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THE VALUE OF
NATURE STUDY IN EDUCATION

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XV.—*The Value of Nature Study in Education.*

By JAMES FLETCHER, LL.D., F.L.S.

(Read May 23, 1901.)

It is not my purpose on this occasion to present a plea that more attention should be devoted to natural history studies by those entrusted with the education of the youth of Canada, for I am thankful to say that the educators of every Province of the Dominion have already shown that they appreciate keenly the value of these studies as an integral and effective part of a practical education. In Manitoba and the North-west Territories remarkable results are now very apparent in the improved condition of the whole country, as a direct outcome of the simple instructions on plant life, illustrated by common plants, which have been given in the rural schools for the last four or five years, in connection with the vigorous campaigns which are being annually waged against noxious weeds.

My appeal to-day is rather to the educated classes of Canada, amongst whom it must be acknowledged there is an appalling and unnecessary ignorance concerning many useful branches of knowledge, some information upon which would make them far better citizens and more efficient competitors in whatever branch of work they may have adopted as a means of obtaining a livelihood; for there is no profession, trade or occupation in which definite exact knowledge is not daily required with regard to subjects a consideration of which comes within the scope of some branch of natural science. It is to the Fellows of this Section of the Royal Society of Canada, as representatives of the educated classes of the Dominion, that I have presumed to make my appeal to-day, not but that I know they themselves all appreciate to a large extent every point I can lay before them, but it is to draw more direct attention to what I consider a most important matter, with the object of arousing their sympathy with what is now a conspicuous and very popular movement in the educational world. There is no more remarkable development in the history of the science of education than that which has lately taken place with regard to Nature Study. The Fellows of this Section must every one of them have a large influence in their own immediate circle, and I shall have succeeded well to-day if I can by any feeble effort of mine induce them to think that it is a concern of theirs to second the efforts of the educators of the country by encouraging and speaking well of this

movement, the object of which is to educate in its true meaning—*i.e.*, draw forth and cultivate the faculties of youth—by means of the innumerable common objects of nature which surround us on every side and are always at hand to teach their own lessons.

During the last half decade there has been a most decided awakening on this subject; years ago many of the public schools of England had their natural history societies; the universities in the Old World and here all have their professors of various branches of biology, all of whom have done and are doing grand work; but that is not Nature Study.

Nature Study, to be successful and to take its most useful place in education, must deal with the beginnings of things and is for young people, they cannot be too young. It is particularly suitable for the lowest grades of scholars but commends itself equally to the most advanced. It is essentially kindergarten work, and kindergarten work is essentially Nature Study. The imaginary objection to the wider adoption of this study has sometimes been raised that there are neither text books prepared nor a staff of trained teachers sufficiently equipped with special knowledge to undertake its direction. In reply, I claim that no written text books are necessary and no special advanced training is required in the teacher. An elementary knowledge coupled with a love for nature and an appreciation of general principles will at first suffice. Frequent opportunities for increasing this knowledge will be provided while directing the students. These latter must be made to feel the humility of the teacher when investigating the vast field of nature; above all, to inspire confidence and call forth original mental effort, the superior knowledge of the teacher must be kept in the background; freest and fullest discussion must be allowed and encouraged. No dogmatic dictum must be uttered, which cannot be proved by demonstration. A modest acknowledgment that the teacher does not know, coupled with an invitation to a student to investigate a matter together with the teacher, will, I feel sure, do more to stimulate effort than any help in the shape of unearned information which the student should have been able to work out for himself from the objects examined.

Objects for study abound without stint in all places and at all seasons of the year—spring, summer, autumn or winter, it is all the same—for Nature itself is the book and every commonest object inside the school and out is a text for a sermon—the very wood of the school-room floor, of the desks or the furniture, the chalk used on the black-board, even the speck of dust floating in the sunbeam, the light itself; outside, the drop of rain, the flake of snow, a stick, a straw, a stone, a fallen leaf, a twig of any tree, a winter bud or a piece of bark, a bird,

a beetle or a butterfly, a frog, a snake, or even a toad. Everything is worthy of study from many points of view, and has a multitude of mental uses and direct lessons to teach.

The scope of Nature Study should as much as possible be confined to the simple elements of knowledge. It should not be taught to the scholar *by* the teacher, but studied by the teacher *with* the scholar, the teacher merely using his or her superior knowledge and experience in directing and encouraging the scholars to strive to learn for themselves from and of all things which come before them, in a word, to be self-dependent and not to trust too much to what they find in books written by others, but to examine and consider everything for themselves.

There is beauty in everything, but to what an enormous extent is that beauty hidden from human eyes! How many of us go through the world with our eyes open but seeing nothing, because the scales are still before our eyes and we have not yet learnt how to look for and to see the beauty illimitable which is waiting to be revealed! Nature Study properly directed will teach us to want to see and to want to know about the thousand and one useful things which many people have not yet learnt that there is any use in even wanting to know about. But seeing is not all that Nature Study will teach; for, by natural sequence, the mind will be stimulated and instinctively strive to arrive at accurate conclusions, which, being founded on personal observations, will be held intelligently and with confidence.

Another objection which has sometimes been advanced particularly by teachers who have not as yet taken part in this latest development of education, is that the curriculum of studies is now so full that there is no time for anything more. This objection is quite natural, for there is frequently danger in making a change; but we know that all progress is change; and, in the case of Nature Study, if it is systematically undertaken, a very short time every day, ten or fifteen minutes taken from the school time, will suffice. It is no violent change that is suggested which would upset the old edifice of mental training, but, on the contrary, is a happy blending of recreation with the existing system of studies, by which the latter will be strengthened.

The experience of a thousand years has proved the wisdom shown in the choice of subjects used in the training of boys and girls, and there is no desire to do away with any of these; but the object of giving a boy a lesson in geography is not particularly to teach him where Timbuctoo or Kamtschatka, or Kilimanjaro, are situated; nor in history is there any great use in his knowing and remembering in after life—as far as making a good and useful citizen is concerned—

the exact date when a king of any country came to the throne, or died. On the other hand, there is every use in his having his mind so trained by the study of books on geography, history and mathematics, that he may not be surpassed in the race of life when the time comes for him to start out on his own merits to take his stand in the world.

Nature Study has much to commend it from an educational point of view. In education, no advance can be made until an interest is aroused in the subject taught, and Nature Study, above all things, stimulates mental activity. Its very essence is a spirit of inquiry and a desire for knowledge — to want to know about everything seen, what it is, why it is there, how it got there, what are its uses. A thirst for knowledge is an instinct in every healthy mind, an instinct, too, which can be cultivated and developed to a wonderful extent, but also one which, if neglected, will soon fade and die. There is no pleasure in life to compare with that of acquiring knowledge and imparting it to others. The true and good teacher is that one whose ambition is not only to teach all he knows to his scholars, but to do that and leave them with minds fitted to soar to even greater heights of knowledge than he himself has ever attained. The best of teachers is that one who fits his pupils to rise highest above his own standard.

Perhaps one of the greatest advantages of Nature Study in education is that bond of sympathy which it creates between the teacher and the taught. The so-called "bad boy," of which there are supposed to be so many, might, as a rule, more accurately be described as a misunderstood or badly managed boy. This so-called "bad boy" is nearly always of a restless, active, inquiring disposition, who cannot keep still or concentrate his thoughts on the routine work of the school-room. This simply means his interest has not been aroused in that work. Perhaps his badness may show itself in playing truant; however, even this may not be from badness but is merely an indication that there is something of more attractive interest outside the school than in it. Each boy has his own individuality, and lucky is the boy and happy is the teacher when the latter can detect the weak and strong points of the boy and make use of them in moulding the character of the future man. Natural objects are, I believe, attractive to all of us when we are young and a desire for knowledge about them may, I think, be developed in almost everyone into a passion. How fortunate is the child who during the inquiring age, when it first begins to see and think for itself, and when everything is new and strange, is associated with a wise preceptor who will have patience enough to answer the many earnest questions asked, instead of, as is often the case with some people, selfishly for their own convenience,

checking inquiry ! Many children, however, are not so fortunately surrounded in their early associations as the first named class and have much to learn in after life.

There is so much, indeed, in the extensive wonderland of nature, which is new and strange and beautiful, that it gives many more opportunities for a teacher to catch the attention of an active and therefore observant pupil, than any other subject included in the course of ordinary school study. The attention once caught and rightly directed, nature herself does the rest ; a constantly changing panorama of endless interest is presented. Beauty undreamt of is seen in the commonest objects, which before may have been deemed without interest or even repellant. What wonders can everywhere be found with a magnifying glass, that magic mirror which brings to light innumerable treasures in places least expected ! The perfection of structure and endless variety almost overwhelm us, and these exist in every part of the kingdom of nature. Very soon the restless spirit finds more than enough to occupy it ; the fact that knowledge is a common possession is borne in on him, and a mutual fellowship and sympathy springs up between him and the good friend who has shown him the way and led, not driven, him into this paradise. The desire for knowledge, once created, soon spreads to all other branches of study, and the habit of concentration of thought will be of use in every transaction of after life.

Not only is Nature Study useful in training and strengthening the mind to act for itself, but, more than any other part of the framework which supports the educational edifice, it becomes a permanent support of the completed structure. The uses of this knowledge are so manifest that Nature Study must take its place as the common sense method of education ; and it is at the same time the common sense basis of the two great and most important occupations of the masses — Agriculture and Horticulture ; these pursuits, having to deal with the care and nutrition of plants and animals are founded on subjects all of which come within the limits of natural science, a preliminary knowledge of which is Nature Study. A farmer possessed of an elementary knowledge of geology knows by it the composition of his soil and its suitability for the cultivation of various crops. From zoology he learns much which will help him in the rearing, development and care of his stock ; this also teaches him which of the common birds, mammals, insects and fishes are his friends and which his enemies. Who can deny that as a rule he has much to learn in this direction ? Botany teaches him the nature of the plants he grows, and indicates how varieties may be preserved and improved. Chemis-

try proves to him the value of every crop produced, whether as food or as an ameliorator of the soil.

Although in this *cui bono* age the material aspect of every question has always to be calculated with, there is another feature of these studies which ranks high in importance, namely, the actual pleasure which is to be derived from them. What pleasure can compare with that of recognizing the indications of returning spring, so long and anxiously looked for during the cold solitude of winter? The hearing of the cheery Shore Lark's song in bleak and blustery March is the first unit in the glorious annual procession of the seasons. This is soon followed, as the power of the sun increases, by the colouring of the bark on the twigs of shrubs and trees, the happy songs of the returning birds, the opening of the flowers, each in its season and in its own special habitat, accompanied by the reviving of the army of their busy humming insect allies, which, when seeking their own nourishment, play such an important part as the chief means of securing the cross-fertilization of flowers and the perpetuation of many plants. This procession, beginning slowly at first and easily noted, before long unfolds its variegated pageant with ever quickening steps, soon to rush by so quickly in its race, as to defy the powers of the quickest observer, to note the constant changes in the crowded members of its alternately widening and diminishing train, — birds, plants, mammals, insects, all animated life. Each one has distinctive habits, corresponding with the seasons, and every group is worthy of the closest study; there is nothing that does not provide a source of elevating pleasure and a rich field in which the humblest observer may reap scientific laurels. Many of the smaller wild birds, if treated as friends, will soon learn to trust us, lose their fear, and respond to our advances. Some, as the Wren, the Swallows, the American Robin, the Chipping Sparrow, will build their nests close to our houses and will even make use of suitable sites which have been provided for them. Here they may be observed at leisure and will teach us many things which will constantly delight and surprise us. A study of the lives and habits of the myriad hosts of insects will show us perhaps more than anything else the gigantic ends which are attainable by persistent, constantly applied effort, and by apparently inadequate means. An examination of the structure of any part of the least of these will direct our thoughts and reveal to our wondering eyes the universal perfection to be found in all creation.

The benefits which can be drawn from Nature Study may be summarized as follows:

From the teacher's standpoint.

Sympathy with his pupils, and an exhaustless supply of material always available to maintain this bond, such as no other study gives.

New fields of personal and fascinating research of a useful and healthful character.

From the pupil's standpoint.

1. Interest in studies. The attractive and novel nature of the objects observed catches the attention and induces studious habits, which soon extend to all other studies and promote perseverance.

2. Increased power of observation. With practice the faculties of observation and comparison are wonderfully developed, and, with this, greater reasoning powers are evolved.

3. System. The wonderful system everywhere manifested must induce systematic and orderly habits—finishing completely everything undertaken and having a place for everything and keeping it there.

4. Neatness. The beauty of neatness will be constantly apparent in natural objects, and its nature brought out later on by the necessity of making constant notes, which will be useless for future reference unless legibly and neatly written. The advantage of neatness will also be demonstrated and skill of hand developed in mounting, classifying, and arranging numerous specimens, should collections be made.

5. Patience. There is nothing more necessary for effective work in nature than patience, indeed it is so indispensable when studying living animals, that little progress can be made without it; the development of this virtue then is a natural and unconscious outcome of this work.

6. Literary value. A point which must not be forgotten in this connection is the care necessary in expressing all records in concise, definite and simple language, so that there may be no danger of doubt or misunderstanding. This gives these studies much value in education.

7. Increase of knowledge. By an intelligent consideration of the commonest objects which surround us, we derive an unexpected and most useful increase in our practical knowledge of the things which make up the world we live in, and at the same time find in that knowledge a source of pure pleasure not provided by any other course of study.

8. Kindness. Nature Study introduces us to many friends among the wild birds, animals and insects which we should never have appreciated as such but for its power in having removed some part of the dense cloak of ignorance by which most of these are hidden. These

fellow creatures are thus more kindly treated as they deserve to be, and we are enormously benefitted.

9. Truthfulness. The uniformity of habit to be found in all the individuals of every living species of plant or animal safeguards accuracy in recording observations. Any departure from truth, unconscious or otherwise, is sure to be detected by those better informed, or to be exposed by subsequent investigators. Added to this, the great mass of unrecorded facts in connection with almost every branch of study demands the greatest care in seeing and in recording every observation precisely as it appeared to the investigator. This cannot but foster habits which must produce that greatest of all virtues—strict truthfulness.

10. Healthful recreation. As a source of healthful recreation both for the teacher and the scholar, the advantages of examining and studying natural objects are at once apparent. Students who have had their attention strained by abstract teaching, will find a welcome relaxation in observing things coming under their senses, and as the natural place to examine these objects is where they occur in a state of nature, the student is led away from the school and his books into the open air of the fields and woods.

There is, moreover, another side to this picture, *viz.*, the æsthetic and moral use of these studies, which bring before us only what is always true and perfect and which can produce nothing but reverence for the great Author of all things. How beautifully has the poet Keble expressed some of the ideas I have tried to lay before you in the verse—

“ Nothing useless is or low :-
 Each thing in its place is best,
 And what seems but idle show,
 Strengthens and confirms the rest ! ”

“The rest”—ah, what is that “rest,” and how full of meaning is that one word, perhaps there almost accidentally used? That rest is the charming field, exquisite in detail, which forms the magnificent panoply of nature around us, and which belongs to all, to you, to me, and to everyone who will enjoy it. Mother Nature is no hard mistress. She gives but one command before delivering up the free title deeds to this rich domain, imposes but one condition:—“Look and see, study and understand.” That rest of creation referred to by the poet is partially revealed by what strikes the eye when we look across the broad landscape of nature, stretched around us with lavish hand, which appeals to our senses and calls forth our best instincts, be it in dewy,

happy spring, when all is fresh and young with the vigour, hopefulness, and ambition of youth ; in summer, when all things are maturer grown and with brighter hopes of the autumn fruitage, or even in winter with its changing moods of quiet restfulness or fierce tempestuous rage. Nature is always changing but yet is always the same and full of interest at every season. Everything is indeed best as it is, and the more we strive to unlock its sealed door with the golden key of knowledge, the happier we shall be and the more useful will our lives have been.

In nature, until interfered with, all things are perfect, all things are fitted exactly to the ends they have to serve. Perfect method, perfect harmony, an all prevailing principle of absolute perfection, there to be found and nowhere else. Well then may those entrusted with the education of others turn to these natural models to inculcate those principles so necessary in developing the mind. Alertness to observe, coupled with an increasing power to think and draw the right conclusions from things seen, a keen appreciation of the absolute necessity of the strictest accuracy in recording, noting only what is actually seen, whether understood or not, or even whether at the time thought to be of value or not. All knowledge, if it really is knowledge, that is an accurate observation, will at some time be useful either for ourselves or someone else. All in nature is so systematic and neat that the ardent student is led to see the value of these virtues in all his work, and habits so acquired will remain for a lifetime.

Thus I claim that Nature Study gives all that education demands. It is an open book written in plain characters which become plainer the more we study it, with volume after volume in infinite number, each one the close sequel of the last, free to everyone who will read, absolutely reliable, liberally giving more than credit due to all its readers, as though they had originated, and not merely read off the plain record of their discoveries. These studies enlighten constantly and give capacity for helping others and making them happy, because everything seen is true, everything is perfect, everything is useful.

Nature is all-pervading, has no landmarks, no limits, is the free possession of all. How natural it seems for thinking mankind, when tired and weary of the things of this life and contact with other men, to go out into nature, to find in the leafy woods, on the rolling mead, or by the flowing stream, the quiet and peace so needful ! There, all can understand and know and see that everything in its place is best and *does* strengthen and confirm the rest. With all reverence I say it, thank God, we have that rest, the free and beautiful world of nature, where all can go and find true rest.