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THE JOURNAL OF EDUCATION AND AGRICULTURE,

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FOR THE PROVINCE OF NOVA SCOTIA.

TABLE OF CONTENTS.

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EDUCATIONAL.

I.—THEORY OF EDUCATION.

PHYSICAL EDUCATION—NUTRITIVE SYSTEM OF ORGANS—VENTILATION OF SCHOOL HOUSES.

We stated in last number, that however valuable physical education may be in itself, imparting health, and strength, and gracefulness of attitude to the body, it is mainly so; as a means leading to certain ends. These ends have respect, on the one hand, to the culture of the intellect, and, on the other, to the formation of correct moral habits; and if these ends cannot be overestimated, then is our subject invested with no ordinary importance, and demands from every enlightened Christian patriot the most earnest and patient consideration. But physical education is just the developing and strengthening of all the constituent parts of our bodily frame, and therefore to do any thing like justice to it, we require to be well acquainted with the organs, the functions and the laws of that frame.—Accordingly, in our last, we laid down a few propositions founded thereon, to the discussion of which we now proceed in the hope that we may prove and establish both the philosophy and the the practice of physical education.

Proposition I. *That it is the bounden duty of all interested in the rising generation, and especially of parents and teachers, to use every means for the growth and development of their physical frame.*

This proposition involves all the organs on which the process of assimilation depends, namely, the digestive, the circulatory, and the respiratory, and, in its practical application to education, the whole matter of the ventilation and the temperature of school-houses,—a matter of paramount importance, whether we regard the diligence and progress of the pupils, or the comfort and success of the teacher.

Now in the physical constitution of every man and woman, there is a never ceasing waste and decay going on by copious exhalation, and which, if our health and strength are to be preserved, must be repaired and renewed by a suitable supply of the necessary support. In the young there is something more going on, even the growth and development of all their corporeal organs, demanding a still greater supply of the required nutriment. And what is that nutriment? It is the blood. And not only is this fluid the direct supporter of life and nutrition, by supplying the materials of all the various secretions, it is the medium by which the external and inanimate matter contained in the food becomes organized and endowed with life, and conveyed to every secreting and excreting organ proportioned to its size and to the importance and extent of its function. If, then, the term *vital* can be justly applied to one part of the animal economy more than

another, the blood may be said to be peculiarly the *vital fluid*. But this fluid is continually expending itself. It is supposed that between every two and three minutes the blood completes the circulation of the body. And how are its wasted, exhausted energies repaired? By food and atmospheric air. Here, did our space admit, we should discuss the whole matter of food, both as it regards quality and quantity, as well as the varied digestive processes through which it passes before it reaches the venous system in the shape of a concentrated fluid, namely, mastication, chymification and chylification,—with the agents by which these processes are effected. Suffice it to say, that this food both in point of quality and quantity, should be adapted to the age, the constitution, and the circumstances of the recipient; and that the conditions most conducive to the proper performance of the digestive functions are, temperate habits, regular exercise, and a cheerful mind. These are matters however that belong more directly, in so far as the physical education of the young is concerned, to nurses and parents. It is more to our purpose that we consider as briefly as possible the whole process of respiration. Now, it is a universally admitted fact, since the days of Harvey, that there are two currents of blood in the animal body—the pulmonic and the systemic, the one being carried by the veins and the other by the arteries. The former conveys the veinous blood, which has been gathered up by the capillaries, or the hair-like extremities of the veins all over the body, along with the chyle or the concentrated fluid of the food, to the lungs; and the latter, the vitalized or purified blood, to all parts of the body, diffusing nutriment and strength in its course.—These two fluids,—the blood in the veins and the blood in the arteries,—are diametrically opposed in their nature, the one containing noxious poison, and the other, the very life and nutriment of the physical frame. This change is produced in the lungs, into whose beautiful network the blood is forced by the right lobe of the heart; when, being subjected to the influence of the atmospheric air, it undergoes the change referred to; it passes through a process of assimilation, or becomes part and parcel of ourselves. This air, as is well known, is composed of two essential ingredients, oxygen and nitrogen, in the proportion of 1 to 4 by volume, or of 21 to 79 per cent. This proportion of these two gases is indispensably necessary for producing the desired effect. Let the oxygen—(which really constitutes the life-supporter while the nitrogen is its diluent)—let the oxygen be either increased or diminished, and that instant are the results apparent by a quicker or slower circulation, thereby affecting most materially the whole of our physical and mental framework. Now the quantity of this atmospheric air requisite for purifying the blood can be easily computed. The act of respiration is repeated once in three seconds, or twenty times a minute, and the quantity of air inhaled in every such act by a full grown person is 36 cubic inches, or between 3000 and 4000 gallons every twenty-four hours. By ascertaining, then, the dimensions of any room or apartment and its consequent capacity, we can easily see what number of persons can be accommodated therein, so that all shall be provided with a due supply of this essential, this indispensable element. The food and the drink we consume may be of importance; but what are they in comparison with the pure atmospheric air. The one is at best but the raw material, the other is the vitalizing, the influential power. Men have been known to live three weeks without eating. But exclude the atmospheric air from the lungs for the space of three minutes, and death generally ensues. Thus life will continue with abstinence from food three thousand times as long as it is safe to protract an atmospheric fast. Take another view of the vast importance of this subject. Men usually eat three times in twenty-four hours.—This is all that is necessary to, or compatible with, the enjoyment of uninterrupted good health. But we involuntarily breathe nearly thirty thousand times in the same length of time. We need, then, fresh supplies of pure air ten thousand times as often as it is necessary to partake of meals. Is it not apparent, then, that man subsists more upon air than upon his food and drink?

But granting that there is a sufficient supply of pure atmospheric air, for a given number of persons, for a certain period of time, in a very short space that air will become contaminated and vitiated; and to what is this owing? It is owing entirely to the chemical change which takes place by means of the assimilative process. As to the exact nature of the change which then takes place neither chemists nor physiologists are agreed. Certain it is, however, that the air which is expired from the lungs is not the same as that which is inspired. A considerable quantity of the oxygen has disappeared and in its stead another gas, called carbonic acid—formed by the combination of the oxygen with the carbon in the veinous blood—is thrown off. It appears that about 45,000 cubic inches of oxygen are consumed by an ordinary man in twenty-four hours, and that 40,000 inches of this gas go to form the carbonic acid produced during the same period, the remainder of the oxygen probably combining with other ingredients of the blood. This carbonic acid, need we say, is a potent poison and fatal to animal life, and is therefore discharged from the lungs. But this very circumstance soon vitiates the atmosphere of a well filled or crowded apartment, and sometimes produces the most disastrous results.—What are the langour, the exhaustion and headaches, which occur in churches, theatres and ball-rooms, but so many warnings that ventilation is not properly attended to, that the lungs are insufficiently supplied with oxygen to discarbonize the blood passing through them, and that the system is suffering the evil consequences which such circumstances are fitted to produce. When these warnings are neglected and the same air continues to be breathed again and again, the proportion of carbonic acid at last becomes so large that its presence in the inhaled air prevents its further elimination from the blood. It thus acts as a poison, and extinguishes life. This result occurs very speedily when the quantity of carbonic acid in the air reaches the amount of ten per cent; but a much smaller quantity, especially when combined with animal effluvia, is sufficient to produce fatal effects when its action is prolonged. The most terrible catastrophe known to have arisen from this cause is that which occurred in the Black Hole of Calcutta in 1756. One hundred and forty-six Englishmen were thrust into a wretched prison eighteen feet square, in which there were only two very small windows, by which air could be admitted, but as both of these were on the same side ventilation was utterly impossible. Scarcely was the door shut upon the prisoners, when their sufferings commenced, and in a short time a delirious and mortal struggle ensued to get near the windows. Within four hours those who survived lay in the silence of apoplectic stupor; and at the end of six hours ninety-six were relieved by death! In the morning, when the door was opened, twenty-three only were found alive, many of

whom were subsequently cut off by putrid fever, caused by the dreadful effluvia and corruption of the air. But there have been parallels to such cases even in our own day. Need we refer to what occurred on board the Irish Steamer *Londonderry*, on the night of the first December, 1848, when of 150 passengers, crowded together in a narrow cabin, on account of the stormy nature of the weather, not fewer than 70 were suffocated before morning.

But it is time, and more than time, that we apply the foregoing remarks to our subject,—that is, to the proper ventilation of school-houses, and need we say that the great majority of our school-houses are miserably defective in this respect; that neither in their original design, nor in their execution, has there been the smallest provision made for their ventilation. And the result is but too apparent in the hard-earned experience, physical and mental, of both teachers and scholars.—Contrast, for example, the conduct of the children in a crowded school-room during the former and latter parts of the forenoon session, or still more during the forenoon as compared with the afternoon diet. At first all is attention and mental energy and proper behaviour. Gradually and imperceptibly, a langour, a listlessness, an inactivity and an inattention, steal over them; all this is followed by an utter indifference to, because disqualification for, study. And this again takes vent in mischievous plottings and pranks, as the only alternative of the ever-active children. The teacher, ignorant, it may be, of the cause, and ascribing the whole of this conduct to mental or moral stupidity and indifference, is all the while increasing in his own slowness and fretfulness, being under the influence of the same hallucination; till at length he can hardly look with complaisance even upon good behaviour, and in his peevishness is disposed to magnify the most trifling departure from the rules of propriety. He scolds, he threatens, he dragoons, he flogs, but all to no purpose; for the atmosphere which both scholars and teacher are inhaling, is becoming more and more vitiated, increasing the yawning and trickery of the one, and the irritability and despotism of the other. And this repeated day after day, and week after week, what is the result? The scholars are becoming continually more ungovernable and the teacher more unfit to govern, or, if government is maintained at all, it becomes the end instead of the means, and the real work of education occupies but a subordinate position. Now, need we depict the saddening and the desolating effects of this state of things upon the scholars and the teachers; all the worse because the change in the atmosphere from purity to impurity, from a healthful to an infectious state, is not sudden, but gradual, is not palpable at once, but creeps on imperceptibly. Need we speak of these effects in so far as the bodies of the scholars and teachers are concerned. There are many children whose health is sufficient to enable them to engage in other pursuits, but who are either unable to attend school at all, or who become unable so soon as they begin to attend, or, if they do persevere in their attendance, are subjected to headaches, faintings and the like—all traceable to the causes above mentioned. Thus are abundantly sown in early life the fruitful seeds of disease and premature death. All this, too, explains why the business of teaching has acquired, and justly too, the reputation of being unhealthy,—and why we find so many efficient teachers disabled and laid on the shelf before they have reached the meridian of their days, and others retiring in fear and alarm after they have been engaged but a few weeks or months at the work. There is, however, no reason why the health of either teacher or pupils should sooner fail in a well regulated school, taught in a house properly constructed and suitably ventilated, than in any other business. The evil in question can at once be removed by the application of a suitable remedy.

Need we speak of the effects of such school-houses on the tempers and dispositions of teacher and scholars. This discloses the true cause why so many teachers, who are justly considered both pleasant and amiable in the ordinary domestic and social relations, are obnoxious in the school-room, being there habitually sour and fretful. This, too, explains why children that are amiable at home are mischievous in school, and why those that are troublesome at home are frequently well-nigh uncontrollable in school. To what is all this sourcdness and irritability of temper to be traced? The grand and influential cause is badly ventilated school-houses.—Or, again, need we speak of the effects of this state of things on the intellectual progress and moral well-being of the scholars, or on the success of the most painstaking and enthusiastic teacher. Turn to the testimony of Combe on this subject, than whom there is not a higher authority in the whole range of animal physiology: "It is now many years since, on the occasion of a visit to one of the classes of a great public seminary, my attention was first strongly attracted to the injury resulting to the mental and bodily functions from the inhalation of impure air. About 150 boys were assembled in one large room, where they had been already confined nearly an hour and a half when I entered. The windows were partly opened; but, notwithstanding this, the change from the fresh atmosphere outside to the close contaminated air within, was exceedingly obvious, and, most certainly, was not without its effect on the mental faculties, accompanied as it was by a sensation of fulness in the forehead and slight headache. The boys with every motive to activity that an excellent system and an enthusiastic teacher could bestow, presented an aspect of weariness and listlessness, which the mental stimulus they were under could not overcome." And if such were the effects on the mental energies in a comparatively comfortable school, such as the one here spoken of, and in an hour and a half after the business of the day had begun, what must it be in this Province with too many of our schools! The pupils may attend, and the teacher may carry on his operations for five or six hours every day, but, in so far as any real work is concerned, as much may be done, and that far more perfectly, in one half, aye, in one third of the time, and that too without any physical or moral injury. And what does all this demonstrate? Clearly and distinctly that two-thirds of the time of both pupils and scholars are lost, and worse than lost. Would that parents and trustees could be brought to consider this matter as they ought! Would that they saw and thoroughly believed that infinitely the most economical school-houses are those which make the best provision for a due supply of atmospheric air, whatever be the original cost!

And this brings us to speak of the provision requisite for this end, and what does that provision consist of? It consists of two things—1st. *That the school-room be of sufficient size for the children likely to occupy it, and*, secondly, *that due provision be made for thorough ventilation.* And what, it may be asked, should be the accommodation provided for each scholar? Generally, we reply, that the room should be capacious enough to prevent the air becoming offensive and poisonous in the course of one session. But, more particularly, 150 cu-

bic feet of air should be allowed for each occupant; or, taking the dimensions of the superficial area, seven feet square should be allowed for each scholar. In reckoning the number of children, however, on this scale, some small allowance may be *made for absentees through sickness or other causes*. The minimum allowance is six square feet to each child of the gross total number on the register. Or, taking another mode of computation; supposing the room to be sufficiently large to allow every pupil to sit comfortably at his desk, to leave it without disturbing any one else to seek explanations of his lessons, and to recite without being incommoded or incommoding others; then will the space on the floor be sufficient. To secure, however, *in these circumstances, an adequate supply of* air, the room must be not less than ten, and, if possible, twelve or fourteen feet high.

Take an example:—For the accommodation of 56 scholars *so as to give ample room for moving, for recitation and for* air, the dimensions of the house should be 38 feet by 25, and 10 feet in height within. This will allow an entry of 14 feet by 7½, lighted by a window and furnished with [illegible] for the accommodation of clothes; a wood-room, 10 feet by 7½, *to serve also as an entry for girls or as a recitation-room*; a space behind the desk 8 feet wide for fireplace, passage and recitations; and a platform 7 feet wide. The remaining space to be occupied by the desks and seats of the scholars. For every additional eight scholars the room may be lengthened 2½ feet.

But, however suitable may be the original size of the building, in a short time the air becomes entirely unfit for respiration and all the *physical, intellectual and moral consequences*, ensue. And hence the necessity of frequent and thorough ventilation. And here it may be asked, What is the best method for securing such a ventilation? Need we say that ventilation provided by opening a door or rising the window is imperfect, and frequently injurious. A more effectual and safer method of ventilation consists in lowering the upper latch of the window, so that the impure air above escapes, whilst the purer air below remains unchanged. But it is often asked, Why is it not just as well to raise the lower sash as to lower the upper one? The reason is obvious. In a room warmed and occupied in cold weather, the warmer and more vitiating portions of the air rise to the upper part of the room, while that which is colder and purer descends. But how is this, say some, seeing that carbonic acid, the vitiating product of respiration, is specifically heavier than air? For three reasons:—1st. Gases of different specific gravity mix uniformly under favourable circumstances. 2nd. The carbonic acid which is exhaled from the lungs at about blood heat is rarer, and specifically lighter, than the air in the room which inclines it to ascend. 3rd. The ingress of cold and heavier air from without is chiefly through apertures near the base of the room. To raise the lower sash of the windows, then, allows a portion of the pure air of the room to pass off, while the more vitiated air above is retained, whereas to lower the upper sash allows the impure air above to escape and the pure air below to remain unchanged. And still more, irrespective of this being the best method of ventilation, it is the safest, inasmuch as it prevents the occurrence of draughts, as much to be dreaded and avoided as the breathing of a noxious, destructive atmosphere.

But there may be seasons of cold and stormy weather when it would be unsafe and inexpedient to have recourse even to this mode of ventilation, and what is to be done? To meet such a case there ought to be one or more ventilators in the ceiling of every school-room, so as to allow the vitiated air to escape into the attic, between which and the outer air *there ought to be a free communication by means of a lattice* in the gable, or otherwise a ventilator may also be constructed in connection with the chimney, by carrying up a partition in the middle, one half of the chimney being used for a smoke-*flue and the other half for a ventilator*. Ventilators may also be made at the top and bottom of the side walls of the school-room, which will be found, at times, to serve important purposes.

But, whatever be the method pursued in the adjusting of these ventilators, care must be taken to instil into the minds of teachers correct views of the vast importance of a thorough ventilation of their school-houses, not only for the benefit of the scholars placed under their charge, but for their own comfort and efficiency; and of their exercising a constant vigilance in the matter, seeing that the upper sashes are lowered, or any other ventilators used during every recess or interval, or at the end of the daily session. Then may we reasonably expect *a far larger amount of good to be effected in our schools*, and the work of teaching to become a far more healthful and exhilarating employment.

Nothing but a sense of the vast, the stupendous importance *of this subject, in the whole matter of the education of the* young, intellectually and morally, would have induced such lengthened and elaborate discussion. We earnestly commend the whole to the calm attention of Parents, Trustees and Commissioners of Schools, and of Teachers, and shall esteem it a privilege to give any other information that may be required.

INTELLECTUAL EDUCATION.

ESSAY BY A YOUNG LADY, A PUPIL-TEACHER, AT PRESENT ATTENDING THE NORMAL SCHOOL, AND PRINTED JUST AS HANDED IN TO THE PRINCIPAL AS ONE OF THE USUAL EXERCISES.

Education, if conducted according to philosophical principles, must be adapted to the nature of the being for whom it is intended. That being is man, and he is found to possess a body, intellect and conscience, which are inseparably united.

Education must therefore embrace a three-fold process or make provision for the simultaneous cultivation of all his powers. Such an Education involves a thorough knowledge of the principles and constitution of human nature. The horticulturist who endeavours to rear a tender plant, without any knowledge of its nature, or the treatment it requires, will not succeed. The Mechanic who undertakes a piece of machinery, when wholly ignorant of the materials required for its construction, is sure to fail. How very essential then is such a knowledge to him who undertakes to direct and unfold the complicated mechanism of a little child, a human bud, a being destined to immortality.

It is therefore evident, that every teacher should be well acquainted with Animal Physiology, and Intellectual and Moral Philosophy.

Leaving the physical and *moral* out of view for the present, let us confine our attention to the intellectual part of man's nature. The intellect manifests itself in various ways. These manifestations, or modes of acting, are called faculties, and are variously arranged by metaphysical writers. The classification of Dr. Wayland is that adopted in the Normal Seminary and is as follows:—Perception, Consciousness, Original Suggestion, Abstraction, Memory, Reason, Imagination, and Taste which belongs to all. The more extensive a teacher's knowledge of

these powers (other things being equal) the better fitted is he for the discharge of his duties.

We can only glance at the nature of these powers before we pass on to their improvement.

Perception is that power by which we become acquainted with the existence and qualities of external objects. In this act of the mind there is a notion or idea of the object perceived and a strong conviction of its reality or present existence. This belief is immediate and not the effect of reasoning. Perception is wholly dependent on the organs of sense. They are bundles of attenuated nerves through which impressions are transferred to the brain and thence to the mind. Our notions of things are faint or distinct, according to the capabilities of the organs through which the impressions are made. This shows the importance of improving them. Young children are very much under the influence of the perceptive powers for the first few years. For this reason teachers should pay particular attention to this subject and endeavor to increase their capabilities, especially those of *Vision* and *Hearing*. Exercise is the only means that can be employed for this purpose, either with regard to the bodily organs or mental powers.

A teacher should be provided with objects of different shapes and sizes. By means of these he can easily lead his pupils to form a correct idea of form, after which they may be asked to give descriptions of any object within the sphere of their observation. He may also train them to judge accurately of heights and distances. If pupils are asked the length of the schoolroom, and if after they have decided on the number of feet, they are allowed to ascertain its true length by means of a foot rule, the probability is, that their ideas of distance are a little improved. Lineal drawing is also an excellent means of improving the eye. Let every child be provided with a slate and taught to copy from the blackboard as well as to represent the objects by which he is surrounded.

The ear may be cultivated by vocal or instrumental music, and also by attention to the modulation of the voice. No school should be without the refining and elevating power of music, not only for the improvement of the ear and voice, but also for the influence it enables a teacher to exert over his pupils. This influence arises from its well-known power of deepening and changing the tones of the mind.

Consciousness is that power by which we are made cognizant of the operations of our own minds. This state of mind can be controlled by the will. When directed to an external object the state of the mind is said to be attention. When our mental states are made the subjects of thought it is called reflection.

A person who possesses the power of turning his attention to any subject by an act of volition is said to have a well disciplined mind. In order to exercise consciousness the attention of children must be secured. This can only be done by exciting their interest. A skilful teacher can generally attain this object by his manner in treating a subject, but if that should fail, he may resort to physical exercises, music, &c. He must also be careful to avoid long lessons and make a point of seeing that whatever is got, is *got thoroughly*.

Original suggestion gives rise to original ideas occasioned by perception and consciousness. When the mind becomes possessed of ideas by means of the perceptive powers, new suggestions arise by its own original power. These are sometimes called intuitions, innate thoughts or acts of pure intellection. Original Suggestion may be strengthened and improved by encouraging children to enquire into the reasons of things; endeavouring to excite the principle of curiosity with regard to the nature of things with which they are surrounded. Also by training them to habits of patient thought and never telling them what they can work out for themselves. Oral lessons, if properly conducted, are of great benefit for this purpose.

Abstraction is that power which enables us from a knowledge of individuals to form conceptions of genera and species. In this mental process, we are conscious of three distinct operations of the mind. Analysis, or the separation of the parts, generalization, or the observation of certain qualities or characteristics common to all, and combination, or the art of forming a complex conception of the whole. It is through the exercise of this power that we are able to reduce the immense variety of subjects, embraced in every branch of human knowledge, to a few leading principles or general classes. This faculty may be cultivated by presenting suitable objects of analysis to children, and by encouraging and assisting them in the process.

A teacher can do much towards strengthening and developing this power, in teaching the alphabet. Grammar also furnishes an excellent means for its improvement.

Memory is the power which enables us to retain and recall past events.

A good memory possesses susceptibility, promptitude and retentiveness, or in other words it can treasure up with ease, recall with readiness and permanently retain whatever facts are submitted to it.

Memory is of great importance on account of its relation to the other faculties, and because it is essential to professional success. It is greatly assisted by association and methodical arrangement. The best means a teacher can employ for its improvement, is to see that his pupils keep it in habitual and earnest use. He may also do much 1st., by simplifying, 2nd., by aiding it by means of the senses, and 3rd., by reducing knowledge to practice.

A clear conception should be given to children of what they are required to commit to memory, so as to make it a memory of the understanding and not a memory of words. Every lesson should be reviewed before proceeding to the next. This will enable the teacher to ascertain whether its leading ideas are retained and give him an opportunity of fixing them more deeply in their minds.

Reasoning is that power which enables us, from the elements of knowledge already possessed to proceed to other and original knowledge. It consists in a series of mental acts by which such a relation is found to exist between the known and the unknown, that if the former be true, the latter must be true also. From certain premises we draw certain conclusions, moving our minds onward from uncertainty to belief; thus increasing our knowledge. Children may be taught at a very early age to trace cause from effect, and to draw inferences from facts with which they are acquainted.

The habit of viewing subjects argumentatively and the study of Geometry, Natural Science, and books of a syllogistic character will strengthen and invigorate the reasoning powers.

Imagination is that which enables us from materials existing in the mind, to form complex images according to fancy.

By this power in connexion with other faculties, comparisons are formed, analogies observed, and qualities combined, creating scenes of beauty and grandeur far surpassing anything real. The character of imagination differs very much in individuals. Some possess an active, others a passive imagination. Some a poetical, others a philosophical imagination.

It may be much improved in all by studying nature, and attentively perusing poetical works. Taste is the sensibility which enables us to distinguish the beauties or deformities of nature and art, deriving pleasure from the one and pain from the other. It is susceptible of a high degree of refinement, and contributes a great deal to our enjoyment. To improve it we must become familiar with the beautiful in nature, and study the best models of art. Let us now for a moment look at the beautiful connexion existing between these powers. Perception gives us a knowledge of external objects, or supplies ideas from without, consciousness makes us aware of what is passing within our own minds, original suggestion gives rise to new ideas, abstraction generalizes and combines them, memory treasures them up in its recesses, and draws them forth at pleasure. Reason makes use of them in the acquisition of other knowledge, imagination combines and arranges them anew, while taste presides over the whole.

They are all materially dependent on, and act in subserviency to one another. We cannot do justice to one of these powers if we neglect the others, no more than we can strengthen one bodily organ while the other parts of the physical frame are allowed to remain in a state of debility. Their education must be carried on at one and the same time. Proper subjects of thought must be furnished and presented in such a manner, as to exercise all, or as our esteemed Principal figuratively expresses

it, "The food must not only be provided, but presented so as to be thoroughly digested." In doing this the teacher descends to a level with his pupils and adapts himself to their limited capacities by drawing illustrations from familiar objects. He suits himself to their different periods of development, by first giving a mere outline, and then gradually filling up. He leads them to exercise their powers, and makes their various endowments of mutual advantage, by a process of questioning, and ellipses, and by allowing simultaneous answers.

He thus trains them to think, reason, and judge, for themselves, and fits them for occupying whatever station they are called to fill, with respectability and success.

Such a system of education as we have thus briefly and imperfectly endeavoured to sketch, we would designate as *the natural system*. To any who have doubts of its suitableness or practicability we would simply say, *Visit the Model Schools of Truro.*

C. R.

II.—PRACTICE OF EDUCATION.

SCHOOL MANAGEMENT—ASSIGNING LESSONS—CONDUCTING RECITATIONS—REVIEWS OF LESSONS.

School organization and school arrangement may be regarded as synonymous terms. They both mean, the carrying into execution a plan previously existing, at least in its leading lineaments, in the mind of every skilful and experienced teacher; the adjustment and setting in motion of the whole school machinery. School management is just the continued working and ordering of that machinery, modifying, repairing, and enlarging, according to circumstances. Having discussed the matter of school organization we would now invite attention to a few points bearing on the management of schools.

1. *Assigning of Lessons.*—Lessons or recitation exercises are of course, prescribed with the view of being prepared against a fixed time. It matters not whether they are to be prepared at home or in school, they must be given out beforehand. And when is the proper time for doing so? This we hold to be a matter of primary importance, as it involves much that appertains to the instrumentality of the teacher. Very often these exercises are prescribed *en masse* before the dismissal of the school for the day. This is a very inopportune time. The children are then in a state of excitement, and with the exception of a few anxious scholars, are in thoughtless indifference as to the future—bent on play. But this time is still more inexpedient, as it is then impossible for the teacher to explain or illustrate any points in the lesson that he may consider advisable,—and, accordingly, he generally prescribes, without saying a word in explanation. And what is the result? It may be the whole drift and meaning of the lesson may depend upon one difficult word that has never before come under the notice of the scholars; or, it may be, there is one short clause or sentence upon which, like the keystone of the arch, the whole force and beauty of the passage depend, and which is to them altogether unintelligible. The pupils commit the exercise to memory, with all faithfulness and diligence, but it is nothing but the memory of words; the vocables are carefully mandated, but there is no idea or thought associated therewith. And is not this doing all that can be done to foster a mechanical spirit in the young, to treat them as parrots, and thereby to make them the slaves and the drudges of the old rote system,—as it is called? And what is to be done to obviate all these difficulties, to put the scholars in their right position, to treat them as rational beings? It is not only to prescribe the lesson in every department of knowledge immediately after the preceding one has been recited, but it is to bring the main instrumentality of the teacher to bear upon his scholars there and then. The teacher ought always to be in advance of his pupils one or two lessons, that is, have them thoroughly prepared; he ought to fix upon the words or clauses requiring analyses or explanation, and, gathering from a previous perusal of the passage the leading idea or fact or principle embodied, to present the same in a picture or figure or allegory, borrowed from some object or thing with which the scholars are, generally speaking, known to be familiar. In one word, it is to make the time of assigning the lessons the time for the teacher's agency being brought into play. Then will his instrumentality be most extensively and beneficially felt. Then will the scholars be made acquainted with things and not with words merely, or, at least, the words will occupy their rightful position, and then too will their memory become not the memory of words, but the memory of the understanding.

2. *Conducting Recitations.*—"In considering a teacher's qualifications," says Page, "the power of exciting an interest in the recitations of his school may not be overlooked. No man can be successful for any length of time without this.—This comprises what is usually implied by *aptness to teach.* All men have not this faculty by nature in an equal degree. Some may talk for an hour upon an interesting topic in the presence of children, without commanding their attention; while there are others who can talk over a common-place subject and secure for any length of time an all absorbing interest in every word. This difference is seen in every grade of public speakers, and in all descriptions of writers; but perhaps more strongly than anywhere else it is observable among teachers. Enter one school, and you may notice that the scholars are dull and listless; indifference sits undisturbed upon their brows; or perhaps they are driven by the activity of their own natures to some expedient to interest themselves, while the teacher is with commendable spirit, laboriously—perhaps learnedly—explaining some principle or fact designed for their edification. The secret is, he has not yet learned to awaken their attention; he fails to excite their interest.

Pass to another school. A breathless silence pervades the room; the countenances of the children, upturned towards the teacher, beam with delight. As he kindles into earnestness and eloquence, they kindle into responsive enthusiasm.—Whenever his eye meets theirs, he sees—he feels the glow radiated by the fire he is lighting in their souls, and his own gathers new warmth and enthusiasm in return. Such a man is *apt to teach*; and you could scarcely break the spell by which he holds his class, 'though you should give them for playthings, shining fragments broken from off the sun.'

He who possesses this gift naturally has very great advantage as a teacher to begin with. The ability to *tell well* what he knows, is of more consequence to the teacher, than the greatest attainments without the power to communicate them. Combine high attainments with the ability to tell, and you have the accomplished teacher.

But this power to communicate is not necessarily a *natural gift*; it comes not always by intuition. It can be acquired. It is founded in philosophy; and he who can understand anything of the workings of his own mind, who can revert to the mental processes he went through in order to comprehend a

principle, who can go back to that state of mind he was in before he comprehended it, and then by one step more can put himself in the place of the child he is teaching, realizing exactly his perplexities and feeling his precise wants, can become the *apt teacher*."

In these sentiments of Page we entirely concur. There cannot be a doubt that those teachers who have been largely endowed with the gift of an aptness to teach possess superior advantages in all recitation work, and, indeed, in every department of their vocation. But this gift is susceptible of great improvement, and even in the case of those who possess it in a very limited measure, much may be done for its acquisition both by study and practice; and this ought to be the constant aim and pursuit of all teachers who would arrive at eminence in their profession. Granting that some degree of proficiency has been arrived at in this rare qualification, it must not be supposed that this is all that is necessary to secure skill and success in a recitation exercise. There are other things indispensably requisite, and to these we shall briefly advert.

1. *There must be a thorough preparation of the lesson by the teacher himself.* The time in the history of education is, we trust, well-nigh past, when individuals shall be found unblushingly avowing, that their grand object in teaching some given branch of knowledge is for the purpose of learning it themselves. No one, we hold, can present an adequate view of any subject to the minds of the young, even when well graded or classified, without possessing ten times more knowledge on that subject than it is necessary to communicate. And the reason of this is obvious. If he is, first of all, to give an outline or a comprehensive view of his theme,—and this he ought to do, if he would present it to his pupils in all its connected, relative proportions, then it is clear he must beforehand be thoroughly acquainted with it in all its length and breadth, and in all its minutiæ of details.

Besides, if he is to adapt himself to every diversity of endowment and attainment in his pupils, he must borrow images and illustrations from objects and things with which not only one, but all, are familiar. And does not all this imply, on his part, a thorough and an accurate knowledge of the subject in hand? But not only should the teacher understand what he professes to teach, he should specially prepare himself for each lesson. "What," says the experienced teacher, "prepare myself on such elementary branches! Why, I have taught the same lesson over and over again, class after class have I taken through this book and that book, and what need is there for preparation on my part?" We say nothing here, in reply, as to the treachery of the memory and the need there oftentimes is of its being refreshed, particularly in more advanced branches; but we do say, and that most emphatically, that every teacher ought thoroughly to prepare himself on any lesson, even on the Alphabet, in order that he may acquire greater force and efficiency in the teaching of it, by drawing more extensively upon his own accumulated and progressively accumulating resources, by availing himself of any new sources of information that may have been opened up, by considering what collateral matter he can bring to illustrate it, and by borrowing fresh and unwonted imagery from new scenes of observation. By such means he comes to the recitation exercise with his mind so full of the subject, that he is not only independent of text-books, but he feels that these would be both a clog and an impediment to him. What enthusiasm then glows in his countenance, sparkles in his eye and leaps from his tongue. He watches the halting of the pupil, perceives his difficulty, devises his expedient for illustrating the dark point in some new way, and, at the proper moment, renders just the amount of assistance which the pupil needs.—Not confined to the text, he has the use of his eyes; and when he speaks or explains he can accompany his remarks with a quickening look of intelligence. In this way his class is enlivened. They respect him for his ready attainment, and they are fired with a desire to be his equal. What power does this impart to the teacher? How it simplifies the whole matter of order and government! How commanding, and yet how sweetly constraining, will be his whole demeanour!

Another requisite for success in recitation work is, *that the teacher never proceed without the attention of every child in the class.* This is necessary, indispensably necessary, at once for the communication of instruction and for the disciplining of the mind. If the class, or any number of the class, be inattentive, it is plain that they are uninterested and can derive no benefit, and that the energies of the teacher are being expended to no purpose. Besides, for the teacher to go on with his work in these circumstances is to generate a habit of inattention, one of the greatest calamities which can be inflicted on a child, unfitting him for doing his part in life, and thereby materially affecting the whole of his eternal condition, whether of weal or of woe. No teacher, therefore, should advance a step without the undivided attention of the class. For this end, before starting, he ought to summon every individual in the class to his right position, and to see that every eye is fixed upon the teacher. To overcome the *vis inertiæ* of the mind as well as to rivet the attention of the class, it is of great consequence to begin with something very simple and with which the generality, if not the whole of the children, are well acquainted, and gradually to go on to the more complex, until they are fairly launched into the subject. It is well too not to satiate their minds on any subject. Accordingly, in the programme already presented for the allocating of the teachers' time in school, we insisted that no recitation exercise should last longer with young children than fifteen minutes, and, with more advanced, than twenty or twenty-five minutes. Even during this period, however, the spirit of inattention may manifest itself. If there is only one or two individuals in this situation the teacher's pause may suffice. But, if there is a goodly number, the shortest and surest way of reviving their interest and securing their attention, is to put them through some physical exercises, or making them sing some pleasant air, and immediately thereafter resume the work. This will prove of vastly more value than all reproofs or remonstrances. A relief will not only thereby be afforded to their bodies, but the whole of their mental framework will be revived and reinvigorated. That these ends be fully accomplished, however, it is clearly necessary that both schoolmaster and scholars be unmolested and uninterrupted. Provision ought to be made in the school arrangements, that during the recitation exercises there shall be no interruptions, either on the part of any prosecuting their studies and requiring the solution of their difficulties, or on the part of others demanding correction for any misdemeanours. Both must be deferred till a suitable season;—and thus allow both teacher and scholars to devote their entire energies to the work in hand.

Many other hints might be offered in connection with this subject. We might, for example, point out the impropriety or the evils arising from a formal routine in teaching, and

how a diversity of treatment may be introduced, by directing the attention of the scholars to the subject, instead of contenting themselves with the mere repetition of the words in their text-book, and especially by applying what they have learned to the practical business of life.—Again, we might insist on the advantages arising from the teacher, in all his explanations and illustrations, using such words as are plain and intelligible to the youngest child in the class, and of having it as his paramount desire to deposit things and not vocables in the minds of the scholars placed under his care.—And still more, we might speak of the occasions when simultaneous recitations would be beneficial, and when they would not; and, finally, we might show both the duty and benefit of the Teacher expressing approbation when the lesson has been promptly and accurately gone through, or of dissatisfaction when the reverse has been the case, and, especially, of bringing them *to the law and to the testimony*, and showing them that, in the one case, they have been using their endowments as their Creator intended, and that, in the other, they have not: but on these and similar topics there is no need of dilating, as they must commend themselves to every judicious and skilful Teacher, and will afterwards claim attention when discussing the most improved methods of teaching the various branches of education.—Let but the teacher thoroughly prepare himself on every lesson he assigns, from the most elementary to the most advanced,—let him cast aside, during the exercise, all dependence on the text-book,—let him have as his motto, *quality and not quantity*, and we have no fear of the issue.

3. *Reviews.*—This is a matter of primary importance. If real substantial progress in education is to be gauged not by the what, but by the *how*, and who that knows anything of the nature of the human mind will call in question this criterion of judgment?—then it is palpable that frequent reviews are indespensably necessary,—necessary not merely that the subject or the truth be imprinted on the memory, but presented to the mind's eye in all its native bulk and in all its native proportions. This can only be done by reiteration and reiteration until it be interwoven into the very framework of our mental constitution, and become part and parcel of ourselves. When we asked a distinguished teacher, not many days ago, how often he reviewed, he instantly replied, "*Every day, Sir.*" This reply is in exact accordance with our own views. Before the teacher begins any new lesson, he should uniformly review the preceding: more than this, if the subject under consideration is protracted and consecutive, he should, as long as it lasts, go back on every recurring season for recitation to its very commencement, reducing the outline as he progresses, and, when finished, view it in all its dependencies and relations. But in addition to all this, it would be, in our opinion, of immense advantage, to have a review-day once a week, in every common school.—By such a review we contemplate something more than the mere repetition of the words of the text-book. This would make it a mere memoriter process. As far as possible, the subject should be called up in its more salient features, and its application to practical life expatiated on. If this course were expected by the learners, they would *think* during the week in order to anticipate the examination of the teacher; and this *thinking* would be more beneficial to them than the knowledge itself. In addition to these periodical reviews, it would also be of great advantage to have a general review at the termination of any particular branch of study. This would be somewhat akin to the outline taken of the whole subject before the class opened a text-book at all, but it would be an immense deal more interesting, more satisfying, more profitable, inasmuch as they would then be able to look at it in all its bearings and in all its relations. In one word, we regard it as one of the highest qualifications of the teacher so to manage his educational affairs, that whatever is once thoroughly committed to memory by his scholars, shall never require to be learned again. And what can alone effectuate this? Nothing but *reviewing* and *re-reviewing!*—nothing but iteration and reiteration!

III.—OFFICIAL NOTICES.

The Present Term of the Normal School will close on Thursday the 23rd of this month. The private competition for Diplomas will take place on the 16th, 17th, and 18th, and the Public review of the whole institution on the 22nd and 23rd. Teachers, Parents, and others interested in the cause of education, are respectfully invited to attend.

The next or Winter Term of the Normal School will commence on Wednesday the 10th of November.

The Quarterly Term of the Model Schools will commence on the first of November.

The Superintendent of Education will hold Teachers' Institutes, meet the Boards of School Commissioners and address public meetings, as follows:—

Antigonishe—September 27th.
Port Hood, C. B.—September 29th.
Margaree, C. B.—October 1st.
Baddeck, C. B.—October 4th.
Sydney, C. B.—October 8th.
Arichat, C. B.—October 13th.
Guysborough—October 16th.
St. Mary's—October 19th.
Middle Musquodoboit—October 21st.

The Teachers' Institutes will meet on the days fixed at 10 o'clock A. M.; the Boards of School Commissioners at 3 o'clock P. M.; and the public meetings at 7 o'clock P. M.

Dr. Forrester requests that the Clerks of the different Boards will be so kind as give intimation of the above appointments to the parties concerned.

D. F. will also address public meetings on the subject of Education, at the following intermediate places, Merigomish, Little River, and, in Cape Breton, Pleister Cove, Mabou, Hogamah, Lake Ainslie, Broad Cove, Middle River, St. Ann's, North Shore, Boularderie, Little Bras d'Or, Sydney Mines, Bar, Mire, West Bay. Due intimation of the time and place of these meetings will be forwarded.

IV.—EDUCATIONAL INTELLIGENCE.

COLONIAL.

NOVA SCOTIA—SUPERINTENDENT'S VISIT TO WALLACE AND PUGWASH.

As these two places do not come within the usual range of the Superintendents' tour, he paid them a special visit last month. On the evening of Friday the 20th of August he held a public meeting at Wallace, and lectured on the subject of Education. The following day he proceeded to Pugwash, held a Teacher's Institute for the benefit of those Teachers who are labouring in the surrounding neighbourhood, and addressed a public meeting in the same place in the evening. The Teacher's Institute was attended by seven Teachers, which considering the state of the locality, was a pretty good muster. The principal topic of discussion at the Institute was the best method of teaching Geography. The Superintendent invited any of the Teachers to name a subject, and that was the one selected. When all the Teachers had described the way in which Geography is taught by them, Dr Forrester gave his views. After a few general observations on the many advantages arising from a through acquaintance with this branch of a common school education, and the propriety of combining it with the Natural and Civil History of the country under consideration, he showed that in order to teach Geography successfully, it ought to be regarded in two grand aspects,—*incidental and systematic*. The former, he stated, should consist of oral lessons on the Geography, natural and political, of the native country of the Pupils, beginning with the School House and surrounding neighbourhood, and gradu-

ally extending till the whole was embraced. By this means much valuable instruction might be communicated to the minds of little children, from 5 to 7 years of age, involving many of the principles and definitions of general Geography. The latter, or systematic Geography, he showed would be always most advantageously taught by presenting the leading outlines first, and, as the Scholars advanced, by filling in the details. The Public Meetings were numerously and respectably attended. The great object of the Superintendents addresses at both places, was to show the benefits arising from well graded or classified schools, as furnishing at once the best and cheapest education; and pointing out the advantages that would arise to Wallace and Pugwash from abolishing all the small schools within a mile and a half of two miles of these two villages, and erecting in each place a school house that would provide accommodation for 200 or 300 children, with two Teachers at least. There they could be all taught according to one system, with uniform books, and the lower classes would be preparing for the higher. The Teacher, it was shown, according to this plan, could teach 50 or 100 with far greater success than he could 25 at the miscellaneous schools, with all ages and grades of attainment, from the Alphabet up to the highest departments in Classic and Mathematics. It was truly gratifying to find the hearty response given to these views by the parties most interested in education, at both places. At Pugwash, the Hon. Mr Pineo, one of the Commissioners of Schools, publicly stated that these small schools had well-nigh worked out the destruction of all education there, and that so deeply was he impressed with this fact, that he had determined to discountenance the present practice, by withholding, as far as he was concerned, the Provincial allowance from these small schools, and intimating to the Teachers accordingly. For the carrying out of these views a Committee was appointed, for the purpose of obtaining subscriptions, and of taking any other steps that might be deemed advisable. Mr Pineo, with noble liberality, now intimated his readiness to subscribe £25 pounds towards this object, and, if the people entered with cordiality into the measure, stated, that more would not be wanting if necessary. We know that the same spirit prevails among the more influential at Wallace, and we shall be gratified to learn that similar steps are being taken there towards the furtherance of the same object. We believe the most intelligent residents in the above places are completely satisfied as to the soundness of these views; but if any are sceptical or desire to see them exemplified, we would recommend them just to take a ride as far as to Tatamagouche. Though the school there established on the above principle, has only been in existence some four or five months, we think it furnishes the most substantial evidence that these views are something more than idle speculations,—that they are actual living realities.

SPINNEY'S SETTLEMENT, ARGYLE.

We have very great satisfaction in giving insertion to the subjoined communication. What is the reason we know not, but there is no denying the fact that from Yarmouth on through Tusket, Argyle, and Barrington, the people are generally bestirring themselves in the great cause of education far more than they are doing in other more favoured, and, outwardly, more advanced districts. We long to see *a suite* of well conducted Model Schools at Yarmouth, attended by 300 or 400 children, and taught by three or four teachers, all working into each others hands, and all following out the self-same system. Such an educational establishment would tell extensively upon the whole surrounding districts. We know that the more intelligent in that enterprizing town are longing to embark in this great work, were only a right beginning made,—and, we trust, the day is not far distant when a few public spirited individuals shall come forward and make that beginning. We believe there is not a finer arena in the Province for the exhibition of the working of the *Training System* than Yarmouth. In the meantime we hail the vigour of some of the outer ports, and record with peculiar delight the doings of the good folks of Spinney's Settlement, Argyle.

For the Journal of Education and Agriculture.

MR. EDITOR,—

The friends of education in this thriving settlement appear much revived in regard to the more extensive dissemination of knowledge in their locality. They are now beginning to feel that "education is a debt due from present to future generations," and are apparently exerting themselves to lighten the debt in some degree. Having long laboured under many difficulties in this department, they felt the need of a more commodious house for the education of their children.

Having "understanding of the times," they knew, pretty well, "what they ought to do," and went nobly to work. In the spring of 1857 they laid the foundation, and in the same season finished it in a most creditable manner. The building is in a healthy, sightly, and central situation, and is calculated to accommodate about fifty pupils.

But they were not satisfied with the empty house. Through the indefatigable exertions of a few individuals they procured assistance, and have now equipped their house with a set of globes costing £6 5s., a set of wall maps, eight in number, costing in all £8, an eight-day clock, costing £2, Webster's Unabridged Dictionary, costing £1, a thermometer, arithmeticon, bell, and many other useful articles of school furniture.

Their teacher now indulges the hope that, with the continued co-operation of parents and the blessing of God, he may be successful in promoting their welfare. But before closing permit me to express the earnest wish, that Trustees and leading men in other districts may "go and do likewise."

Yours very truly,

S. B. ARCHIBALD.

Argyle, N. S., September 3rd, 1858.

NEWFOUNDLAND.—OUTLINE OF EDUCATIONAL BILL PASSED AT THE LAST SESSION OF THE LEGISLATURE.

The first section appropriates £10,500 annually for Educational purposes.

The second section divides £9,550 between Protestants and Roman Catholics according to population in the several districts.

The third section appropriates the remaining sum of £950 towards the support of Commercial and other Schools.

The fourth section provides for Convent Schools in the Roman Catholic Diocese of St. John's by taking £395 of the Roman Catholic grant, and placing it at the disposal of the Bishop of that Diocese.

The fifth section makes a similar provision for the Diocese of Harbor Grace to the amount of £250.

The sixth and seventh sections define the Protestant and Roman Catholic Educational Districts.

The eighth and following sections, up to the fourteenth inclusive, provide for the appointment and guidance of the several Boards of Education. The eighth and ninth sections each contain a provision to the effect that it shall not be necessary to appoint a Board in any district where the sum appropriated is less than £25. Where such is the case the district is placed under the control of the nearest Board. The ninth section provides that it shall be lawful for any of the Roman Catholic Boards to appropriate any of their surplus funds in the support or establishment of any Roman Catholic Schools in the said island where the same may be required. There is no such liberty allowed Protestants; which is an omission that might well be amended.

The fifteenth section enacts a very low scale of fees to be paid by each pupil; for which the Schoolmaster has power to distrain, with the consent of the Chairman of the district Board.

The sixteenth section takes £500 from the grant to the Protestant Boards in the districts of St. John's, Brigus, Harbour Grace, Carbonear, Trinity Bay West, Trinity Bay North, Bonavista North and South, Fogo, Twillingate and Fortune Bay, and places it in the hands of the Newfoundland School Society, towards the support of schools connected with that Society, in the several districts above named.

The seventeenth section in like manner takes £250 from the Protestant Boards in the districts of St. John's, Brigus, Bay Roberts, Carbonear, Trinity South, Bonavista South, and Bo-

rin, as a contribution in aid of Wesleyan Schools in those Districts.

The eighteenth section directs the Roman Catholic Board in the district of St. John's, to appropriate £150 to the Orphan Asylum School, and £300 to the presentation Convent Schools. The Roman Catholic Board in Harbor Grace district is to appropriate £100 in aid of the St. Patrick's Free School in that district.

The twenty-fourth section appropriates an additional sum of £760 to be paid for training Protestant and Roman Catholic teachers. Not more than two scholars shall be paid for from any one district in each year. Twenty-five pounds to be paid for the Board, lodging and training of each scholar, while so being trained.

Sections twenty-six and twenty-seven provide for the payment and appointment of two competent Inspectors, one a Protestant the other a Roman Catholic, who shall be sworn faithfully to discharge their duty, and make annual reports of their proceedings to the Governor.

The twenty-ninth section declares that the Act shall come into operation on the 30th June next.

The Academies are likewise very handsomely provided for. The Roman Catholic Academy is to receive £600. The Church of England £400. The General Protestant £150 and £200 in aid of a new Academy under Wesleyan control.

CANADA.—COURSE OF INSTRUCTION IN THE MODEL GRAMMAR SCHOOL.

This school will be opened for the admission of pupils on the 9th of August.

The Model Grammar School, established by the Council of Public Instruction for Upper Canada, is mainly intended to exemplify the best methods of teaching the branches required by law to be taught in the Grammar Schools, especially Classics and Mathematics, as a model for the Grammar Schools of the country.

The regular curriculum of five years embraces an extended course of instruction in Latin, Greek, Mathematics, French, German, English Grammar, Literature and Composition, History and Geography, both ancient and modern, Logic, Rhetoric, and Mental Science, Natural History and Physical Science, Evidences of Revealed Religion, the usual Commercial Branches, Drawing, Music, Gymnastic and Drill Exercises; the more advanced Students will also attend Lectures in the various departments of Literature, Science and Art.

Only one hundred pupils will be admitted.

Accordingly, the numbers in each class will be strictly limited, in order that a due regard may be paid to the peculiar temper and disposition of each pupil, and that the utmost efficiency may be secured in the cultivation of the intellectual faculties, and the inculcation not only of the principles but of the practice of a high-toned morality.

Every Pupil must follow the prescribed course of instruction, and pass the entrance examination in Reading, Spelling, Writing, the simple and compound rules of Arithmetic, the elements of English Grammar and outlines of Geography.

There are four Scholastic Terms—the same as those appointed for the County Grammar Schools—and the fee for admission is Five Dollars per Term, payable in advance.

The School contains large and well ventilated Class-rooms, with ante-rooms, a Library, and a Hall for assembling the whole school. The most recent improvements in school architecture and school furniture have been adopted. A large play-ground is attached, with covered sheds for exercise in wet weather.

The course of instruction is so arranged as to prepare and strengthen the mind for the more severe study of each succeeding year.

By the peculiar system of discipline adopted, the conduct and application of the Pupils will be regulated by motives similar to those by which our conduct in after life is influenced, and the various honors will be made to depend as much on good conduct as sound scholarship.

The pupils will board in private houses sanctioned by the Council, at prices agreed upon by the parents of the pupils and the keepers of the houses. A pupil will be allowed to board in any private family at the request of his parents.

All applications for admission to be transmitted in writing to the Chief Superintendent of Education for Upper Canada.

Education Office, Toronto, July. 1858.

ENGLAND.

THE ENGLISH ESTIMATES FOR EDUCATION IN 1858.

Mr Adderley said he should, with the permission of Hon. members, direct their attention to the vote to which they were asked to assent, and which he would beg them to regard under three distinct heads. The whole amount of the vote for public education in Great Britain for the current year was, in round numbers, £663,000; of which sum, £157,000 might be considered as being expended under the head of building and furnishing schools; £400,000 in paying various classes of schoolmasters, and £57,000 in defraying the expenses connected with the management of those schools, and in the payment of the salaries of inspectors. The £157,000 might again be subdivided into the two sums of £150,000 for building, and £7,000 for the purchase of maps, diagrams, and scientific apparatus; while the £400,000 might be looked upon as having, for its principal items, £280,000 for the payment of the annual stipends of pupil teachers, &c.; £67,000 for grants to training, and £22,000 for grants to industrial schools. £16,000 of the remaining sum of £57,000, to which he had alluded, being expended upon the maintenance of the establishment in London, and £40,000 in defraying the cost of inspection. The increase in the present, as compared with the vote for last year, amounted to £83,000, and that sum, he might add, might be spread over the whole of the items of the vote with the exception of two—namely, the vote for building, which was the same as that of last year, and the grant for assistant teachers. Now, the increase of £83,000, which he had just mentioned, must, he thought, be a circumstance of unmixed satisfaction to the committee. (Hear.) There were, indeed, only two suppositions upon which the contrary could fairly be anticipated to be the case; the one being that the present system of national education was one of which the committee did not approve, and therefore desired to have changed; the other, that the money laid out upon the promotion of that system was improperly and wastefully expended. With regard to the probable extension of the system, and the limits which might be set to the expense which it entailed, he might be permitted to state very briefly the calculation which he had made. We had laid out upon buildings for educational purposes, in the purchase of furniture, &c., about £1,000,000 from the period when the first grant had been made. That sum might be looked upon as permanent capital, which, at the rate of six per cent., would constitute an annual charge on the treasury of £60,000. Now, the current expenses for public education was, deducting the cost of building and furniture £500,000; which, added to the £60,000 which he had just mentioned, made the entire annual charge upon the treasury, in connection with the subject, £560,000. With that amount of expenditure it was sought to provide for the education of 800,000 children. Now, taking the population of England, Scotland, and Wales at 24,000,000, one-eighth of that number, or 3 000,000, would come within the range of persons requiring education; from which number if one-third were deducted, to make allowance for those who would receive their education at private schools, 2,000,000 of children would still be left dependent for the means of instruction upon the national grant. The present rate of expenditure contemplated, as he had said before, the education of 800,000 children; and starting from that fact as a basis of calculation, he had no hesitation in saying that, with the reductions which might be effected in the grant for buildings, in that for the maintenance of normal schools, and in other items of expenditure, a sum of about £1,000,000 per annum would be found to be sufficient to provide for the educational wants of the people, taking

the population at the amount at which it at present stood Now, if he were right in that view, he did not think that the committee ought to object very strongly to intrusting the expenditure of so large a sum to such a department as the Council of Education, especially if the minutes of departments were regularly kept and produced for the inspection of the House of Commons, and were classified and codified as was at present the case.

SCOTLAND.

BRIEF ACCOUNT OF THE TRAINING SYSTEM—POSITION OF THE BIBLE IN THAT SYSTEM.

The Training System embraces the education "of the whole man," physically, intellectually, morally, and religiously, it rests on the Scripture precept—"Train up a child in the way he should go," and looks for the fulfilment of the promise associated with it—"and when he is old he will not depart from it." It proceeds on the belief of *this law of habit. Its means to train are peculiar.* One or two only can I notice, as essential in public education.

1. Two schools (the covered and uncovered) are needed to evoke and reveal fully the elements and tendencies of mental and moral character.

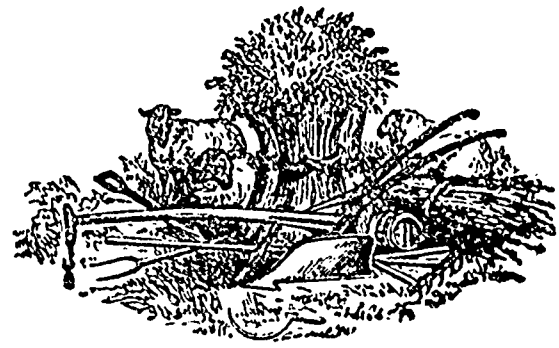
(1) In the *Covered School* powers of memory, readiness of reply, quickness in expedient, depth in reasoning, or precisely opposite qualities, may manifest themselves, yet the disposition lie concealed. The *intellect* has so far shown its power and peculiarities; but the *heart*, the inner impulses, tendencies, and predilections, are all hidden. In the "*Uncovered School*," or playground, only are they all manifested. Not only does the playground promote bodily health, and save from corrupting training in the streets, but it reveals almost every variety of character, solitary or associative, leading or led, passionate, revengeful, or generous. It is the boy's theatre of life, where appear those very principles of action, the emotions, dispositions, and characteristics which have their fuller development amid the competitions of after life. It is only when thoroughly unfettered, and regulated by the spontaneous impulses of their own hearts, that the strength or weakness, the beauties or defects, of intellectual and moral character are displayed. The boy occupying a low place in the "covered" school, often held the highest and foremost in the "uncovered," and thus the teacher sees better the whole scope of each pupil's individuality, and is able, with greater success, to mould each by appropriate teaching. This work demands the highest training power, and the loftiest and most enduring moral purpose. The results of this training do not appear on examination days—they are then impalpable; but are embodied in subsequent life, and the country is the gainer. All the trainer has of acknowledgement is the silent consciousness that he has done his duty. Teachers only of the highest class are competent for this duty; but for its faithful discharge the Committee of Council on Education have no certificates of merit. Playgrounds should be associated with all public schools in large towns, for the purpose of physical and moral training.

(2.) The ruling and moulding power in both schools is, as it ought ever to be, the Word of God. It is the book which gives the first thoughts daily, and casts its light forward over every duty. Dogmatic theology, and ecclesiastical forms and formularies, are left to those who conscientiously believe in their special power; but here those simple precepts and invitations, those beautiful teachings from emblem, narrative, and parable, and those still richer passages which show the way of salvation to the lost through faith in Jesus Christ, as Redeemer, are all in the course of short lessons, clearly and affectionately analyzed and applied. The principles thus inculcated in school are to be embodied out of it. Herein is a notable peculiarity of this system, *that the principles unfolded to the children in the "covered* school," are to be exhibited in the uncovered school, and thus right action becomes a habit, a law of early life. This is training or doing. This Book, with its simple yet sublime teachings, arouses and taxes the slumbering energies of feeling, thought, and purpose in the young mind, and gives intellectual power while it imparts moral purpose. There is thus no loss of mental energy. The very effort to master the ideas suggested by such terms and phrases as "God," "Heaven," "Hell," "Salvation" must elevate and expand the thinking powers, and this doubtless accounts for that higher intellectuality which we generally find ever associated in the public school with the most efficient Bible training.* If we desire the conjunction of highest intellectual culture with the fullest moral power consistent with their circumstances in life, we must bring to bear on the masses some such force as this.

* The following striking testimony is borne to the intellectual power of the system, by a highly competent judge, Dr. W. Knighton, originally trained in Glasgow Normal Seminary, late lecturer in Whiteland's Training Institution, now Principal of Ewell College, Surrey:—

"It is not without reason that I have declared the intellectual benefits of this method to be great, for I have tried it with various classes and races, and never found it to fail in exciting the mental powers to action, and in strengthening them by exercise. In Manchester and London I have tried it with the children of the very poor, brought up amongst smoke and steam, amid hardship and want. In Ceylon and Calcutta, in the far East, I have tried it with Buddhists, Mohammedans, Parsees or fire-worshippers, and lethargic Hindoos, the swarthy inhabitants of tropical lands where ease and luxurious do-nothingness are the rule, active exercise the exception, and my experience goes to establish the fact, that by no other method of which I am aware, or which I have seen in operation, can large numbers of children be induced to use their mental faculties so freely and so beneficially, or to enter willingly into so wholesome and healthy an intellectual competition with each other"—*Training in Streets and Schools*, pp. 30, 31.

AGRICULTURAL.



I.—THEORY OF AGRICULTURE.

We have now laid down some general principles on this important subject. We have considered the relation of Agriculture to Science, and pointed out the most effectual means by which sound and enlightened views on such topics may be disseminated throughout the Province. We proceed in this number to the consecutive discussion of its more salient features, taking up, first of all, the subject of Soil, the first care of the husbandman.

The following simple statements are extracted from the *Agricultural Class Book* of the Irish National Board of Education:—

SECTION I.

Q. WHAT do farmers understand by the word earth?

A. The soil we till.

Q. Of what is this soil composed?

A. Of different earths, of which the chief are alumina, silica, lime, and magnesia. There are also minerals (of which iron is the most common) and what are called *alkalies* found in it, besides the decayed remains of plants and minerals.

Q. What is alumina?

A. A pure clay; it is named alumina, because it forms the principal part of alum. It is generally combined* with other earths, of which silex is the most frequent. It is also combined with a great deal of water. From such clay as this, pottery ware, bricks, &c., are made.

Q. What is silica?

A. In its pure state it is flint stone, sand, or fine gravel. It is abundant in some form in all soils. It cannot be dissolved by water.

* Combined means joined with.

From silica, together with either of the alkalies, soda or potash, in certain proportions, glass is made. The silica and alkalies are heated and run together into one mass, which is called glass.

Q. What is lime?

A. The substance of marble, limestone rock, chalk, and gypsum, It also forms a great part of marl, and of shells and bones of animals. When naturally mixed with the soil it is in the form of gravel, or a kind of sand, but not quite so loose as sand. It is slightly soluble in water.

Q. What do you mean by soluble?

A. Capable of being dissolved or melted.

Q. What is magnesia?

A. An earth resembling lime, but neither found in such large quantities, nor so often. It is sometimes found with lime, which is then called magnesian lime.

Q. What is the name given to the dark-coloured substance formed of the remains of decayed plants and animals?

A. Humus, or vegetable mould; it contains all the principal food of plants in the most perfect state for their immediate use.

Q. Where is it found most abundantly?

A. In old garden soil, burial grounds, old dunghills, and hedges.

Q. What is meant by the word alkali?

A. It is an Arabian word, which means the ashes of sea plants which have a saltish and sourish taste. The word alkali is now applied as a name for potash, soda, and ammonia,* which are very abundant in the soil, and form a greater or less part of the food of all plants.

Q. What is potash?

A. It is a powdery substance of a light gray colour, and most easily obtained from wood ashes, or the ashes of any land vegetables. It is seldom found pure, but for the farmer's purpose it may be considered as being so.

Q. What is soda?

A. A substance similar to potash: it is solid, and white, and like potash, seldom, or never found pure, that is, by itself alone, but in combination with something else. It is chiefly obtained from bay and rock salts, and by burning sea-weed, in which it exists in large quantities. Bay salt is that which is made from sea water, and rock salt is that which is found under ground. Like potash and its compounds,† soda and its compounds are found, generally, in all soils in greater or less degree.

Q. What is ammonia?

A. It is a gas‡ which (being without colour) cannot be seen; but we are made sensible of its presence by its smell, which resembles that of hartshorn. It is neither found so often nor in such large quantities as potash and soda. It is given out from decaying animals and vegetables, and also from the urine of animals. It is seldom found except in combination with other substances.

Section II.

Q. Are all soils alike?

A. No; they differ much in their qualities.

Q. Tell me some of the different kinds of soils, and the names by which they are known.

A. The chief are sandy, gravelly, clayey, loamy, peaty, and alluvial soils.

Q. What is a sandy soil?

A. A sandy soil is one in which sand, or silex, is in a greater quantity than other earths; and thus the sand marks or gives character to the soil. Sandy soils are mostly poor and barren; water runs too quickly through them. A sandy soil is also called a light soil.

Q. What is a gravelly soil?

A. It consists chiefly of small stones; and unless the gravel be limestone, it is a very poor, hungry, light soil; and, like a sandy soil, it parts too quickly with water.

Q. What is a clay soil?

A. A close hard soil, in which alumina is in the greatest proportion. From the great affinity or liking which alumina has for water, a clay or aluminous soil takes in and holds a great deal of water.

Q. What is a calcareous soil?

A. One in which lime, in the form of limestone, limestone gravel, chalk, marl, or shells, forms the chief ingredient.§

Q. What is a loamy soil?

A. A mellow soil, not so stiff and greasy as a clay, but closer than a sandy soil. A loamy soil is naturally very good. There are varieties of loams, but they all contain lime, more or less.

Q. What causes the varieties of loams?

A. The different proportions of sand, and lime, and clay: according to their proportions, loams are light, heavy, middling, or calcareous.

Q. What is a peat, or bog soil?

A. One composed of the remains of the roots, and other parts of trees, grasses, and other plants in a partly decomposed state. This, in its natural condition, is the most unproductive of all soils.

Q. What do you mean by a partly decomposed state?

A. Partly rotted or decayed.

Q. Why is an unreclaimed peat soil so unproductive?

A. Because the substances of which it is formed, while they are in a partly decomposed state, are not able to nourish the better order of plants

How does this arise?

A. The great quantity of water which all bogs contain, prevents the decomposition from being completed.

Q. Does this entirely depend upon the presence of water?

A. Chiefly so; for the water prevents the air, which is necessary to rot or decompose any thing, from having its effect: and bog water contains an acid called *tannic*, which preserves vegetables from decaying. For instance, there are found in bogs sound pieces of trees, unrusted metals, and even the bodies of animals in a perfect state, which is owing to the effects of tannic and other acids and the want of air.

Q. What is an alluvial soil?

A. An alluvial soil is that of which the banks of rivers are mostly composed: it is brought by the sea, and deposited, or lodged, by rivers in their course, and by floods. It is the richest of all soils, when deep and dry, and owes much of its goodness to its having been thoroughly mixed by the action of water.

Soils of Nova Scotia.

Dawson arranges the Soils of Nova Scotia in five groups, corresponding to the distribution of the underlying rocks.

1. The soils of the Primary or Metamorphic district of the Atlantic coast.
2. The soils of the Primary or Metamorphic district of the inland hills.
3. The soils of the Carboniferous and new Red Sandstone districts.
4. The Marine and River Alluvia, or Marsh and Intervale soil.
5. Bog soils.

We give below an account of the nature and treatment of the soils of the two Metamorphic districts—the Atlantic Coast and the Inland Hills:—

Soils of the Metamorphic District of the Atlantic coast.

Lay the edge of a ruler along the map of the Province from the northern part of Clare to the head of Chedabucto Bay, and nearly all the country to the South of this line will belong to the district now to be considered. It is an uneven, but not very elevated country, composed of slates, granite and hard quartzose rocks; full of lakes, streams and rocky ridges; and contains the greater part of the barren lands of the Province.

Over a great part of this tract, the soils are encumbered with boulders and large stones, though when these are removed, it sometimes happens, that a considerable depth of soil is found beneath. Some of the more stony and rocky tracts are, however, absolutely uncultivable. Of the cultivable soils there are two well marked kinds, which are very prevalent. The first of these is *granitic* soil, derived from the waste of granite and gneiss and some varieties of mica slate. It is generally coarse and sandy, and often in its natural state, covered with black vegetable mould, which is capable for a time of producing good crops Such soils occur abundantly in the county of Shelburne; between Chester and Halifax; at Musquodoboit Harbour; and between Indian Harbour and Cape Canseau; also in the southern part of Annapolis and King's Counties, in the northern margin of this district. These soils are generally deficient in lime, gypsum, and phosphates, though they often have a good supply of alkaline matter. It is fortunate, that this kind of soil occurs near the sea, since when sea weed and fish offal are applied to it, they afford, in the sea shells and bones contained in them, considerable quantities of lime and phosphates. In improving this soil and keeping up its fertility, lime, lime rubbish, creek and marsh mud, are valuable substances; and when the black peaty mould has been exhausted or burned off, composts of peat and lime will be found very valuable. Fish offal is extremely rich manure, and when applied to these light granite soils should be composted with swamp mud, and ploughed in with crops, in preference to laying it on the surface. A compost of this kind will be found very excellent for turnips, carrots, or potatoes, and if in

* There is a fourth alkali called lithia, but it is so rarely met with that it does not require any notice.

† A compound is a union of many substances; for instance, glass is a compound of potash, or soda, and silica.

‡ Some knowledge of chemistry is required to understand the nature of gases. They may be said to be elastic fluid substances, the particles of which have a great tendency to separate from each other, as is the case in common air.

§ The ingredients of any thing are the substances or materials which compose it.

sufficient quantity, will ensure a good crop of wheat or barley in the ensuing season. An opinion prevails on our Atlantic coast, that wheat cannot be cultivated in consequence of the influence of the fogs. There is some ground to suspect, that the want of success with this crop results, at least in part, from the want of Phosphate of Lime and Ammonia in the soil. Farmers on this coast desirous of improving, should try wheat with good dressings of guano, or fish offal compost, which, in a chemical point of view, is very much the same with guano. These dressings may either be sown with the wheat, or put in with a previous green crop.

The second class of soils in this district, is the *slaty* variety. These are usually clays, more or less stiff, or light and shingly. Where not too much encumbered with fragments of rock, or too shallow, they are generally cultivable, and often of fair quality. Soils of this class occur abundantly in Clare, Yarmouth, northern district of Queen's, Lunenburg, Halifax, and southern Guysboro'. In Yarmouth, Queen's County and Lunenburg, there are large tracts of soil of this kind, of excellent quality, and deserving of being classed with at least the best second-rate uplands of the Province. In many parts of this district, however, the slaty soils are so intermixed or covered with fragments of quartz rock, flinty slate, &c., derived from the numerous ridges of these hard rocks which traverse the slate formation, as to be much injured, or rendered nearly useless.

When of a retentive nature, these soils should be drained. They also require lime, and their deficiency in this substance would probably have been more manifest than it is, had not the frequent application of sea manure supplied much of this mineral. Gypsum may also be found useful in the lighter varieties of this soil, especially in inland situations.

The slaty rocks often contain sulphuret of iron, which, by the action of the air, is converted into Sulphurate of Iron, a substance which communicates a poisonous quality to the soils and stains the surface of a rusty colour. Where this is the case, lime will be found highly useful, and gypsum will be unnecessary, since that substance will be formed by the action of the lime on the Sulphate of Iron.

The value of stable manure to these soils has been much underrated. This has arisen in part from the small effects produced by long manure on the stiffer soils. Drainage, liming, and composting the manures, would have given better results. Sea manure, from its speedy decomposition, and the calcareous matter which it contains, suits these soils admirably; though when the stable manures are neglected, it cannot permanently sustain the fertility of the soil.

The two following hints will be found very serviceable in all parts of the Atlantic metamorphic district. *First:* In the lighter granitic and slaty soils, fruit trees thrive well, and might be cultivated in many stony and hilly tracts not serviceable for other purposes. *Secondly:* Stony tracts covered with brushwood, may be converted into excellent pasture, by burning the bushes, liming, and sowing with grass seeds. When treated in this manner, large tracts of the most unpromising parts of our Province will support valuable herds and flocks, which will be supplied with winter food by the cultivation of the wide peat bogs, which abound in these districts. Many facts that I learned in Shelburne, Queen's County, Lunenburg, &c., convince me that our so called barren Atlantic coast must ultimately become an important fruit and wool producing district.

Soils of the Inland Hills (Silurian and Devonian Systems)

Under this head we may notice the soils of the Cobequid range of hills, extending from Cape Chignecto to Earlton; those of the hills on the South side of the valley of Cornwallis and Annapolis; all the hilly country extending from the sources of the Stewiacke through Pictou, Sydney and Northern Guysborough; and the hills of Cape Breton, or at least the greater part of them.

With the exception of some spots too rugged and rocky for cultivation, the soils of this district may be characterized as good. Some of them are formed from the waste of syenite and greenstone, rocks allied to granite, but differing somewhat in chemical composition, and producing much more fertile soils; though these are often very stony. The greater part of the soils of this district, however, are slaty in their character and consist of brownish loam, with fragments of slate, often giving them a shingly character. They are often deep, and easily worked, and always fertile. They produce in their natural state a fine growth of hardwood timber, and when cultivated are remarkably favorable to the growth of hay and grain crops; though in some localities they are too high for the successful culture of wheat and Indian corn. They are well supplied with lime and phosphates; and when deep are less easily exhausted than most other kinds of upland. Hence in the more fertile parts of these hills, as in Southern Horton, Earlton, New Annan, the Pictou hills, Lochaber, and Northern Cape Breton, there are fine flourishing agricultural settlements, which, in spite of a climate a little more rigorous, are advancing more rapidly in wealth than most of the lower districts.

Farmers who are settled on the deeper and richer soils of this district, may rest assured that they could not secure a more fertile upland soil in any country; and that with proper economy of their manures, its productiveness may be kept up for an indefinite period. In the poorer and colder soils of this district, and in those which have been run out, draining, subsoil ploughing, and the application of lime, gypsum, and wood-ashes should be resorted to, in connection with the use of all animal and vegetable putrescent manures that can be obtained.

On all soils of this district, it is probable that gypsum would be found beneficial

Before leaving this district, I may mention, that the soil of some parts of Clare, Northern Yarmouth, Northern Queen's County, Rawdon, and Douglas, though included in the first district, approaches in its quality to the good soils of the second.

II.—PRACTICE OF AGRICULTURE.

GENERAL TOPICS.

Improvement of the Mechanical Texture of the Soil.

As soon as the Hay and Grain crops are safely housed, the Farmers of Nova Scotia ought at once to commence their improvements and preparations for the following year. This, we hold, is the grand desideratum of our Agricultural population. Too often is all this work left over to spring, when, in consequence of the bustling activity connected with the committing of the seed to the soil, it is very imperfectly done, if done at all.

There are two methods of improving the mechanical texture of the soil, by the addition of other substances and draining. Both are thus described by Dawson:—

a. The addition of substances capable of changing the texture. Thus shore sand is sometimes carted upon stiff clays with benefit. In like manner coal ashes, lime rubbish, sandy marl, peat composts, and many other substances ordinarily employed as manures, tend to lighten and pulverize the ground. On the other hand, marsh and creek mud, and similar substances, much improve the texture of light and gravelly soils, by making them more retentive. In applying manures containing much sandy and earthy matter, it is always to the interest of the farmer to consider the effects which they may have on the mechanical qualities of the soil, and to use them on those portions of ground where their effects in this respect will be most beneficial.

b. Draining is by far the most effectual method of improving the mechanical quality of land. Covered drains are those which produce the most beneficial effects, as they draw off moisture from the subsoil without producing wasteful washing of the surface. The effects of underdraining may be summed up as follows:

It makes the soil warmer, draining off the water which otherwise would keep the ground cold by its evaporation. For this reason it enables the ground to be worked earlier in spring and later in autumn, and renders the growth of crops more rapid.

It tends to prevent the surface from being too much washed by rain, as it enables the water to penetrate the soil carrying downward the substance of rich manures, instead of washing it to lower levels. It thus saves the riches of the soil from waste

It allows the roots of plants to penetrate deeply into the soil, instead of being stopped, as they often are, at the depth of a few inches, by a hard subsoil, or by ground saturated with water, or loaded with substances injurious to vegetation. For this reason, drained lands stand drought better than undrained, and their crops are also larger and more healthy. Hence also it often happens, that draining benefits even light lands, if they happen to have an impermeable subsoil.

It permits free access of air, thus preventing the "souring" of the soil, and bringing manures of all kinds into a fit state for absorption by the roots.

It prevents injury to the soil from the water of springs and other waters coming from beneath by capillary attraction. It also prevents baking in dry weather, and causes the ground to crumble more freely when ploughed.

It tends to diminish the effects of frost, in throwing out the roots of clover and grasses.

In short, it renders land easier and more pleasant to work, makes crops more sure and heavy; prevents alike injuries from drought and excessive moisture, economizes manures, and is equivalent to the deepening of the soil, and lengthening of the summer.

The following short summary of the methods of under-draining is taken from "Norton's Elements of Scientific Agriculture." It is

to be hoped that its practice will soon be familiar to every farmer in our Province:—

"First, as to their depth; where a fall can be obtained, this should be from 30 to 36 inches. The plants could then send their roots down, and find to this depth a soil free from hurtful substances The roots of ordinary crops often go down three feet, when there is nothing unwholesome to prevent their descent. The farmer who has a soil available for his crops to such a depth, cannot exhaust it so soon as one where they have to depend on a few inches, or even a foot of surface. Manures, also, cannot easily sink down beyond the reach of plants. On such a soil, too, deep ploughing could be practised, without fear of disturbing the top of the drains. The farmer should not, by making his drains shallow, deprive himself of the power to use the subsoil plough or other improved implements that may be invented, for the purpose of deepening the soil. There are districts in England, where drains have had to be taken up and re-laid deeper, for this very reason. It would have been actual saving, to have laid them deep enough at the first

"Second, as to the way in which they should be made, and the material to be used.

"*a*. The ditch should, of course, be wedge-shaped, for convenience of digging, and should be smooth on the bottom.

"*b* Where stones are used, the proper width is about six inches at the bottom. Small stones should be selected, or large ones broken to about the size of a hen's egg, and the ditch filled in with these to a depth of nine or ten inches. The earth is apt to fall into the cavities among larger stones, and mice or rats make their burrows there: in either case water finds its way from above, and washes in dirt and mud, soon causing the drain to choke. With small stones, choking from either of these causes cannot take place, if a good turf be laid grass side down above the stones, and the earth then trampled in hard. Cypress or cedar shavings are sometimes used, but are not quite so safe as a good sound turf. The water should find its way into the drain from the sides, and not from the top.

"Stones broken to the size above mentioned are expensive in this country, and in many places they cannot be procured; in England, it is now found that tiles, made of clay and burned, are cheapest. These have been made of various shapes.

"The first used was the the horse-shoe tile. This was so named from its shape; it had a sole made as a seperate piece to place under it, and form a smooth surface for the water to run over.

"Within a few years this tile has been almost entirely superseded by the pipe tiles (which are merely earthenware pipes, of one inch bore or larger, and made in short lengths). These tiles have a great advantage over the horse-shoe shape, in that they are smaller, and are all in one piece, this makes them cheaper in the first cost, and also more economical in the transportation.

"They form a connected tube, through which water runs with great freedom, even if the fall is very slight. When carefully laid they will discharge water, where the fall is not more than two or three inches per mile. If buried at a good depth, they can scarcely be broken; and if well baked, are not liable to moulder away. There seems no reason, why well made drains of this kind should not last for a century.

"Third, as to the direction in which the drains should run. The old fashion was to carry them around the slopes, so as to *cut off the* springs: but it is now found most efficacious to run them *straight down*, at regular distances apart, according to the abundance of water and the nature of the soil. From 20 to 50 feet between them, would probably be the limits for most cases. It is sometimes necessary to make a little cross drain, to carry away the water from some strong spring. In all ordinary cases the drains running straight down and discharging into a main cross drain at the foot are amply sufficient.

A ROTATION OF CROPS.

There are two sorts of reasons in favor of this plan of rotation of crops.

1st. Because different plants draw from the soil different sorts of food, so that one plant will grow freely in a soil which is worn out as regards another.

2d. Because the crops being various, the occasional failure of one is not so much felt, seeing that the others furnish subsistence sufficiently without it.

The cultivation of a fair proportion of all the varieties of crops which Providence permits to grow rapidly, ought therefore to be considered as the best means of averting a famine; and what intelligent farmer, with the case of Canada and Ireland before him, would wish to be limited to the culture of wheat and potatoes only?

PLAN OF ROTATION.

Divide the arable portion of the farm, whatever may be its size, into six parts, as equal as possible, with a direct communication from the barn yard to each field, and from one field to the other, so that the cattle may pass from one to the other when required. This division into six fields, may require on most farms new fencing, and it will be proper, beforehand, to see how this can be done with the least possible expence. I shall now suppose the farm prepared to receive the application of this system, and that is the one which I have found the best for even the poorest settler.

1st. Root crops, such as potatoes, carrots, beets, parsnips, &c., [turnips and also flax], and in cases where the land is not sufficiently open for a crop of this kind, the field must be left in fallow.

2d. Crop of Wheat or Barley.

3d. Crop of Hay.

4th. Pasture.

5th. Pasture,

6th. Crop of Oats or Peas.

In beginning the application of this system, that field of the series which is in best condition for a Root crop, should be called Field A

The best for Wheat or Barley B

That which is actually in Hay. C

The Pasture Fields D & E

That which is best for Oats or Peas, F

Each field for the first year ought to be appropriated to the crops above mentioned, and after the fashion now in use among the farmers of Lower Canada, except in the case of field A. By this plan they will at all events still get as much from their five fields as they get at present.

The culture of field A and of crop No. 1 come up together for the first year, and ought to be the object of special attention as this is, in fact, the key to the whole system; for the good culture of this field has for its object, and ought to have for its effect, not only a good crop the first year, but also to improve the land for the five other years of this Rotation of Crops.

In the following year the cultivation of the different crops will be according to the following order:—

Crop No.	2	in the field A
Do. "	3	" B
Do. "	4	" C
Do. "	5	" D
Do. "	6	" E
Do. "	1	" F

and so on, changing each year until the seventh, when crop No. 1 will come back to field A, and the whole will then be in a good state of fertility, and free from weeds. The above system has been proved to be capable of restoring old land, and extirpating all weeds.*

In order to render the thing more simple and easy of comprehension, I shall suppose myself to be again obliged to take a worn-out farm in the autumn of 1849. The first thing that I should do, would be to divide the land into six fields, by proper fences, to prevent the cattle going from one field to the other; and I would then take for field A, that which appeared best for green crops or root crops; I would collect all the manure which I could find in or out of the barns, I would take up the flooring of the cow-house, stable and pig-gery, and I would take out as much of the soil underneath as I could get, for this soil is the essence of manure, one load of it being as good as four or five loads of common dung. The portion thus removed ought to be replaced by an equal quantity of ordinary soil, or, if it be possible, of bog earth, which might be removed when necessary afterwards.

The dung and other manure thus collected, should be placed on the field A, in September, or the beginning of October, spread with care (as far as it will go), and covered up in a shallow furrow. Manure aids the decomposition of straw and the weeds of the soil, and frees it from these plants, which thus help to keep the soluble portion of the manure, until its juices become necessary for the crops of the succeeding years The greater variety there is in the crops of this field, the better it will be, provided the soil is suitable for them. Thus, this field ought, as nearly as possible, to look like a kitchen garden.

* Journal New Brunswick Society, p. p. 26, 45.

SPECIAL WORK FOR SEPTEMBER.

The husbandman is now busily engaged in gathering in the precious fruits of the earth, and storing up in his Barns those supplies that are necessary for the support of man and beast during the length and severity of the approaching winter. The cereal crops are the first that are housed, and then the Grain crops, and last of all comes the careful pulling and depositing of the orchard fruit. And whilst in all this there is abundant ground of thankfulness for the past,—and what emotions should more befittingly swell the breast at this season?—there is a loud call to look forward to and prepare for the future. First of all, it is well to have an eye to the seed you intend to sow the following spring, whether in the garden or in the field. When the seed-stalks are cut down, and they should be so a little before they are ripe, they should not be left in the sun, but laid in a shaded and airy place. Some

seeds, if secured from damp, will remain sound a long time. Turnips, beet, cabbage and radish seed will keep for five or six years; beans nearly as long, if in pods; kidney-beans are good even the third year, if in pods also, otherwise they cannot be depended on after the first year; carrot seed will keep to the second or third year; in a word, it is of more consequence that seeds should be heavy, and of the colour which shows ripeness, than new. The best corners or places in the field where are the wheat, the barley, the oats, &c., should be selected for seed, and carefully preserved. Such care will do far more for the next crop than all changes of seed.—As soon as the wheat is cut down, every means should be employed to encourage the growth by the young Timothy Grass or Clover. It is not unusual for farmers to allow their sheep and cattle to browse and graze in such a field. This is exceedingly injurious to the coming hay crop, while it does little or no good to the cattle. It would even be of great advantage to put a little fine mould on the young shoots in the shape of top-dressing. The expense of all this will be amply refunded by the next crop of Hay.—In plucking the fruit off the trees in orchards, great care should be exercised; all should be hand-plucked, as it is called, and not shaked by force from off the trees. This method of shaking is exceedingly injurious not only in so far as the preservation of the fruit is concerned, but for the crop of the following year. The buds that are to blossom in spring are all formed the previous year. Many of them have grown side by side with the fruit, and when these are violently shaked off the tree, hundreds and thousands of the buds are destroyed. There is thus the strongest necessity for care in taking the fruit off the trees.—And now, too, is the time, as already hinted, for laying plans and making preparations for the following spring. This is the custom at home, and it ought far more to be the custom in this country, where the spring is so short. We are persuaded that nearly a third more might be made out of farming and gardening in this country were all done that could be done in autumn.—Taking into account the excellence of the climate in this country in autumn, it is more than a compensation for the very brief and oftimes bleak weather in spring. This is the season that ought to be devoted to improvements.

SCIENTIFIC.

To the Editor of the Journal of Education and Agriculture.

Rev. Dr. Forrester,—

Sir,—I would now give the readers of your Educational Journal the promised details of the interesting Geological discovery reported in your last number. The Thecodont Saurian remains that I have found consist of twenty-one teeth, or ten pairs and a single one.

They were discovered in a coal mine on the property of Mr. Fraser, the locality being described by Professor Dawson, in his Acadian Geology, as "to the south east of New Glasgow near the new road to the Pine tree gut." They were imbedded in a layer of Bituminous Shale, which is about two and a half feet thick and forms the roof of the mine. These Crocodilean remains were associated with small Stigmaria and Calamites, probably a part of the Saurian's jungle. There were also Ganoid scales of various figure, and some of them of considerable size and thickness; teeth, small, sharp and conical; larger conical and longitudinally striastriated, coprolites or fossil excrements of fishes and other remains, probably of his victims.

I shall attempt to describe the appearance and properties of the teeth in question as intelligibly as I can. As I cannot have figures accompanying my description I shall refer to a figure contained in the valuable work already referred to, expecting that most of your readers who take an interest in such subjects have the Acadian Geology in their possession. Like those of the Bathygnathus Borealis, represented in Fig. 8, they are conical, compressed, recurved, *i. e.*, curved toward the gullet, serrated like a certain kind of sickle, but externally as well as internally, the two enamel edges being thereby rendered better adapted for cutting, they present a similar transverse section, and their pulp cavity is elliptical.

They differ, however, from those figured in other respects. With one exception they are in pairs—there are two teeth for every root—in every pair the alternate teeth are similar in form, but are generally different in dimension—so that when *in situ* and counted toward the gullet, the first and third and second and fourth, &c., were of the same shape, but of varying size. The first of each pair when counted in the same direction is truncated, the crown is levelled externally and rounded, and it is recurved slightly: the second is not truncated and is very much recurved, and is about one half larger than the first: the two largest of this kind are rather more than two thirds of the size of Fig. 349 in the 4th Edition of Lyell's Elements of Geology, and therefore they are each more than twice the size of the tooth of the Thecodontosaurus there represented. In every pair this relative proportion is observed. The two largest pairs are of equal size, and the remaining six pairs vary from about 7-8 to 1-8 of the size of the largest. They are all serrated, beginning a little below the crown and reaching within a little of the base: so that this Saurian monster appears to have been amply supplied with hooks for securing his Ganoid victim and weapons for dispatching it.

There is also something like a small tooth between the large ones of each pair, which, when broken near the root, presents a circular cross section.

The shape of the root is somewhat singular: it projects inward in the form of a triangle with its vertical angle rounded and the teeth rising laterally from the base: a flattened heart-shaped prominence a little removed from the teeth, with its point extending to the rounded vertex, occupies the greater part of the surface of the root: viewed in profile it appears of considerable depth, and from the middle of its under base there is a downward projection, jutting out considerably beyond the outside of the teeth: so that these formidable instruments of death must have been firmly planted in their sockets, and in every way fitted for their destructive office. From their similarity of direction in regard to their roots they all appear to have belonged to the left side of the lower jaw, or to the right side of the upper, or partly to both—if they belonged to one jaw, as is not improbable, it must have been as well supplied with teeth as the great Gavial of the Ganges.

I have referred to one of the number as single: this tooth has a root for itself—this root in the specimen can only be seen in profile, it wants the downward projection which the others have and the heart shaped projection, and appears to be oblong rather than triangular: the tooth is compressed, recurved and serrated: is shaped like a pruning hook, faces toward the root and is about 1 4 of the size of the largest tooth, so that it appears to have been a frontal tooth. We have, therefore, in all a frontal tooth and twenty lateral teeth of this Saurian. I had hoped to meet with more of its remains, but, unless they be found in one or other of the mines that are or may be opened in the neighbourhood, there is no probability of this hope being realized, as the mine where these remains have been found is exhausted, abandoned, and being rapidly filled with water.

From the preceding description it will appear evident to any one who has studied such subjects that the teeth which we have discovered have, as we have assumed, belonged to a reptile of the Saurian family. We do not, however, presume to affirm that this discovery has added a new reptile to the few of this class which have been found in the Lower Carboniferous System. We *shall leave this* to be decided by a competent comparative anatomist. I intend to send a pair of the teeth to Dr. Leidy of Philadelphia and endeavour to receive his opinion on the subject.

Here then we have another fact subversive of the progressive development hypothesis. In one of the oldest sepulchres of the animal world the remains of a reptile of a high order of organization have been found, where, according to this monstrous theory, no such remains could possibly exist.

Verily "all things were made by Him and without Him was not made any thing that was made." At all times and in all places "He is wonderful in counsel and excellent in working."

Yours truly,
D. HONEYMAN.

Whilst we have great pleasure in inserting the above interesting and important communication, we would, at the same time, take the opportunity of stating to all our scientific friends throughout the Province that we shall be delighted at any time to open our pages to any such communication. Indeed it is our intention, when our arrangements are somewhat more perfected, to present our readers, occasionally, with sketches on the several branches of Natural Science, and to illustrate these sketches by native specimens or productions.

Our next number will contain an account of the proceedings connected with the close of the present Term of the Normal School. We intend to devote the whole of the Educational department to the subject.

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