3.

Dr. Forrester will apprize parties on the spot of the hour when these meetings will be held.

Teachers' Institutes will also be held about the same time. Dr. Forrester will write the Clerks of the School Boards requesting them to make the necessary arrangements for these Institutes, and he earnestly hopes that all Teachers will faithfully and punctually attend the same.

The present Term of the Normal School will close on Thursday, the last day of March. Wednesday and Thursday will be devoted to a public Review of all the work done during the Term. All interested in the cause of Education are invited to attend.

Dr. Forrester begs to intimate, that Trustees and others, wishing to obtain Normal Trained Teachers at the end of the present Term, must make application to him, stating all the particulars about the school, not later than the beginning of next month.

IV.—EDUCATIONAL INTELLIGENCE.

COLONIAL.

NOVA SCOTIA.

Musquodoboit, February 8th, 1859.

DR. FORRESTER,—

Dear Sir,—The Eastern Shore till lately was very little known, yet its population between Musquodoboit Harbour and St. Mary's River can be little less than 2,000. When I first visited it they had two small schools, one at Sheet Harbour and one at Ship Harbour. Two or three generations, with few exceptions, have passed away without the benefit of education. At that time the teacher at Ship Harbour was rather a thirsty soul, for his employers complained to me that he had taken a frolic for three weeks. They said they would have thought nothing of two or three days, but three weeks was too much. At that time the poor people got little or no assistance from the School Board in Halifax, for they did not know how to apply for it; but now they have a School Board on the Shore who inquire into their wants and procure for them a share of the funds. Each of the following places has a school house, Musquodoboit Harbour, Jeddore, Clam Harbour, Ship Harbour, Shoal Bay, Tanjers, Popes Harbour, Spry Harbour, Beaver Harbour, Salmon River, Mosher's Island, Smith's Cove, Mary Joseph; two at Sheet Harbour and two at the Bay of Islands. The best schools are at Musquodoboit Harbour, Ship Harbour and Sheet Harbour. Many of the others are poor, and not always in operation. The teachers have great difficulties to contend with for want of books, and to some of the poor schools additional grants should be made.—Mr. Farquhar, Clerk to the School Board, has made every effort in his power to elevate the standard of education on the Eastern Shore, and the tone of religious feeling is slowly but steadily advancing. They have three church ministers on the Eastern Shore, who preach the gospel with ability and diligence, and leave no means unemployed to gather souls to the Saviour. I well remember when divine service was held for the first time in a private house at Ship Harbour, that the owner returned from Halifax at the time of the dismissal of the congregation. He was quite alarmed and feared it was a funeral, because no public meetings had ever been held in the place excepting funerals. In some settlements prayers were read on the Sabbath, and most of the children were carried to Halifax for baptism. I recollect two men coming to me one morning with a child for baptism. The father asked me if I would put the child's name in the Bishop's big book in Halifax. I said I was Bishop myself. His companion said to him, "I told you by the way that God Almighty kept a big book, and if it was recorded in his book it was sufficient."

We have a church at Sheet Harbour, and a detachment of Presbyterians scattered like broken suns. The communicant roll is between eighty and ninety. I had a bridle road to the shore, 25 miles of unbroken wilderness, without a house, and when the snow was too deep I have had to dismount and carry my portmanteau on my shoulders, but I could not use a horse on the Shore, the paths were in the same state in which they were an hundred years ago. But now the roads are good and the country is opened up. But thirty years ago you could not see a wheel carriage or an apple tree on the whole Shore, and the people would not see a newspaper for three months and few travellers except a guest in quest of furs. The little detached settlements remind one of insects in a garden. The insects in an oak tree would live and die before they would make the acquaintance of insects in an ash tree. I have spent many happy days among those poor people, and never preached better than in the crammed backwood school house with the roaring hardwood fire. These golden hours are gone, but the remembrance of them is sweet.

Yours respectfully,

JOHN SPROTT.

BRITAIN.

THE subject of National Education in Scotland has been twice under discussion in the Imperial Parliament—on Tuesday, the 17th February, in the House of Commons, and on Friday, the 18th, in the House of Lords. The following speech was delivered by the Earl of Airlie in introducing the subject in the House of Lords:—

The Earl of Airlie, in rising pursuant to notice to put a question to the Government on this subject, said he was desirous of stating briefly, in the first instance, the reasons why he took that course. His question had reference principally to the state of the parochial schools of Scotland. He thought that the best proof that it was the general opinion that some legislative action on the subject of those schools was required, was to be found in the circumstance that since 1853, and under successive Governments, no less than three bills had been introduced for the purpose of making better provision for the education of the people in Scotland. One main object of each of those bills was to provide such salaries for the schoolmasters as might insure a supply of persons competent to fill that office. Those of their Lordships who were connected with Scotland were well aware that the salaries of the parochial schoolmasters were levied by assessment on the landed proprietors in each parish, and that the amount of those salaries was determined by what were called the flars prices, which were subject to revision at periods of twenty-five years. In 1857 an Act had been passed to the effect that in July of the present year an average should be struck of the prices of oatmeal throughout Scotland during the twenty-five years from 1833 to 1858 inclusive, which average was to determine the amount of assessment for schoolmasters' salaries for the twenty-five years beginning in 1859. Now, it was known that the average prices of oatmeal for the twenty-five years from 1833 to 1858 would not be so low as those for the twenty-five years from 1823 to 1853, and that consequently the schoolmasters' salaries, would not be so much reduced as they would have been if the averages had been struck in 1853. He believed, indeed, that the salaries of the schoolmasters would not be very much lower than they were at present; still they would be somewhat reduced. Now, he could confidently state that it was the general opinion in Scotland that the salaries of the parochial schoolmasters, so far from being on too high a scale, were below the standard at which it would be desirable to fix them. They varied from a maximum of £35 a-year to a minimum of £29; and that it was the opinion of the Governments which had held office from 1853 to the present date that these salaries were too low, was clear from the fact that every one of the three Government bills which had been introduced on the subject since 1853 had contained a provision for their augmentation. In no single instance, indeed, of which he was aware, had exception been taken by any member of Parliament to those provisions. On the contrary, men of all parties and of every shade of opinion on other matters connected with education had repeatedly declared that they thought the salaries of the schoolmasters ought to be raised. On that point, therefore, there was a concurrence of opinion on the part of the people of Scotland—on the part of the Legislature—and on the part of every Government which had held office since 1853; and he could not believe that the present Government entertained a different opinion on the point. He felt, under those circumstances, justified in asserting that the Government were bound to take care that the salaries of the parochial schoolmasters should at least suffer no diminution by the Act which came into operation this year. He had said that it was expected that the reduction in the amount of salaries consequent upon that Act would not be large. He knew not what the amount of that reduction might be, but let them suppose that it was small—that it was but £1 a-year on the maximum. Let their Lordships consider what a reduction that sum would be from an income of £35. (Hear, hear.) Why, a deduction of £1 a-year from £35 a-year amounted to nearly 3 per cent.—that was to say, it bore about the same proportion to the schoolmaster's salary as the income tax paid last year by their

Lordships bore to their incomes. A great deal had been said about the hardship of taxing incomes of £100 a-year, but a deduction of nearly 3 per cent. made from salaries which were not much more than one-third of the lowest incomes which were rated to the income tax was a still greater grievance. It was not, however, only for the purpose of raising the salaries of the schoolmasters that the action of the Legislature was required. There was a general concurrence of opinion on many other points, and that opinion had been expressed whenever the opportunity of giving utterance to it had presented itself. All those who had given any attention to the subject were agreed that retiring pensions ought to be provided for schoolmasters who, from age or cause, were incapacitated for farther work; that greater facilities than at present existed ought to be given for dismissing schoolmasters who were inefficient; and that the schools required a greater amount of, and more effective, supervision and inspection than they now received. Provisions having in view the objects which he had named had been embodied in each of the three bills which had been introduced since 1853, so that on these points also there was a concurrence of opinion on the part of the Government, of the Legislature, and of the people of Scotland. It was felt, too, that the system of parochial schools, though it was one of which all Scotchmen were justly proud, and though it had worked admirably for a long series of years, yet required, like other institutions, to be expanded and to be adapted to the wants of the time. It was felt that the country had outgrown the existing system. There were, for example many large and populous burghs for the education of whose inhabitants there was no national provision. Indeed, speaking generally, he might say that such was the case of all the burghs in Scotland. It was generally admitted, too, that the public money might be more economically administered, and might be made to go much farther under a comprehensive system of national education than under the present system of Privy Council grants. And a want was beginning to be experienced of a class of schools holding a rank intermediate between the parish school and the universities. That was a growing want, and one which recent legislation would cause to be felt more strongly than had hitherto been the case. For, whatever opinion might be entertained in other respects of the merits of the Universities Act which had passed last year, it was beyond a doubt that one effect of the provisions of that Act would be to render a university education less accessible to persons of limited means than it had previously been. It therefore seemed to him that the Government which had passed an Act of which the undoubted tendency was to render a university education more expensive, was bound to provide a substitute for those persons who would for the future be deprived of the benefits of an education which was in times past accessible to their class. He had been speaking hitherto for the most part of the elementary branches of education; but if their Lordships turned to the higher branches they would find, he asserted with confidence, that Scotland was far in arrears both of England and of Ireland in that respect. That which he stated was no gratuitous assumption. It was supported by facts and by figures. Let any one look over the lists of the candidates at competitive examinations, either for Indian or for other Government appointments, and he would find that the proportion of successful to unsuccessful competitors was much smaller among persons educated in Scotland than among persons educated either in England or Ireland. He would find, also, that the ratio of successful competitors to the population was smaller than in England or in Ireland. If, then, looking to the considerations to which he had adverted, he had succeeded in showing that there existed a necessity for a measure to improve the system of education in Scotland, it would not, he thought, be difficult to prove that any such measure ought to be introduced by the Government. There were, as their Lordships well knew, in Scotland two great parties, who, though they agreed upon many points, were yet at variance upon one. Now, any measure upon the subject of education brought forward by a member of one of those parties must be almost of necessity a measure of a sectarian and party character. The success or the defeat of such a measure would be

hailed as a triumph by the one party and deplored as a disaster by the other. It was currently reported that it was the intention of one of the parties to which he had alluded to introduce and to endeavour to carry through Parliament a considered measure of that description, and he was of opinion that it would be an event deeply to be deplored that either party should have it in their power to claim a victory in such a matter over the other. It seemed to him that it was the duty of the Government to endeavour to impose moderation upon the two factions, and to attempt at least to make such an arrangement as might be satisfactory to reasonable persons, though it might not satisfy those of extreme opinions on either side. He hoped he did not look in vain to the Government for such an arrangement. He saw in the noble Earl opposite the parent of a system of education which in Ireland—and in no country were sectarian differences more fierce—had been attended with the happiest results. He gratefully acknowledged too, the many merits of the Scotch Universities Act of last year, whatever exceptions he might have taken or might be prepared to take to some of its details. And, under those circumstances, he should say nothing further upon the subject of his question, but would content himself with asking the noble Earl in conclusion whether it was the intention of her Majesty's Government to introduce, during the present session, a measure for the improvement of the system of education in Scotland?—(Hear, hear.)

AMERICA.

STATE OF PENNSYLVANIA, 1858.

The following summary of the condition of the schools in this State is from the recent message of the Governor.

The annual report of the Superintendent of Common Schools will lay before you the present condition of the Common School System, and of its operations during the past year.—Your close and scrutinizing attention is invited to the details of that document.

Including the city of Philadelphia, it will be observed, that there were in public schools of the State, during the year which terminated on the first Monday of the last June, 528,201 pupils, these were instructed during an average term of a little over five months, in 11,281 schools, by 15,856 teachers, at a total cost of \$2,127,632 41 cents.

Here is a public interest, which,—whether we regard its ramifications into every portion of our social fabric, its large cost, the important powers over the present which it wields, or its incalculable influence upon the future,—undoubtedly transcends all others committed to the care of the secular authorities. This being the case, I have no hesitation in asserting that the time has arrived when its full importance should be recognized, and that its due administration should be made the duty of a fully organized and effective, as well as a separate department in the government.

But the mere care and promotion of our system of Common Schools important and extensive as it obviously is—should not be the sole object of such a Department. If it is true that the power to punish crime includes also the right to prevent it, by providing for the proper intellectual and moral training of the people, it would seem to follow that the department charged with the latter momentous duty, should also be in possession of all the sources and subjects of information, calculated to shed light upon the object of its action. Hence the collection, arrangement, and practical deductions from population and industrial statistics, from natural defects, such as deafness and dumbness, blindness and lunacy, from crime in its various forms and developments, together with such control over all the literary and scientific institutions in the State, as shall bring their full condition into view, should also belong to the same Department.

Therefore, I most respectfully, but earnestly, urge upon your favorable consideration, at the present propitious moment, the organization of such a department, in the room of

those for the care of mere matter whose agency has been or soon will be discontinued by the onward and upward progress of the Commonwealth.

A suitable Department of Public Instruction, will not, however, of itself, effect all that is needed in this direction. The general results of the Common School system, already cited, show the importance of its nature, and the magnitude of its operations. If we look, also, into its special statistics, the conclusion will be equally clear that certain improvements in its working machinery are equally indispensable.

It is needless to attempt to prove the truism that the properly qualified teacher is the life and success of the school. But the facts are startling, that of the 12,828 teachers of our public schools, exclusive of those in Philadelphia, only 5,087 are reported as "qualified" for their important trust; while 5,387 are returned as "medium," or such as are only tolerated till better can be obtained; and that 2,313 are stated to be "unfit." In other words: of the 569,880 children attending the schools out of Philadelphia, only about 230,000 (less than one half) are under proper instruction from inferior teachers; 100,000 are actually in charge of persons wholly unfit for the task.

This presents the subject in a light that cannot be shut out; and though the great and commendable efforts recently made by the teachers of Pennsylvania, for their own improvement, are fully recognized, it cannot be concealed that there is work yet to be done, in this relation, which would seem to be beyond their unaided power to accomplish.

When, however, we look further into the special statistics of this branch of the system, the material for improvement is found to be of the most promising kind. Of the 12,828 teachers of our common schools, 10,889 are under thirty years of age, and 10,916 are natives of Pennsylvania; and a larger proportion than in the most of other States are permanently devoted to the profession of teaching. To render these fit for the position to which they aspire—undoubtedly one of the most useful and honorable in the world—and to raise up a constant supply of well qualified successors, is the work to be done.

Various modes of effecting this object have been suggested or tried, but, after mature reflection, I am led to prefer that devised by the Act of May 20, 1853, entitled "An Act to provide for the due training of teachers for the Common Schools of the State." It places, in relation to the State, the teacher on the same footing with the members of such of the other learned professions as have been recognized by public authority, and it is to be regretted that the prostration of business and scarcity of money, that so soon followed the passage of the act, had the effect of checking many laudable efforts to put its provisions into operation. Under these circumstances, does it not become the duty of the State to afford such aid, or at least hold out such inducements as shall enable this measure to be fairly tested?

The passage of a law guaranteeing the payment of a moderate sum to one Teacher's School in each of the districts created by the act of 1857, would no doubt cause a sufficient number, to establish the efficiency and practicability of the plan, to be completed in a few years; the money not to be paid till the schools were in full and approved operation. It is not probable that this grant would cause any considerable draft on the treasury; but, even if the whole twelve schools should ultimately be established, the boon would neither be out of proportion to that which has been conceded to other institutions, nor the number of graduates beyond the wants of the community. Up to the present time, Pennsylvania has appropriated about \$600,000 in aid of her colleges and academies, and this mainly in the hope of obtaining from them teachers for the common schools. Though the benefits of this munificence have been in other respects, quite equal to the amount given, it will be asserted by no one that the avowed object has been to any considerable extent effected. It would therefore appear to be time that the aid of the State should be brought directly to bear in favor of the great object so long contemplated.

STATE OF NEW YORK, 1858.

The Governor of this State in his recent message to the Legislature states that the amount of capital of the school fund is \$2,551,260 52, which shows an increase during the year of \$21,868 28.

The capital of the literature fund amounts to \$269,952 12. The amount received for revenue is \$16,111 01; which is annually to be distributed to academics, and used for the purchase of text books, maps and globes, and philosophical and chemical apparatus, for academics.

The capital of the United States deposit fund being the amount received from the United States, is \$1,014,520 71. The amount received for revenue is \$218,767 52; which is also appropriated for the annual support of academics, common schools, the State Normal School, the instruction of teachers' classes in academics, and for teachers' institutes.

The expenditures for the public schools of the state for the year 1857 are:—

For teachers' wages	\$2,372,113 86
“ libraries and school apparatus,	136,597 80
“ colored schools,	10,729 93
“ school houses, sites and repairs,	765,528 59
“ incidental expenses,	369,027 05
Amount remaining unexpended,	138,853 56
Total	\$3,792,948 79

The above amount expended for school purposes was raised as follows:—

Balance unexpended from the previous year,	\$140,142 40
From common school fund and state tax,	1,346,302 56
From Gospel and School funds,	17,449 02
School district tax,	1,816,542 71
“ “ rate bills,	390,515 50
All other sources,	51,396 60
Total	\$3,792,948 79

Numbers of school districts in the state,	11,617
“ “ houses,	11,566
“ children between 4 and 21,	1,240,176
“ attending the public schools,	812,137
“ of teachers employed within the year (Males, 8,266; females, 17,887),	27,153

Three or four hundred of these hold the diploma of the State Normal School.

The total receipts of the public schools from the State, district taxes, rate bills, &c., during the year were \$3,792,198 79, about equally divided between cities and the rural districts.

The School Libraries contain 1,402,253.

The Superintendent says that by the provisions of the law granting \$6000 to Genesee College, there were issued to his predecessor a certificate of twenty scholarships to Genesee College and the Wesleyan Seminary connected therewith, admitting the persons who might be appointed under them to all the privileges and instructions in said institutions. He brings the subject before the public and the Legislature, to the end that the benefits sought to be secured may not continue inoperative through the want of applications for the existing vacancies.

By the law of 1851, which caused the raising of \$800,000 annually by general tax, the principle was established that “the property of the State should educate the children of the State.” The law of 1856 extended and enlarged the appropriation by a three-fourth mill tax, which has increased the appropriation from that made by the law of 1851, to nearly \$1,200,000.

Under the management of the present Superintendent of Public Instruction, the School system of our State is acquiring, steadily but surely, a standing and reputation that will make it a model for others.

For special information in relation thereto, I refer you to the report of that officer, which, under the law of 1854, changing the close of “the school year” from 31st December to 30th September, will enable him to present the statistics pertaining to this important interest down to a period corresponding with the other departments of the State, and not attainable under previous statutes.

POETRY.

THE LAST GOOD NIGHT.

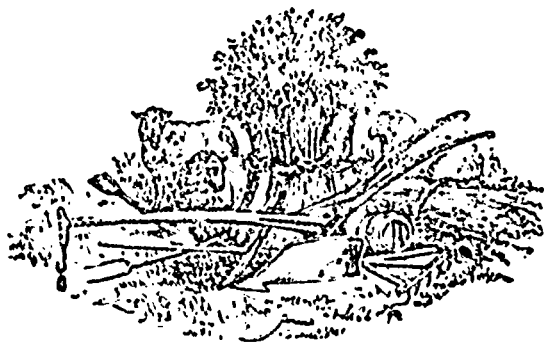
Close his eyelids, press them gently
 O'er the dead and faded eyes,
 For the soul that made them lovely
 Hath returned to the skies.
 Wipe the death-drops from his forehead,
 Sever one dear golden tress,
 Fold his icy hands all meekly,
 Smooth the little snowy dress:
 Scatter flower's o'er his pillow—
 Gentle flowers, so pure and white—
 Lay the bud upon his bosom,
 There— now softly say, Good Night.

Though our tears flow fast and faster,
 Yet we would not call him back;
 We are glad his feet no longer
 Tread life's rough and thorny track;
 We are glad our heavenly Father
 Took him while his heart was pure,
 We are glad He did not leave him
 All life's trials to endure:
 We are glad—and yet the tear-drop
 Falleth; for, alas! we know
 That our fire side will be lonely,
 We shall miss our darling so.

While the twilight shadows gather,
 We shall wait in vain to feel
 Little arms all white and dimpled,
 Round our necks so softly steal;
 Our wet cheeks will miss the pressure
 Of sweet lips so warm and red,—
 And our bosom sadly, sadly,
 Miss that darling little head,
 Which was wont to rest there sweetly,
 And those golden eyes so bright,
 We shall miss their living glance,
 We shall miss their soft Good Night.

When the morrow's sun is shining,
 They will take this cherished form,
 They will bear it to the church-yard,
 And consign it to the worm;
 Well what matter? It is only
 The clay-dress our darling wore;
 God hath robed him as an angel,
 He hath need of this no more:
 Fold his hands, and o'er his pillow
 Scatter flowers pure and white,
 Kiss that marble brow, and whisper,
 Once again a last Good Night.

AGRICULTURAL.



I.—THEORY OF AGRICULTURE.

BOTANY.

ORGANS OF VEGETATION.

In Summer when plants, shrubs, and trees are looking so beautiful as to attract the attention, even, of the most careless observer; when the face of nature presents uninterrupted loveliness; and when we can wander through the fields to admire things which our finite natures can scarcely comprehend—then it is that we are drawn nearer the feet of our Creator, humbly to acknowledge our own weakness, and to seek an interest in Him, who will bring us to that Country where all is joy and sunshine—and where the duties of this life shall have given place to the more sublime duty of singing our Saviour's love. What an interesting thing it would be, if, when enjoying the beauties of nature we could tell the manner by which these grow. And although we cannot tell what the vital principle of life is—yet the Science of Botany enables us to account for a great many things in nature which would otherwise remain in mystery. The *Organs of Vegetation* will be the most important as bearing more directly upon the growth of Plants. We will try, as well as we can, to discuss these—the Root, Stem, and Leaf.

Root.

The Root or descending axis springs from the vital part of the seed after it has been deposited in the ground a certain depth, so as to be within the reach of sufficient moisture, &c. In considering the Root we take—1st. Its Parts; 2nd. Various Forms; 3rd. Functions Performed. *Parts of the Root* are again subdivided into three—1st. Principal; 2nd. Rootlets; 3rd. Collar or Neck.

Principal Part is that in which the nourishment for next Spring is deposited during Winter.

Rootlets constitute the most nutritious part, as it is by them that the minerals, suited to the nature of the tree, are chosen. They have a Capillary Attraction, refusing at times what they accept at others.

Collar or Neck is that part out of which the bud of the future season sprouts. This must not be planted too far up or too far down, as in either case it will retard the growth of the tree.

Various Forms of the Root.—These are modified by the nature of the plants, and there is as much difference in them as in plants themselves. There are three classes, viz., Annual, Biennial, and Perennial. The Annual are of one year's duration, having Fibrous Roots. The crude sap, instead of remaining in the Roots as in Biennial and Perennial Plants, returns to the seed, the process of flowering and seedling being

that which exhausts the plant. The Biennial Plants flower and seed the second year. The Perennial last many years, such as the Birch, Maple, &c.

Functions Performed.—The Functions which the Root performs are twofold. 1st. To keep the plant in its proper place; this consolidates the ground. 2nd. To absorb nourishment; this forms a natural drainage and is of more importance than Farmers generally imagine. They make a large amount of labour for themselves by digging drains, seldom thinking of improving the beauty and value of their farms by planting trees.

Stem.

In considering the Stem we divide it into three—1st. Growth, 2nd. Structure; 3rd. Different Forms.

Growth.—At the top of every year's growth there is a perennial or crowning bud, at each side of this there is an auxiliary. These form branches and crowning buds, which again form branches, &c., until the tree has grown, showing that every tree is just a multiplication of buds. The joints of each branch correspond to the nature of the tree—some are alternate, others are opposite, and others are round, and round in a whirl.

Structure.—The two classes of Stems according to the structure are Exogens and Endogens. The Exogens have two seed leaves, and are, therefore, Dicotyledons. The nourishment of this kind of plant passes up the outside through last year's growth, increasing the hardness toward the centre, and, although the centre decays, the tree will still continue to live until no wood remains to convey the sap to the leaf.—The Endogens have but one seed leaf, and are Monocotyledons. The nourishment passing up the centre, hardening the wood toward the outside. This kind does not live so long as the Exogens in consequence of the bark bursting.

Different Forms.—The Stem has been called the ascending axis, but it does not always ascend. The different forms of Stems are divided into two classes, Aerial Proper and Aerial Subterranean. Of the Aerial Proper there are a great many different kinds, such as clinging, creeping, &c. Of the Aerial Subterranean there are also a great many different kinds.

Leaf.

The Leaf in the Vegetable serves the same purpose as the Lungs do in the Animal World. The Leaf is considered under four heads—1st. Structure; 2nd. Confirmation; 3rd. Duration; 4th. Fall.

Structure.—There is a marked difference between the upper and lower part of the Leaf. The upper is smooth, compact and shining, and the cellular tissue is arranged regularly to prevent too copious an exhalation. On the contrary the lower part is hairy and porous, with the cellular tissue arranged unevenly, for the purpose of ventilation. If the lower part of the Leaf were turned upwards the plant would die.—In tropical climates, where the rains are periodical, we are led to inquire, From whence does the plant receive nourishment? The answer is simple, but beautiful, showing that each of the leaves have safety valves, so constructed as to open when the moisture begins to fall, and, when they have sufficient to last them until the next rain will come, to close.

Confirmation.—The Leaf is made up of two parts—the Lamina and Petiole. The Lamina is the Leaf, and the Petiole the support to the Leaf. There are two divisions of the Petiole—Reticulated and Feather-nerved. The former characterize the Exogens, the rib going up the centre. The latter characterize the Endogens, the rib having various modifications.

Duration.—The duration of the Leaf is varied by different circumstances—some falling off in Summer, others in Autumn, others in Spring, and others not for a number of years.

Fall of the Leaf.—In the course of the season, when the assimilated juice is spreading over the tree, there is always a little left. This fills the Leaf, step by step, until the crude juice can find no entrance. The twig upon which the leaf is suspended swells—the leaf dies and falls off.

"Leaves have their time to fall,
And flowers to wither at the North-wind's breath,"
"And stars to set"—"but all,
Thou hast all seasons for thine own—Oh! DEATH."

A. K. P.

[The foregoing exercise is the composition of a Female Pupil Teacher at present attending the Normal School.—EDITOR.]

AGRICULTURAL EDUCATION.

The *New Jersey Farmer*, published at Trenton, in introducing to its readers a recent letter of Gov. Wright, of Indiana, describing an agricultural school in Germany, says—"Every profession has its school—why agriculture should be left to glean its learning as best it may, we cannot understand. If schools are necessary to train the clergyman, the lawyer, the doctor, the merchant and the artist, is it not eminently proper that agriculture, which depends so entirely for its complete success upon a knowledge of the natural sciences, should also have its schools?"

Certainly, it is, and it passes our comprehension to know why, among farmers themselves, such prejudices exist against everything that is to qualify the young farmer for his profession, except the mere act of his working upon the land with his own hands. It is breath spent in vain to talk about managing a farm well theoretically. We might as well expect the body to grow and flourish without its vitalizing breath; theory and practice must go together, and it is well if the *practice* is quite thorough before we pause to theorize much. That proper schools for instruction will afford the young farmer important aid in the pursuit of his business, will not admit of a doubt, it seems to us, in any unprejudiced mind. What such schools shall embrace, and how they shall be managed, are questions not yet settled among us.

OF GYPSUM.

Another important manure in which lime forms a part, is plaster of paris, also called gypsum, and chemically, sulphate of lime. In this country it has been more generally used perhaps than in any other, and often with very great benefit. In many cases, a few bushels per acre bring up land from poverty, to a very good bearing condition: complaints are, however, made, that after a time it injures the land in place of benefitting it. This, in almost all instances, results from using it alone, without applying other manures at the same time. The farmer has taken away a variety of substances, and has only added gypsum. If the land is entirely exhausted at last under such treatment, it is obviously not the fault of the gypsum. There are many large districts where it produces no effect; but it may always be considered certain, that where gypsum or lime do no good, there is already, in one form or another, a supply of both naturally in the soil; or, as has been previously explained under lime, some physical or chemical defect which prevents their action.

Gypsum, before it is burned, consists of sulphuric acid, lime, and water; of the latter, there are about 21 lbs. in every hundred. This water can be easily driven off by heating the ground gypsum. This may be done with a small quantity, by way of experiment, over a common lamp. During heating, it whitens: it is this burned gypsum that is used for the cornices of rooms, for making casts, for hard finish, etc. When water is mixed with it, a considerable degree of heat is produced, the 21 per cent of water is again absorbed, becoming once more a part of the solid stone, and the whole mass hardening or *setting*, as it is termed, in a few moments. It is upon this property of hardening when mingled with water, that the uses of gypsum in the arts, as above mentioned, depend.

This manure frequently produces a most beneficial effect

when applied as a top dressing upon pastures and meadows: it is also a favorite and excellent application to young corn and potatoes. It is of service not only by the valuable nutriment which it furnishes to the plant, but also from a certain power which it possesses of absorbing moisture and gases.

a. Liebig has supposed that much of its effect upon grass land is owing to this property, that it attracts ammonia from the atmosphere, and retains it for the use of plants. This is without doubt an important effect, but should not be considered the principal one.

b. To this same property is to be ascribed its action when scattered over compost heaps, or mixed into the liquid in tanks. In both cases it absorbs ammonia, and prevents its escape. White fumes of ammonia may sometimes be perceived, both by the eye and the sense of smell, rising from the surface of fermenting manure heaps. A little gypsum sprinkled over the surface of the heap, will arrest this evaporation and loss almost immediately.

c. During drought, it seems by its power of attracting moisture, to aid materially in sustaining the plant. It is slightly soluble in water, and hence slowly dissolves, either when buried in the soil or left on the surface. It is best applied in damp weather, as then it can be sown more easily, and will produce an effect more quickly. The quantity applied per acre is usually not large.

AMMONIA.

This substance, which performs a very important part in the economy of vegetable development and growth, is always found in rain-water, dew and snow, particularly in the vicinage of cities and densely populated districts, where ammonia is profusely generated by decomposing matters. It is a volatile substance, and unless absorbed and fixed by some article capable of attracting and retaining it, passes into the atmosphere, and is lost. That it actually abounds in rain-water as it descends from the heavens, and in no inconsiderable quantity, may be demonstrated by simply distilling a few gallons, and mixing the first two or three pounds distilled with a little muriatic acid. A very distinct and beautiful crystallization of *muriate of ammonia*, or *sal ammonia*, will thus be formed, the crystals having a dark or brownish color.

If a small quantity of muriatic acid be added to a quantity of rain-water, and the mixture evaporated to dryness over a hot fire, the ammonia will remain as a residuum, in combination with the sulphuric acid. It may be detected by adding a little pulverized lime, which will combine with the acid, and the ammonia will be set free. In this state, it is easily detected by its pungent smell.

As to fixers, a recent writer on agricultural chemistry remarks:—"For this purpose charcoal is probably one of the most efficient and valuable articles known, as it is capable, under ordinary circumstances, of absorbing ninety times its weight of ammoniacal gas, which it retains until it is freed and washed into the soil by rain. Here, partly no doubt, by the voltaic action of the spongiolae, it is conveyed into the vegetable system and circulation, and becomes the principal source of nitrogen, so indispensable to vegetable health and growth. Gypsum, another valuable article, is also a powerful fixer, and is highly valuable as an application, on soils, especially those that are dressed with animal substances, which in the process of decomposition evolve considerable quantities of ammonia, and which, like charcoal, it serves to fix and retain for the benefit of the growing crop."

Urate is evolved or given out by putrid urine, and by stable dung in a state of fermentation. It is always a colorless product, and distinguished by a peculiarly pungent odor. When dissolved in water, it is known as "*hartshorn*." It is volatile in a very remarkable degree, possesses the common properties of soda and potash, and combines readily, as we have already shown, with acids. Its effects upon vegetation, are very marked. For fixing and economizing this volatile and highly important product of decomposition, gypsum, or plaster of paris, as it is more commonly denominated, possesses a very

high degree of value. It was formerly supposed that gypsum operated merely as a stimulant when applied to vegetables; but in his very elegant and elaborate work, Professor LIENIG has presented a solution of its action, which experience, we have no doubt, will demonstrate to be correct.

According to his views, carbonate of ammonia, which is known to be present in rain-water, and in itself a most energetic and salutary agent in the production of vegetable phenomena, is attracted and decomposed by gypsum, and soluble sulphate of ammonia and carbonate of lime formed. As this salt of ammonia possesses no volatility, it is, of course, retained in the soil, and effectually economized for the use of plants. Both the above salts, however, have a decidedly beneficial influence upon the *humus* of the soil, and, by a specific action, tend to advance its preparation as a soluble food of plants.

ROOTS CANNOT GROW WITHOUT LEAVES.

It is a well-known and well-settled principle in vegetable physiology, that no part of a plant can grow without the assistance derived from the leaf, which decomposes and re-arranges the crude materials of the food of plants, and thus forms new wood.

For this reason, a very simple and easy way to kill a patch of Canada thistles, or any other weed whose roots spread wide and extend deeply into the soil, is by keeping the tops cut off or the leaves smothered, so that no food can be furnished to the roots below. A few months of starvation in summer will destroy the plants.

For the same reason, clover or any other plants, will extend the growth of their roots more rapidly and freely if a larger top is permitted above ground than if closely pastured.

The following statement, not wholly new, from a source that we cannot at this moment give, is a further corroboration. The "curious circumstance" mentioned, exists the same with any other plant, as with clover:

"AGRICULTURAL EXPERIMENT.—A curious circumstance connected with the growth of clover is, that by cutting the clover twice and removing all the hay, a much better wheat crop is obtained than by feeding it off by sheep, even if some artificial food is used. This is owing to the fact that the growth of the roots of clover in the land is in exact proportion to the growth of the leaves in the air. Each leaflet that shoots upward sends a radicle or root downward. If the leaflet be bitten off or destroyed, its radicle ceases to grow. It therefore follows that grazing clover by sheep materially diminishes the amount of vegetable matter accumulated in the soil by the roots, and consequently the produce of the succeeding crop."

The above is sustained by the following:—

"A friend of mine in Northamptonshire had a field of clover, it was divided into two portions, both were cut at mid-summer, and one part was then fed off with sheep, and the other left to grow till September, when it was again cut, and the hay removed. Equal portions of the several pieces were then compared. Where the clover had been cut once and fed off, he got 35 cwt. of clover roots per acre. Where he cut twice he got 75 cwt., there being a difference of two tons of vegetable matter per acre."—*Country Gentleman*.

II.—PRACTICE OF AGRICULTURE.

TREATMENT OF LIVE STOCK.

To the Editor of the Journal of Education and Agriculture.

HALIFAX, 2nd March, 1859.

Sir,—

As the Spring season of the year is now approaching it occurs to me that a few hints relative to the treatment of Live Stock might not be out of place in the *Journal*, and in the fol-

lowing observations it is not my intention to introduce any new theories, but simply to remind of a good old maxim of the utmost importance to Farmers in general. I would therefore suggest that particular care should be taken of Stock of whatever description. It is to Live Stock that a Farmer must look for his support, principally to the dairy and fat cattle for ready cash produce, and to the working cattle for the cultivation of the soil and production of crops which the Farmer himself and all others are depending upon. It is, therefore, of the utmost importance that he should be particularly attentive to the comfort of his cattle now, when the period of their profit is at hand. It very often happens that after a long and severe winter, such as we experience in this country, and particularly the past, that cattle get considerably reduced in flesh, and after calving only the frame remains with little enough strength to support themselves without giving any remunerative return to the owner; and when put out to grass, even if good, the summer is nearly exhausted before their own frames are brought to a proper state for making a fair return in the shape of produce. All this may be easily avoided by keeping them in good condition, and they will well repay the expense of keep in an abundant supply of milk, butter or cheese. The buttermilk or whey of which is indispensibly necessary as an article of food for the profitable rearing of calves or pigs.

I might suggest a process of treatment, according to my views, and yet prove altogether unpractical to the general class of Farmers, and consequently of no use to them. I will therefore earnestly request that every person will use the best means within his power at present, and persevere in improving the means for next season by growing a larger amount of green crops and a better quality of hay. Where turnips, mangold, carrots or cabbages, are available with an abundant supply of good sweet hay, a proper application of these, with due attention to cleanliness, there will be little to fear from reduced cattle. The cow sheds or stalls where cattle are confined should be so constructed as to give the cattleman every opportunity for performing his work with ease and rapidity, also to give the cattle every amount of comfort in rising up and laying down, that whether standing, lying or feeding they may have ease and comfort in every position, it is also of the utmost importance that it should be warm in winter and well ventilated at every period. And, if it cannot be whitewashed occasionally, a little chloride of lime might be used with advantage. However, if possible, it should be whitewashed at least twice a year. Feeding should be regularly given to cattle, and particularly at the appointed hour, otherwise the cattle will become fidgetty and uneasy. It is the grand maxim of feeding to not give too much at once and feed often—if possible, to alternate the food, giving green or root crops, of whatever kind, alternately with hay. Where house feeding is properly attended to the first or morning feed is given at a particular hour, say 6 o'clock A.M., with turnips or other green food, according to the means at command, taking care to give an abundant supply of whatever kind, and, if too much is given, it is well to remove it immediately after the cattle have taken satisfaction, for if allowed to remain in the stalls or troughs the cattle's breath will materially injure it and make it unpalatable for next meal. If turnips or mangold they may be cooked for pigs with other food, or cut into slices for calves or sheep. The second feed should be given at 9 o'clock A.M., the third at twelve, the fourth at three P.M., the fifth at six, and the sixth or last at nine P.M., and should always be hay, as there will be no fear of the cattle injuring themselves by it at night during the cattleman's absence. Where grain crops are not available the best substitute at the Farmer's disposal is to cut sheaf oats to chaff, and steam or boil it, if grown on purpose, with one half the quantity of pease or pulse, and cut before being allowed to become fully ripe, would be more advantageous than sheaf oats alone. In the absence of either, sweet hay cut into chaff and boiled or steamed, and, if possible, emptied out upon some cut turnips or mangold with a little salt, and given to the cattle warm enough to eat, will considerably assist in the secretion of milk, give them a better appetite for other food, and consequently strengthen them materially for the ensuing spring.

I might also remark that it is injudicious to turn the cattle out to rich luxuriant pasture at once in the spring. It would be much better to put them out for short intervals at first, giving them a good supply of hay on returning to their stalls. If these means are resorted to it will prevent them for a short space of time from suffering too much from laxativeness, which generally occurs when turned out to pasture at once.

Working cattle should receive food adapted to the work they are required to perform. A good supply of carrots and plenty of hay is excellent food for them, and, if a small quantity of crushed corn or bean meal were given with carrots or other roots, it would tend to stimulate their working power.—It is well to keep working cattle and horses above the mark for the labour they have to perform rather than below it.—Where the spring is so late it would be well to remember that well known verse from that eminent ploughman poet, in his address to "His Auld Mare Maggie." That

"When the snaw is cauld and deep,
And threatens labour back to keep,
Her coggie I then gie'd a wee bit heap,
Abeen the timmer
I kened for it she wadna sleep
Between an simmer."

Now, if the demand of any country ever required that the Farmer and his working stock should be prepared to give their greatest efforts, it is in this country, and I hope he will give this matter its due attention. Could there be any more trying affair than for a ploughman to endeavour to perform a fair amount of labour with a weak, worthless team? Where such is the case the ploughing cannot be performed to a proper depth, and consequently a total failure in the crop from want of soil, or at best a miserable return, is the result of such labour. It is a well known fact that the domestic animals are generally of a cleanly disposition, that they will refuse to eat anything having the least offensive odour, and care should be taken to give them nothing of an offensive kind, also to clean out the trough immediately after feeding that it may be in readiness for the next meal. The cattle sheds should be regularly cleansed at least twice every day, and the cattle also well curried and regularly watered every morning and evening. In the morning, after they receive their first feed and while they are eating, the manure of the night's making should be removed to the proper place for its reception, and the cattle well curried and brushed, after which a good bed of clean straw should be given and the milking cattle then milked. They may then lie down comfortably and rest till the time arrives for the next feed, after which any droppings should be removed to the gutter, that they will not soil themselves when they lie down again, and so on till the evening arrives, when the manure should again be removed, get water, and another proper grooming and good bed, that they may rest comfortably until morning, when the same daily routine of business should commence again during the winter or period of house confinement. By this means their skins are kept free from vermin, which, if ever allowed to settle upon cattle, will undoubtedly reduce them to poverty and keep them uneasy. In fact, filth is always accompanied with poverty and all its concomitant evils, much to the destruction of the cattle and loss of their owner.

A. M. F.

[We sincerely thank our unknown contributor for his valuable practical remarks, and hope soon to receive another communication from him.—EDITOR.]

HOW TO INCREASE THE VALUE OF A COW.

Every one who owns a cow can see at a glance that it would be profitable to increase the value of her, but every one cannot tell how to do it. We can, and we think that we can make it equally palpable to our readers. If a cow is kept for butter, it certainly would add to her value if the butter-mak-

ing properties of her milk should be improved. In summer or winter this can be improved just as the yield of a cultivated crop can be improved by what is fed to each, and it is simply a question of will it pay, in manuring the one or feeding the other. Indian corn will add to the quantity and quality of the butter a very sensible degree, and it is simply a question of easy solution, by experiment, whether it will add to the profit of the butter-maker to buy corn at one or two cents a pound, and convert a portion of it into butter at twenty-five cents a pound, or whatever the market price of corn and butter may be, and another portion of it into fat, and another portion of it into manure, for that is the natural result of chemical change produced in the laboratory of the cow's stomach. The same result will follow any other kind of feeding. Good pasture will produce an abundance of milk, often as much as the cow can carry; but does it follow that even then it will be profitable to feed her with some more oleaginous food to increase the quantity of butter just as it sometimes proves profitable to feed bees to enable them to store more honey. It certainly does appear to us that the value of a cow, feeding upon ordinary winter food, may be almost double by making that food suitable for the purpose of increasing the quantity of milk, if that is the purpose for which the cow is kept. Farmers generally understand that they can convert corn into beef, pork and lard, and some of them know exactly at what price per bushel it will pay to convert corn or any other grain into butter, or any other kind of feed into the dairy products? Is the whole business a hap-hazard one? We fear so. Some persons know that they can increase the saleable value of butter by adding the coloring matter of carrots to it. Does any person know the value of a bushel of carrots fed to a cow to increase her value as a butter-producing laboratory? Experimental proof upon this point would be far more worthy of agricultural prizes than it is to see who can show the largest sized roots; for by a few carefully conducted experiments we should be able to increase the value of a cow almost at pleasure.—*N. Y. Tribune.*

CARE OF SHEEP—MUTTON.

The opinion is quite prevalent in some sections, that sheep require no water in winter, and that they actually do better without than with it. This, however, is a mistake, and one that has not unfrequently caused considerable losses. When permitted, sheep, although they are, from their particular nature, capable of subsisting a longer time without fluids than any other domestic animal, will generally drink from four to eight times a day, and with evident benefit, particularly during winter, when they are necessarily restricted to dry and unsucculent food, which engenders thirst, and requires much drink to render the economy of digestion and assimilation sufficiently rapid and perfect to insure a continuance of thrift and health. When practicable, there should always be a watering-trough in the shed or yard, to which the animals confined in it can at all times have free access, without mixing with cattle or large stock of any kind, as they are liable to be injured by the latter, especially when young. When there is a pump in the yard, the trouble attending such an arrangement is comparatively slight, even where the sheep and cattle yards are, as they always ought to be, distinct.

From twenty-five to thirty sheep are as many as can well be kept in one enclosure. When the number exceeds this, unless special care be taken to secure the most perfect ventilation, the animals are likely to contract diseases, and never do so well as when confined in smaller flocks. Pure air is essential to all animals, but especially to the sheep. On taking sheep from their summer ranges, in autumn, the sudden change from green to dry feed often operates detrimentally. This is sufficiently evinced by the sudden loss of appetite, and consequent emaciation exhibited, and which is often attributed, erroneously, to disease. As soon as they are taken from the pastures, a few messes of turnips should be

given them, daily, for a week or so, gradually diminishing the quantity as they become accustomed to other food. By adopting this plan, and allowing them a liberal supply of water and salt, their constitutional vigor will remain unimpaired, and the change rendered unavoidable by circumstances, be productive of no unpleasant or deteriorating results.

In Great Britain, where so much use is made of mutton by all classes, from the peer to the laborer, great attention has been accorded, not only to the production of the greatest quantity but also the best quality of mutton. After so long a series of efforts and experiments, it is but reasonable to suppose that very many important discoveries have been made in this particular branch of rural economy, and that the business of fattening, in all its details, is there more thoroughly understood and practiced than in any other country. It appears, indeed, to be universally conceded by agricultural writers of England, that sheep of great size and rapid growth, will not give so fine mutton as smaller animals, and those which are longer in coming to maturity. This axiom may, in fact, be regarded as constituting the genuine secret of the success which so markedly attends the efforts of the British herdsmen and flock-masters in fattening their animals, for the market. The Leicesters, consequently, are less valuable, being large and quick of growth, than the "South Downs," which are of a more diminutive size, and much longer in coming to maturity.

A late writer, in remarking on this subject, says:—"A sheep to be in high order for the palate of an epicure should not be killed earlier than when five years old, at which age the mutton will be rich and succulent, of a dark color, and full of the richest gravy; whereas if only two years old, it is flabby, pale and flavorless."

In this country, mutton rarely attains the age of four years, and hence, probably, the reason why the article known by that name is generally so poor compared with the English article. Wethers of good size, and of a breed disposed to take on fat readily, are often marketed at two or three years old; but it would be for the breeder's interest to keep them at least till they were five years old, as he would then be able to offer a very superior article, and to secure a price accordingly. There is no meat superior to good mutton; it is wholesome, and possesses a flavor, equal, if not superior, to the best beef.—*New England Farmer.*

RAISING AND FEEDING ROOTS.

MR. EDITOR:—In the discussion of this subject there is one important point which, if I recollect rightly, has not been made sufficiently prominent by your correspondents, that is, the great advantage to be derived from root crops, in lengthening out a proper rotation, and in affording a change of variety of feed. I am not yet a believer in turnips, or any other root, as an exclusive feed, nor do I think it best to feed them to a any great extent, in severe cold weather, unless warm shelter is afforded for the stock to which they are fed. But I have, for several years, fed a few turnips to young stock in the spring, and I am fully confident, that, not only did it make them more healthy, improving their coats and a gradual change from hay to grass, but that the nutriment supplied was amply sufficient to pay all expense of raising the turnips.

No one doubts the advantage of a little corn meal, or oil meal, or oats, in addition to the usual feed of hay, yet no sane man would think of attempting to keep neat cattle entirely on either. Why, then, do they expect any better results from roots fed in like manner? Perhaps no one would think of carrying it quite to this extent, yet I think Mr Emerson went nearly as far in some respects, and I would respectfully suggest to him to read an article in the November *Agriculturist*, by "Diogenes Redivivus," entitled "A Desponding Farmer."

I think highly of turnips, also, as a feed for swine, to which I have been feeding them for a few weeks in

the following manner. I fill a barrel kettle with one-fifth turnips and the rest potatoes, and boil with water enough to wet a half bushel of meal, which I add when cooked soft. I have not the means of weighing, to ascertain the precise result, but they appear to be thriving much better than I ever saw any when fed on clear meal, and the way they take hold of it, certainly indicates that it suits their taste exactly. I ought, perhaps, to add that I tried the pot: toes and meal without the turnips, and allowing piggy to be a judge, the addition of the turnips is a decided benefit. I have seen the experiment tried of raising swine on corn meal, and on corn and oat meal, repeatedly, and although either may answer well for fattening swine previously grown on other feed, or then mixed with a good supply of skimmed milk, it has invariably proved a complete failure when fed to young animals, unless with the addition of a large amount of milk.

My own experience, as well as the directions of nearly all agricultural writers, indicates that, as a general rule, no one cultivated crop ought to be taken from the same land two years in succession; and in the cultivation of young orchards especially, which is an absolute annual necessity, and where grain crops are considered injurious, the turnip is indispensable, and farther, as far as my experience goes, it can be profitably grown, in proof of which, I will give the result of a small patch which I raised the past season:

EXPENSE OF CROP.	
Use 16 rods land,	\$1,00
Preparing land and sowing,	1,00
Hoing,	2,00
Harvesting,	2,00
Manure,	1,00
Total,	\$7,00
Amounts of crop, 103 bushels, at 12½ cts,	\$12,87
Cost,	7,00
Profit,	\$5,87

It is true the land was in good condition; an acre of such land would, with an addition of 30 loads hog manure in the hill, have produced 80 bu. corn, (60 pounds to the bushel.) and this leads me to another point, viz., without this same hog manure I could not raise over half that amount of corn per acre, and I believe more than half the farmers of the northern part of New England, are in the same predicament, unless they substitute some of the concentrated fertilizers, a plan which I consider to be of more than doubtful expediency.

I have had plenty of evidence that we cannot keep swine without roots or milk, the last of which, after deducting for raising calves, &c., is in many cases a minus quantity; therefore I come to this conclusion—no roots, no swine—no corn.

I should have stated that in harvesting turnips, I cut off all the roots close to the bulb, which, although adding one-quarter to the cost of getting in, makes them much nearer to feed.

WILLIAM F. BASSETT.
Ashfield, Mass., Dec. 13, 1858.

COMPARATIVE VALUE OF ROOTS.

MR. EDITOR:—Will you, or some of your readers, inform me what is the comparative value of roots for cattle and hogs?

There are many farmers that practice feeding roots that have never made any accurate estimate of their value, compared with different kinds of grain, hay, &c.

In conversation with a gentleman upon this subject he said, that he had practiced feeding his horse with eight quarts of oats and eight quarts of carrots a day, and that he performed more labor and was in better condition than when fed sixteen quarts of oats a day. In this case a bushel of carrots is equal in value to a bushel of oats.

What is the value of ruta bagas, carrots, beets, parsnips

and potatoes, compared with rye, oats, peas, barley, buckwheat, corn and hay, when fed to cattle and hogs?

I want to investigate this subject, and take this course, hoping to receive information from those who have made accurate experiments; and any such information will be gratefully received by a

SUBSCRIBER.

Fort Fairfield, June 23, 1858.

NOTE.—We have several times given statements of chemists and others, of their experiments to ascertain the comparative value of the different roots and other substances used for fodder—good hay being the standard.

In No. 21, Vol. 21, we published the following editorial upon this subject, which may give some light to our friend by way of an answer to his queries:

It is a great object to the farmers of Maine to raise a supply of the best kinds of fodder for their stock during the winter. Hay, we all know, is the great dependence—the staple material for this purpose, but there are many other crops which can be raised to advantage among us, and which are very valuable for furnishing food to stock, and thereby saving hay.

In order to ascertain the real value of these crops for the purpose above named, it will be necessary to compare the nutritive properties of the several articles with good hay as the standard.

Experiments, and close and careful comparison of the results of many trials, have given the following as the comparative difference between the articles mentioned and good hay. We have published these results before, but we now put them in tabular form, so as to give the reader an easier mode of comparing them.

100 pounds of hay are equal to
275 pounds of green Indian corn,
442 pounds of rye straw,
161 pounds of oat straw,
153 pounds of pea straw,
201 pounds of raw potatoes,
175 pounds of boiled potatoes,
339 pounds of mangol wurtzel,
504 pounds of turnips,
51 pounds of rye,
46 pounds of wheat,
59 pounds of oats,
45 pounds of peas or beans,
61 pounds of buckwheat,
57 pounds of Indian corn,
68 pounds of acorns,
105 pounds of wheat bran,
109 pounds of rye bran,
167 pounds of wheat, pea, and oat chaff,
179 pounds of rye and barley

From this "bird's eye view," it will be easy to calculate the *fodder* value of any of the above articles which you may raise. For instance, if you have 504 lbs. of turnips, they will give as much nutrition to your cattle as 100 lbs. of good hay, or in other words, it will take 5 lbs. of turnips to be equal to 1 lb. of hay.

An ox, it is said, requires 2 per cent. of hay per day if he does not work, and 2½ per cent. if he works. Suppose, therefore, you have an ox that weighs 1500 lbs., he will require 30 lbs. of hay per day if he does not work. But you wish to feed him in part with turnips. If you give him 15 lbs. of hay, how many pounds of turnips must you give him to make up the supply? Ans. 75 lbs., which, at 60 lbs. to the bushel, will be 5 pecks.

Again, according to the table, a little more than half a pound of Indian corn is equal to a pound of hay. If, therefore, you give the same ox but 15 lbs. of hay, how much Indian corn must he have to supply the 15 lbs.? Ans. A little over 8½ lbs. Allowing corn to weigh 50 lbs. per bushel, it will take 5 quarts and a third.

Allowing the estimates in the table to be correct, they will be a convenient guide to farmers in feeding cattle, &c., on other articles, in order to save their hay.

A milk cow is said to require 3 per cent. of her weight per day. A sheep, full grown, 3½ per cent.—*Maine Farmer.*

111.—AGRICULTURAL INTELLIGENCE.

ANCIENT ROMAN AGRICULTURE.

By request of the Agricultural Association, the Rev Dr McCaul delivered an Address on Ancient Roman Agriculture, in the Crystal Palace, on the Thursday evening of the Exhibition. Mr Ferguson, the acting President of the Association, introduced—

The Rev. Dr. McCaul, who, in an able and excellent address, gave a brief but very clear description of the chief characteristics of Roman agriculture, as related to their farms and farm houses, their crops, their cattle and agricultural products, and their mode of cultivation. Under the first head he referred to the care which they exercised in selecting a farm, and mentioned the particulars as given by Columella, which should influence a choice, viz., good soil, good air, good water, good roads and good neighbours. The advice, which the old author gave, would in his (Dr McCaul's) opinion, be valuable even now in Canada to those desiring to select a position. The Roman farm houses—at least of those who were in good circumstances—were on a large scale, containing separate accommodation for the proprietor and his family, the farm servants and slaves, and granaries, barns and other out offices of a similar description. The wealthy had villas on a wonderfully large scale, containing different suites of apartments, suitable for use in winter and in summer, and attached to the villas were covered drives, ball courts, swimming basins, fish ponds, &c. Lucullus had a villa so large, that it was said he had more ground to sweep than to plough. Of their crops cereals were not held in the high estimation in which we hold them. They depended chiefly for their supply of wheat on Sicily, Sardinia, and Egypt. Their principal remunerative crops were from vines, and olives, and bees. They had fall and spring wheat, spelt, barley, sesame, rye, millet and pannicum, but not *zea*, interpreted as maize, for this was unknown until after the discovery of the new world. Of other crops, which they cultivated he would name beans, vetches, lupines, hemp, flax and turnips. In their kitchen gardens they had many of the vegetables which we now value, with some peculiar to the soil and climate. They had garlic, leeks, onions, parsley, asparagus, cucumbers, beets, cabbage, artichokes, kidney beans, lettuce, parsnips, anise, mustard, skirret, savory, &c. Of their fruits the principal were, apricots, damsons, peaches, pomegranates, cherries, apples, pears, strawberries, blackberries, bilberries, &c., but it is not probable they had melons. It is surprising that the list of their horticultural products contains but very few species as compared with ours. In this our greater intercourse with remote parts of the world gives us very marked advantage. They did not rear fat cattle as we do for the butcher, for joints of beef and mutton were not articles of ordinary diet. They were well acquainted, however, with the good points of cattle, and their description, would be a useful index even now. Oxen were valued by them for draught; sheep for the fleeces, and for milk, butter and cheese. Butter was not used as we use it, the oil of the olive supplying a substitute for most purposes. As they had not the sugar cane, honey was a very important article in their diet, yielding the saccharine matter which they required. There were two modes of cultivation—by the proprietor himself with slaves, or by *coloni*, free tenants. Sometimes they adopted a principle similar to the *metayer* system on the continent of Europe, and not unlike our plan of shares, by means of a class called *coltores*. They were acquainted with the advantages of the rotation of crops, paid much attention to manures, and were careful in forming drains, but it is not probable that they used those formed by tiles. Of their agricultural implements they had many intended for the same purpose as those in present use. Here the learned Doctor explained from a diagram, the different parts of a Roman plough by drawings of sculptures from Theban tombs of the 18th and 19th Egyptian dynasties. In

conclusion, the Dr drew a very eloquent comparison between ancient Roman and Canadian farmers. The address was heard throughout with marked attention, and at its close, three hearty cheers were given for Dr McCaul, after which the audience dispersed.—*Leader.*

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