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THE OTTAWA NATURALIST.

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No. 11

CANINE INTELLIGENCE.

By SIR JAMES GRANT.

THE JUDGE AND THE DOG.

What a peculiar animal the dog is! How full of instinct, in fact almost approaching common sense, or uncommon sense, if it might so be termed. There is so much in the very expression of his face, the cock of his ear, the grin of his mouth, the wag of his tail and the occasional oblique attitude of his body, all making up in a most unmistakable way, for the absence of speech, so often uttered by a bark. Is it any wonder the dog takes so important a place in almost every household? He is far more than ornamental, he is useful, and his characteristics, studied out, even in a moderate way, demonstrate beyond a doubt, how much there is in this type of the quadruped species. Now and then in this section of Canada we have a real dog show, and for variety and peculiarities of dogs, the wonder is, how so many strange dogs found their way so near the north pole. In the discharge of my professional duties, I have often been amazed at the sense exhibited by dogs, particularly in the way of observing the sick of the household. Recently, a little Scotch terrier, one of the small, well cut and shaggy-haired kind,—the little fellow that looks under his long hairy eyebrows, as if he knew more than any other of his class—attracted my attention. This little canine held his own position in the household with great coolness and dignity. When any stranger called, he generally observed the surroundings in his own peculiar way, and just in accordance with his impressions, he would growl as if not perfectly satisfied, or take a good look and walk off quickly to his usual quarters, fully satisfied

nothing in particular would happen. The proprietor of the house, a judge of high standing, had been ill for some months, during all of which time the little terrier was a great comfort and source of pleasure. Wherever his master changed his place there also the little dog was to be found. He noted every action, and no matter how many called, or what the company was, behind, or under his seat or on the mat near his feet, the little canine proved beyond a doubt his faithful character, and almost actual knowledge that his master was not in his usual health and spirits. For some time the physician had not paid much attention to the little canine, who apparently was not to be passed over in a casual manner. One day, when making the usual call, the small dog was actually on the sidewalk evidently on the look-out for the particular friend of his master. No sooner had the physician arrived than the dog began his usual gyrations, evidently greatly delighted at the prospect, and followed him to the bedside of his master. There he took his position, first looking at the doctor and then at the sick man, as if quite aware something was wrong. As things moved lively he was on the alert, but when all was quiet and dull he remained much the same. This state of affairs passed on for some weeks, and the certainly instinctive actions of the little terrier could not but be observed. After a long and trying illness the patient passed away. Some days afterwards, the family physician called to pay a friendly visit. The dog was there, but much changed in character. No longer active and energetic as formerly but rather quiet and indifferent, he took his position on a rug near at hand and turned his back on the visitors, evidently not wishing to attract attention, as his chief source of pleasure was gone, and the familiar voice was hushed forever. The actions of these little animals, so strange and peculiar, are evidence of mental power, difficult to define and sufficient to make us cherish their actions, indicative of rare attachments and canine sympathy.

MEETING OF THE ENTOMOLOGICAL BRANCH.

Meeting No. 19, held at Mr. Gibson's rooms on January 19th, 1905; nine present. The chair was taken by Mr. Arthur Gibson, who stated that the proceedings this year would be of the same nature as heretofore, viz., that each member would be called on in turn, and he trusted that all would endeavor to bring something to exhibit, or some note to read at each meeting of the Branch. In the past this plan had proved so successful that he considered it probably the best way of keeping up the interest. Every actually observed fact was of value, however simple and unimportant it might seem to the observer who made it. Accordingly he called upon every one present in turn and a most instructive evening was passed.

Mr. W. Metcalfe showed a collection of about 100 specimens of all orders which had been collected by him when carrying on his own investigations among the small Heteroptera. His material in his own specialty was not yet sufficiently in order to bring before the Branch, and he asked Dr. Fletcher to speak of any of the specimens in the other orders which seemed worthy of mention. Several rare specimens of flies, beetles and sawflies were then exhibited and short statements made concerning each.

Mr. Norman Criddle, one of our members, from Aweme, Man., described the physical nature of that part of Manitoba where he lived and pointed out the exceptionally suitable character of the locality for collecting insects and plants. He also showed an interesting series of Tiger beetles taken on the drifting sand of an extensive tract of sand hills lying south of Douglas on the C.P.R., and about 12 miles east of Aweme. These specimens included the beautiful local variety of *Cicindela formosa*, which has received the varietal name of *Manitoba*, Leng; *C. venusta*, *C. purpurea*, var. *limbalis*, *C. punctulata*, and the two very interesting sand-loving species *C. lepida* and *C. limbata*. These two latter are extremely rare in collections, being found on the sea coast and on similar sandy tracts to the one above mentioned, in Kansas and Nebraska. Other striking insects shown by Mr. Criddle were a curious rove beetle named *Xenodusa montana*, var. *hirsuta*, which lives in nests of ants; a large and strong ground beetle, *Pasimachus elongatus*,

and a specimen of the Rocky Mountain Locust, *Melanoplus spretus*, which occasionally has done harm in Manitoba and the North-west, but which has not been seen for a year or two.

Mr. C. H. Young showed a most exquisite collection of microlepidoptera (about three hundred specimens) which had been taken during the past summer at Meach Lake, Que., and around Ottawa. All the members present were delighted with the beautiful and neat way in which these specimens were set and labelled. Many of the specimens had been reared by Mr. Young from larvæ, and records kept of their food plants.

Mr. W. J. Wilson submitted an interesting small collection of insects taken on the Hudson Bay slope during the past season. He stated that the season had been an exceptionally poor one for all kinds of insects, except perhaps for mosquitoes.

Mr. Andrew Halkett read some interesting notes made in the Arctic regions as Naturalist of the Neptune Expedition, under Mr. A. P. Low. The large larvæ of the Bot Fly of the Cariboo were shown, and a description was given of the way in which these repulsive creatures occur in the backs of the cariboo. They are oval in shape, over an inch in length and about half an inch in width. The body is covered with short spines, and the creatures must be the cause of great suffering to the animals while they are present beneath the skin. When mature they force their way out through a hole in the skin, in a similar way to the warbles seen on the backs of cattle, and fall to the ground. Later, the mature fly, *Odemogena tarandi*, L., appears. It is a hairy fly three-quarters of an inch in length, of a yellowish colour, bearing a black band across the middle of the thorax, connecting the bases of the wings. The abdomen is yellow at base but has two-thirds at the tip reddish-brown. This insect Mr. Halkett spoke of as the "Tooktoo Fly," which he named from the Esquimaux word for the cariboo. Parasites from the walrus and seal were also shown, as well as some beetles and caddice flies.

Mr. D. A. Campbell showed some eggs, and larvæ in the first stage, of the Cecropia moth, pointing out that the piliferous tubercles were of a different nature in the different stages.

Mr. J. W. Baldwin showed a series of the Meadow Brown butterfly (*Satyrus nephele*), which illustrated the exceeding vari-

ability of markings in this species. A bottle containing living specimens of small ground beetles which he had collected in the autumn and had kept alive through the winter was also exhibited.

Dr. Fletcher showed specimens of two imported cockroaches, *Panchlora viridis*, a beautiful apple-green species, which had been found at several places in Canada during the past season. Specimens had been taken by Mr. C. Stevenson, in Montreal, by Mr. Baldwin in Ottawa, by Miss Dorothy Coates in Winnipeg, and by Mr. J. W. Cockle at Kalso, B.C. The species is a native of the West Indies, and had, probably, in all instances, been imported in bunches of bananas. Another large species found by Mr. C. Stevenson, in Montreal, *Periplaneta australasiae*, has also lately turned up in numbers in Philadelphia. An extract was read from a letter by Dr. Henry Skinner, just received, in which he quotes from a correspondent, as follows: "I had a lot of living insects sent me yesterday. They are in the greenhouse of one of the members of the Pennsylvania Horticultural Society, and are devouring everything from an orchid to an overcoat." Some remarkable oak galls from California gave an opportunity for speaking of the work of these insects. Specimens of the Brown-tail moth from Massachusetts were shown in all stages of the insect. A single specimen of this moth was taken in St. John, N.B., in 1902, by Mr. W. McIntosh, but no further occurrence in Canada has been reported. It is now causing great concern by its rapid increase in Massachusetts.

Mr. Arthur Gibson showed specimens and spoke on the cosmopolitan occurrence of the granary weevils. The best remedies for preventing injury and destroying the beetles in infested grain were described. The Columbine borer (*Papaipema purpurifascia*) in all stages was shown, and an account given of injury done by the larvæ in beds of columbine at the Experimental Farm. Some well-made inflates of the larvæ of some sphinx moths were also shown by Mr. Gibson and were much admired by all present.

The Chairman drew the attention of the members to the beautiful report by Prof. E. P. Felt, State Entomologist of New York, recently issued on the Mosquitoes or Culicidæ of New York State.

J. F., for Sec.

BOTANICAL BRANCH.

The second meeting of the Botanical Branch was held at the residence of Mr. J. M. Macoun, Thursday evening, Nov. 18th, when the following members were present: Messrs. Fletcher, Attwood, John Macoun, Blackadar, Edward Cameron, Roy Cameron, R. B. Whyte, W. T. Macoun, T. E. Clarke, Carter, St. Jacques, Clarke, Ami and J. M. Macoun.

The discussion on "Individuality in Plants" was resumed and a letter was read from Prof. D. F. MacDougal, of the New York Botanical Garden, in which he stated that certain points connected with mutants and hybrids seem to be well established. These are:

"1. No systematist who has seriously examined the mutants of Lamarck's evening primrose, in the adult stage, has decided them to be otherwise than species and varieties in accordance with the estimate placed upon them by de Vries.

"2. Lamarck's evening primrose does not vary widely, not so widely as some of the mutants, as has been found by statistical methods. The mutants do not intergrade with each other or with the parental form as shown by series of measurements.

"3. The common evening primrose does not vary as widely as it is reputed to do, as has been found by cultural studies: doubtless closely related species have been confused with it, which has led to much misapprehension in the matter.

"4. Mutants have been seen to arise from Lamarck's evening primrose in my own cultures under circumstances that admitted of but one interpretation, and historical investigations show that this species is eligible as research material in every way.

"5. The entire obliteration of the evening primroses and all records concerning them would still leave ample evidence that new qualities arise suddenly or by mutation and that new species owe their origin to changes of this kind. It can not be proven of course that all species arise in this manner, and very probably they do not, as for instance, the species that have been formed by natural hybridizations."

In Prof. MacDougal's paper on "The Origin of Species by Mutation," he cites *Chelidonium laciniatum* as an example of a

species which apparently originated accidentally. He says: "Sprengler, an apothecary in Heidleberg, discovered in his medicinal garden in which *Chelidonium majus* was cultivated a new form of *Chelidonium* with divided leaves and laciniate petals. . . . The new species was found to be self-sustaining and in repeated cultural tests has shown no tendency to revert to *C. majus*."

During the discussion Mr. W. T. Macoun stated that among seeds of *C. laciniatum* received from Upsala and grown at the Experimental Farm, only twenty per cent. had proved to be that species, the remainder being *C. majus*. It is, of course, possible that the seed may have been mixed, but if not, this disposes of *C. laciniatum* as a species. Further tests will be made at the Experimental Farm from their own seed.

One of the members having suggested that the fact that the Early Rose and some other varieties of potatoes no longer ripened seeds was an evidence that these varieties were degenerating, it was brought out in discussion that the reverse was the case. The energy which formerly was required to mature the seed now went to increase the size and number of the tubers. Mr. W. T. Macoun expressed the opinion that if by spraying and watering growing potatoes could be carried past the time when the stalks usually dry up a greatly increased crop would be the result as this would give an opportunity for the small tubers to grow and ripen.

A description of an interesting experiment on the vitality of the common buttercup was given by Dr. Ami, details of which appeared in the December number of THE NATURALIST.

The third of the series of meetings in connection with the Botanical Branch of the Club was held at the residence of Mr. H. M. Ami on the evening of Dec. 6th, 1904. There were present Messrs. John Macoun, W. T. Macoun, R. B. Whyte, A. E. Attwood, D. A. Campbell, T. E. Clarke, H. St. Jacques, and Roy Cameron. Mr. E. Stewart, of the Forestry Branch of the Department of the Interior, and Mr. Hamilton, of the Exhibition Division of the Department of Agriculture, were present as guests.

The topic chosen by the chairman for discussion was "Conifers," and he introduced the subject with a brief paper on "A typical young pine forest growing at Ironsides, near Ottawa,"

where conditions prevail which afford an excellent opportunity for members of the Botanical Branch of the Club to study not only pine-life, but also the growth of trees generally. There are poplars, birches, maple and pine trees, growing together in a young forest which began to sprout after the fire of 1870 which cleared the whole region for miles, and laid bare, owing to erosion of the underlying clay deposits, several thousand acres of land on which not a blade of grass could be seen. The following notes on the forest, which can be seen there at the present time, are herewith given.

"After the big bush-fire of 1870, which swept over a large portion of the Ottawa valley and laid waste large areas of good and bad timber lands, there followed the consequent erosion and denudation of the country. The timber-laden district of Ironsides, between Ottawa and Old Chelsea, had been totally destroyed by fire, leaving on the ground nothing but the bare burnt clay, together with a few large trunks of the gigantic pines of this neighbourhood, which attested to the great destroyer of plant-life and the once thriving forest. Lumber camps had come and gone. Man had cut the best for himself, leaving only the smaller scrub behind, and a few others spared by the axeman.

"Presently, not even the trunks of the trees were seen standing or fallen, throughout the burnt areas, for the erosive agencies soon began their powerful operations, whilst vegetation, which usually acts as a deterrent to the progress of waters from rain in reaching the nearest streams, was no longer there.

"Rain having acted upon the unctuous clay deposits, the fine materials of which it is composed were soon carried down to the lower levels in the nearest brooks, and a clean, bluish-gray clay surface, well-washed and presenting a destitute and barren piece of country followed.

"Not a blade of grass could be seen for miles. This state of affairs continued for a couple of years, during which the waters of the district carved out the strata, and carried off much of the soil and clay of the district. Deep valleys were excavated, trunks of trees, and other remains of vegetation, etc., were carried away and buried in the sediments of this period down the Gatineau or Ottawa.

"Nature is always busy, and as soon as there came a slight lull in the process of denudation, she sent forth her redeeming forces and employed them in restoring, reconstructing and maintaining the equilibrium by sowing seeds of various grasses, shrubs, trees and other kinds of plants from this well-known

prolific district, and soon the blue-gray clay mass and tints began to disappear and assume a green appearance. Denudation and reforestation had a struggle. The former had won outright at the outset, but now it was the birth of a new forest, and it was also the turn of plant-life to flourish and spread its beneficent mantle over the land.

"To-day there may be seen in the same district a dense young forest of soft and hard-wood trees, with the usual associates of the forest in the form of shrubs, flowers and grasses, sedges, mosses, etc. The humblest of these are, perhaps, the greatest protectors to our forests. They keep back the rush of the waters in periods of flood and rainstorm. In the Ironsides district to-day we have a young pine forest which is apparently growing to the best advantage for the production of fine pine timber in the not distant future.

"What are the conditions prevailing? Along with the young pines there may be seen growing in luxuriant form, poplar trees (*P. grandidentata*, *P. tremuloides* and *P. balsamifera*), also birches and maple trees, amongst which we have *Acer rubrum*, whose gorgeous tints of autumn time afford such glorious pictures to the view of the city folk from Parliament Hill. As is well known, poplars grow much faster than pine trees. A visit to the locality will show you a young pine-tree practically surrounded by other trees, chiefly poplar. The poplars are taller than the pines, and are likely to maintain their supremacy for some years to come. As long as the poplar-trees keep growing taller, and in the growing period of the year over-top the pines, we find that the lower branches of the pine-trees will be stifled or become more or less abortive, owing to the density of the foliage surrounding the trunk of the pine-tree. By the time that the poplar-tree reaches its maximum height, the branches of the pine-tree will be mere twigs. This will give the pine-tree a trunk free from knots, and form merchantable timber of the greatest value. The instant the poplar-tree stops growing taller, the pine-tree in turn shoots upward and out from the mass of foliage below, and soon towers above the poplars till it reaches its maximum height—three or four times that of the poplar. Then the life of the poplar begins to decline, the trunk decays, its branches break and fall, whilst insect-life comes in to accelerate its doom. The pine-tree, in the course of a few years, begins to spread an umbrella-like shade over the dying poplar, to hasten the final crisis, which the winds of summer or storm soon bring about. Then the monarch of the Eastern Canadian forest is king, and rules.

"I imagine that there are few places on this continent where a study of pine-life can be carried on to greater advantage than in our immediate vicinity at Ironsides, Que. I had an opportunity

this fall (September, 1904) of visiting Woodstock, Vermont, where Yale students of forestry have an excellent opportunity to study young forests.

"I have no hesitation in saying that it would be most interesting to have yearly records of the life-history of some of the individual trees of the Ironsides district, in order to ascertain the normal as well as the best conditions which must prevail in order to form fine timber trees, whether pine, spruce or poplar, or even hardwood. Whether it would be advisable to reserve just such a piece of country which thirty-four years ago was as bare of vegetation as a billiard-ball or an egg, is a question which it may be worth while for the Government to consider.

"I have recently heard of a Canadian pine and conifer forest growing in Germany which was seeded sixty years ago and is now flourishing. Baron Fuerstenberg's father it was who planted the seeds of Canadian conifers in Gammertingen, Germany, these long years since, and I have learned that they now have a forest worth while cutting. It would be interesting to ascertain the quality and quantity of lumber that can be cut from these trees.

"I would strongly advise anyone wishing to see a young pine forest, to visit the thick woods of Ironsides, along the line of the Canadian Pacific Railway between Ironsides station and Chelsea, within the 'Ottawa District.'

"H. M. AMI.

"Ottawa, Dec. 6th, 1904."

DISCUSSION.

In the discussion which followed, Mr. W. T. Macoun described the results of the experiments in tree-planting made at the Central Experimental Farm in Ottawa since 1887. Here a forest of the Scotch pine grows well. Several plantations of white pine also had been made in three different ways: five feet apart, ten feet apart, and with mixed trees. He remarked that shade killed pine trees. Prof. Macoun remarked that poplar and birch were the scrub in which pine delighted to grow. Poplars and birches came and died, then the pines and elms survived and flourished. He reiterated a statement made by him before the Forestry Conference in Toronto, in 1903, to the effect that pine trees grew from the seeds which came up out of the ground where the squirrels and other small mammals had stored them. White pine grew from decaying logs for the most part. Mr. Hamilton stated that at the River Désert, up the Gatineau, in 1874, four

years after the big fire, he saw poplars growing, and seventeen years after the pine trees were one foot thick at the stump. He believed that trees flourished best when thickly planted. He had noted the fact that pine trees growing in light soil had lighter colored leaves than those grown in richer and darker loam. Mr. Stewart pointed out that broad-leaved trees and other forest weeds killed smaller pines. Mr. W. T. Macoun further remarked that during an outing last fall with Mr. Elwes, of England, an enthusiastic forester, when a traverse was made from Kingsmere to the Gatineau river, through the forest, they had noticed young pine trees growing almost invariably upon the decaying trunks of fallen trees. He believed that the Scotch pine would thrive in America, and in our Northwest especially would be a welcome grower. Seedlings of the Scotch pine (*Pinus sylvestris*) grown in Canada at the Central Experimental Farm had already been planted. There were three Old Country trees in Canada doing very well, namely, the Scotch pine, the Norway spruce, and the European larch.

Among the specimens exhibited were *P. inops* from the New Jersey barrens, and *P. Tæda* from Georgia.

THE THREE SPRUCES.

Mr. W. T. Macoun then spoke on the three spruces, *Picea rubra*, *P. nigra* and *P. alba*. The first grew in the east only, while the other two grew from Prince Edward Island to the Rockies. Black spruce grew in damp and wet places; white spruce grew best on the margins of swamps or edges of moist land; whilst red spruce grew on farms on high lands. He exhibited specimens of eleven spruces growing at the Central Experimental Farm, amongst which we note: *P. Omorica*, *P. orientalis*, *P. excelsa*, *P. Engelmanni*, *P. obovata*, *P. Sitchensis*, *P. pungens*, *P. Alcockiana*, besides fine examples of the three Canadian spruces, black, white and red. Mr. Macoun pointed out the differences which existed between the various species shown, as well as their resemblances.

Prof. Macoun pointed out, and Mr. Stewart supported him in the view, that the black spruce (so-called) of commerce in New

Brunswick was *red* spruce proper (*P. rubra*). Mr. Stewart enquired if it was known that black spruce grew any merchantable size anywhere. No one had ever heard of black spruce making merchantable wood.

Prof. Macoun had collected the three spruces at Eastman's Springs, near the Mer Bleue. In the latter bog the black spruce was common. He had noted a *law* in the fruiting of spruces, namely, that white spruce always had the top cones on the tips of the branches hanging down; red spruce had them half-way down; whilst black spruce had its cones close to the trunk, and these stay on for ten years, and even over twenty years. White spruce lose their cones soonest, red next. You will generally find the cones of the white spruce tree on the ground. Pollination in spruces was also discussed by Prof. Macoun. He stated that whereas the tops of spruce trees were often crowded with cones, as much as a bushel at the very top, the lower limbs of the tree were covered with pollen.

Regarding the character of colour of the wood of the spruces, it was noted that the wood of the white spruce was white, that of the black spruce more resinous and hence darker, while the colour of the wood of the red spruce was very near that of the black, hence the term "black spruce" given to red spruce in New Brunswick and elsewhere. In the discussion, Messrs. Campbell, Clarke, Attwood and others took part. Through the kindness of Prof. D. P. Penhallow, of the Botanical Laboratory of McGill University, Montreal, Mr. Ami was able to show, with the aid of the microscope, thin sections of the three spruces discussed during the evening. Microscopical sections revealed the structure of wood beautifully, and marked differences were observed. The microscopical test was always crucial and proved most satisfactory.

WHAT IS NATURE STUDY?

Putting the definition of the Nature Study movement in one concrete sentence, I should state it as follows: "The Nature Study movement is the outgrowth of an effort to put the child into contact and sympathy with its own life."

L. H. BAILEY, Ithaca, N.Y.

NATURE STUDY—No. XXI.

NATURE STUDY IN THE SCHOOLS OF NOVA SCOTIA.

(A Historical Sketch.)

By DR. A. H. MACKAY, Superintendent of Education for Nova Scotia,
Halifax, N.S.

A systematic course of oral and objective study was outlined in the first conspectus of a course for the schools of the province, which was presented to the Provincial Educational Association at Truro on the 14th day of July, 1880, by the Principal at that time of the public schools and Academy at Pictou. This was done on the invitation of Dr. David Allison, then Superintendent of Education for the province. After due discussion the conspectus was referred to a committee for simplification and presentation at the convention held the next year, where it was further discussed and passed, practically in the form in which it was soon after prescribed by the Council of Public Instruction for the first eight grades of the public school system, known as the common school grades, in the year 1881.

In 1887 "The Educational Review," which has ever since been continuously published at St. John, N.B., was started with the object of developing the Nature Study side of the course, as well as serving incidentally as a teachers' organ for the Atlantic provinces of Canada. Illustrated lessons on natural objects were prepared, the most continuous being the series under the title "Ferndale School." The whole environment of common school life was more or less covered, instruction for teachers on various subjects, including even the evening sky, which was illustrated by a series of star maps. The Ferndale series dealt with the biological side mainly; but other pages covered mineralogy, physical phenomena of common range, and so forth, before any general effort appears to have been made in the educational press of the other provinces of Canada.

A little later, 1901, a Science building was erected in connection with the Provincial Normal School; and the Provincial School of Agriculture founded by the Government a few years earlier, was then more completely affiliated with it. An extra course of two years in the sciences underlying the art of agriculture was

given to teachers who could take this extra time, for which a special diploma and prize were awarded, and an additional provincial grant of \$100 when they were engaged in teaching in an efficient rural school. This idea has been carried out in a fuller manner by Dr. James W. Robertson, director of the Sir William C. Macdonald Rural School Fund, when \$175,000 were donated to build the Macdonald Institute of Nature Study, etc., at Guelph, in Ontario, and additional funds were provided for Nature Study teachers and school garden demonstrations.

For about twenty-four years the idea has been in the public course of study, developing gradually from morphological to biological observation—from the observation of forms to the observation of action. For a number of years records have been made of the biological and meteorological facts capable of being accurately observed by pupils and verified by teachers, such as the dates of first flowering, leafing and fruiting of plants; the migration of birds; thunderstorms, frosts, high and low water, etc. These have proven so valuable as scientific records, that for some years they have been annually compiled into averages for the different regions of the province as well as for the whole province. The schedules have to some extent been utilized in the other provinces of Canada, and a similar system has been introduced in imitation of it into some of the schools of Denmark. The main object of the scheme originally was to give some objective work to the pupils on their way to and from school, to be reported to the teacher in school. These schedules are being carefully bound up into annual volumes, for the benefit of future students of climatic and ecological conditions in the province.

In the provincial course of study special directions are given for each of the eight grades of the common schools. The general directions published in each school register give in brief form the substance of the *special* directions published annually in the "Journal of Education," which is the official bulletin of the Department, sent free twice a year, in April and October, to each school board in the province. These general directions, which indicate the view taken by the Nova Scotia Education Department of the character and importance of this elementary work in the public schools, are as follows:

“NATURE STUDY.—The noting, examination and study of the common and more important natural objects and laws of Nature as they are exemplified within the range of the school section or of the pupils' observation. Under this head, pupils should not be required to memorize notes or facts which they have not, at least to some extent, actually observed or verified for themselves. Many books on the list recommended for school libraries (see October “Journal,” 1903) are useful guides to the teacher for portions of the work prescribed in some of the grades. There should be a short “Nature Lesson” given every day on the daily collections and observations of the pupils themselves—not on the statement of teachers or books—the lesson always being based on the objects or observations. These guide books are to be used only to show the teachers how to give such lessons. They are entirely prohibited as text-books for either pupil or teacher, for under no circumstances should ‘notes’ from the books be given to pupils. All such studies must be from the objects. Observations under this head form some of the best subjects for English composition or drawing exercises in all grades.

“In schools with pupils of several grades under one teacher (as in most rural schools), many of these lessons may profitably engage the whole school. In nearly all, either the whole senior or whole junior divisions of the school can take part. A skilful teacher can thus give profitable object lessons to several grades of scholars at once; at one time giving a Grade V lesson, at another time a Grade VI or Grade VII or Grade VIII lesson, which will also contain enough for the observation and interest of Grade I, Grade II, Grade III and Grade IV pupils. An object lesson given to the highest class can thus, to a certain extent, be made a good object lesson for all the lower classes. The older pupils will see more and think more.”

“It must be remembered that the memorizing of notes and facts merely stated to pupils is strictly forbidden under this head. Such memorizing is pure cram, and is injurious instead of being useful. The teacher may not have time to take up in class every object indicated in the Nature lessons of the course. In such cases the pupils should be given two or three objects nearly related to the typical specimen examined in school, with directions to search for

and examine them at home, as illustrated in the specimen class lesson. Without much expenditure of time the teacher can note that this work has been honestly attempted to be done by each pupil. The lessons must be direct from Nature itself, but under the guidance of the teacher, who can save time in bringing the pupils to the point desired by his more matured experience. They are intended to train the observing and inductive faculties, to show the true way of discovering something of the nature of the world which immediately surrounds us and which is and will continue to be reacting upon us in one manner or another. This knowledge is so much power over Nature, from which we have to win our material existence. It is also essential as an element in any true and useful system of philosophy.

"More stress has been laid here on the natural history of each section than on elementary physics and chemistry. Not because physical phenomena are less important; but because the elements of these sciences are the same all the world over, and there is no end to the cheap and well illustrated guides to practical work in them which will well suit a section in Nova Scotia as well as one in England or in the United States. But there are no such simple guides in the biology of each section, nor in many others of its scientific characters. The teacher, then, must become a student and master himself; for such exercises have special power in developing the habit of accurate observation (which is the soundest basis for any career, ranging from that of the poet and professional man to the tiller and lord of the soil, the tradesman, the manufacturer, the inventor) and in developing in connection with history and civics an intelligent attachment to both the material and ideal features of our country."

These quotations are from the official instructions published annually for a number of years. They will in future be still further modified, it may be assumed, so as to utilize the ideas and principles now being developed in so many countries, many of which have been so effectively set forth in THE OTTAWA NATURALIST series of articles.

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