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THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, FEBRUARY, 1904. No. 11

OUR EAGLES AND OSPREYS.

Rev. C. J. YOUNG.

The eagle is a notable bird in every country, and the person who takes but little interest usually in the avi-fauna of his neighborhood, after seeing one, is very apt to say to his friend, "I saw an eagle the other day." But we must regretfully admit that this will soon be a remark of the past, so bitter is the war of extermination that is waged against these noble and comparatively harmless birds.

The bald-headed eagle (*Haliæetus leucocephalus*) is rapidly decreasing in numbers in Ontario, and the sight of a nest will be almost denied to the rising generation. The golden eagle (*Aquila chrysaetos*) has always been a rarity in this province. The former bird is occasionally observed in the winter; one or two are frequently seen in the vicinity of Kingston sailing along the shores of Lake Ontario; inland it is but rarely noticed until spring, on account of lack of food, I suppose. Up to the year 1895 two or three pairs always nested in the woods around Charleston Lake, County of Leeds, Ont.; at the present date one pair may possibly do so. One of these nests was located in a poplar tree, a most unusual building site, fixed in the limbs not more than twenty feet from the ground. The tree grew in a ravine just under the Blue Mountain which overlooks the lake. Another nest was in an oak, near Slim Bay, and which was occupied as lately as the year 1901.

The bald eagle also bred commonly along the St. Lawrence; south of Lansdowne, near Symonds Mt., a nest built in an elm being used for many years. The birds subsequently moved to a tall pine at the head of Landon's Bay, and raised their young

there in safety until the tree was blown down in 1895. They have now left the locality, a locality they had been accustomed to nest in for numbers of years no doubt,—and have gone elsewhere to breed. At Wolfe Island this bird nested until recent years, occupying a large elm near Long Point, at the head of the island. When this tree blew down the eagles built a nest at the head of Simcoe Island. There they occupied a high elm, which was climbed by a man of the name of Shelbourne in 1900; a feat that very few persons would care to undertake; and the birds again changed their abode. At present there are but one or two nesting places remaining at the eastern end of Lake Ontario.

Going inland, we hear of a few pairs of bald eagles along the Rideau, and at the lakes in its vicinity; and in the latter part of summer young birds as well as a pair of old ones might be seen at Sharbot Lake almost daily. But what destruction goes on; in the spring of 1903 a pair of these eagles selected a comparatively small hemlock for a nesting station near this lake. They successfully hatched their eggs, and raised their young until they could just fly. Then the nest was found by men engaged in peeling hemlock bark; the alarm was sounded, word sent abroad, and the tree was felled, the two young ones killed and left lying on the ground, and one of the old ones shot! Such is the fate that too often overtakes these birds, nowadays.

The golden eagle nests very rarely in Ontario. A nest seen by the writer was built in high rocks at Schooner Lake in North Frontenac, and was considered for a long time inaccessible until some river drivers let one of their number down from the top of the cliff by a heavy rope, and he managed to swing himself on to the ledge where the nest was located and secure the eggs. This was towards the end of April, a few years ago, and since, the nest has been deserted. In 1903, the writer visited the place, and suggested the means by which a man named Herbert reached the nest.

As with the eagles, so it is with the ospreys. They are rapidly being exterminated. A few years ago a nest located on a pine or hemlock stub was no uncommon sight in the back country; now it is a very rare sight. This bird is more partial to the neighborhood of small inland lakes than to the larger waters

and sometimes selects a tree quite away from the water The nest is almost as large as a bald eagle's, but built in a different situation. The osprey is a late breeder, the bald eagle an early breeder. The former usually lays its eggs--at least in Ontario – about May 20th, the latter about April 12th ; the golden eagle about the end of April. Where not harassed and molested the two former birds are vehement in defence of their nests, and greatly resent intrusion; but I notice where they have been much disturbed, they lose spirit and do not come within gunshot of an intruder, hardly venturing to attack him if he climbs their tree.

I have not observed the osprey at Charleston Lake, or seen more than three nests in North Frontenac. One of these, in the township of Bedford, I visited with a friend on May 29th, 1903. It was built on a partially dead limb of a living maple, and is the only osprey's nest I have ever seen in a living tree. These birds were fortunate in hatching their young, which, I later learnt, they brought out in safety. But usually, as in the case of the eagles, the hue and cry is raised and the tree is either felled after the young are hatched or else the old ones are shot whilst incubating their eggs.

In some parts of North America the osprey is still fairly plentiful and is said to breed in communities, but this is not the case with our Canadian bird, which is invariably solitary, and only found in pairs widely separated. Again, in nesting, as mentioned above, the site is usually a pine, a tamarac or hemlock stub, the altitude varying from 30 to 60 feet from the ground.

In Scotland the nest was usually placed on some rocky island in a highland loch, or on a ruined tower, as at Loch Awe in Argylshire, and I believe on the coast of Maine, rocks by the sea coast or even the ground have been chosen, but not so in Ontario.

It is to be hoped these noble birds, both eagles and ospreys, may continue to enliven the beautiful lakes, and what remain of forests, in Ontario, but as matters are now proceeding, it cannot be many years before they become here, birds of the past.

PRESIDENT'S ADDRESS.

(Delivered December 15th, 1903.)

Members of the Ottawa Field-Naturalists' Club, Ladies and Gentlemen :—

Although this is but the 24th Annual Address which a president of this Club has had the opportunity to deliver, the 25th anniversary of the Club's organization will have passed before the next president has prepared the 25th Address. The Council of the Club has therefore thought it appropriate to celebrate the 25th anniversary at this time, and bring together as many of the original members as possible. While some of the first members are dead, it is pleasing to know that all of the original Council of the Club are alive ; that all of them, with the exception of one, the Hon. Joseph Martin, are living in Ottawa, and that nearly all of them are here to-night.

On the 10th of March, 1879, forty men assembled in the rooms of the Literary and Scientific Society to organize a club which would promote the study of Natural History in the Ottawa district. At this meeting the club was formed and given the name of the Ottawa Field-Naturalists' Club, which it has creditably borne ever since.

The officers for that year were :—

President : Lieut.-Col. White.

Vice-Presidents : J. Fletcher, W. D. LeSueur, B.A.

Committee : W. P. Anderson, C.E., W. R. Billings, W. H. Harrington, J. Martin, H. B. Small, M.D.

The Club had a very successful season, and by the close of the year the membership had swelled to 90. This year it is 254.

On looking over the Transactions of the Club and the seventeen volumes of THE OTTAWA NATURALIST, one is impressed by the enthusiasm of the members all the way through. How few clubs, societies or associations of twenty-five years' standing can show so fine a record ? There is a reason for this, however. Once a man becomes an enthusiastic student of Nature he is always an enthusiast, and we have many men of this stamp in our Club of whom we are justly proud. We know so little about

Nature, it is so easy to learn more, and there is so much to learn, that we should be poor naturalists indeed if we did not show some progress.

The following is a list in chronological order of the men who have been presidents of the Club since it was founded :

Lieut.-Col. White	1879-80
Dr. James Fletcher	1880-83
Dr. H. B. Small	1883-85
Mr. W. H. Harrington	1885-86
Prof. J. Macoun	1886-87
Mr. R. B. Whyte	1887-89
Dr. R. W. Ells	1889-92
Dr. Geo. M. Dawson	1892-95
Mr. F. T. Shutt	1895-97
Prof. E. E. Prince	1897-99
Dr. H. M. Ami	1899-1901
Dr. R. Bell	1901-1903
W. T. Macoun	1903-1904

I shall not in this address attempt to tell of the work which the Club has accomplished in past years, as others will speak more fully upon it; but as I am partly responsible for the work of the present one, it may be appropriate for me to say a few words about it.

On being elected president last March I felt that the Club might have made a much better selection, as my record of work for the Club was not very long. I appreciated the honor, however, and determined to do what I could to make the year a successful one. Everything happened to be in our favor this year New life was being stirred in the Club by the Nature Study movement which was interesting so many of the teachers and scholars in the city ; and a spring and early summer with delightful weather for excursions enticed many out to the woods and did much to make them successful. Furthermore, the Club has a capital secretary in Mr. Wilson, and he and the other members of the Council, of which the ladies form a faithful part, were always ready and willing to co-operate with me.

During the spring and summer two general excursions were held and nine sub-excursions. All of these were very enjoyable,

and considerable work was done. These excursions were made as educational as possible, and particular pains were taken by the leaders of the Club to assist students and teachers, of whom there were nearly always a large number and who were most anxious to learn. Full reports of these excursions were published in THE NATURALIST from month to month throughout the summer.

During the year the Botanical and Entomological branches have held meetings at the homes of the members, the Botanical branch having had twelve meetings and the Entomological eight meetings. These have been very enjoyable and profitable to the members.

THE OTTAWA NATURALIST has maintained its high standard, and the 17th annual volume is now nearing its completion. The addition of the Nature Study department, edited by Dr. Fletcher, has done much to make our journal still more popular.

We invite your attention to the programme of soirées for this winter.

On January 5th the Rev. G. Eifrig will give a lecture entitled "The Differences and Correspondences between the Avifauna of Ottawa and the Maryland Alleghanies." This should be exceedingly interesting to Ottawa naturalists as, no doubt, Mr. Eifrig will tell us much about the winter homes of some of our summer birds.

The illustrated lecture of Dr. Barlow on January 19th, on "The Recent Landslide on the Lievre River," will be of exceptional interest as the slide occurred so recently and was of such an unusual nature. Dr. Barlow was over the ground shortly after it occurred, and has many good lantern slides to illustrate it. No less interesting will be Mr. Dowling's address on the same evening on the Newington Bog, which was visited by Mr. Dowling and other members of the Club in the autumn and of which Mr. Dowling has some good slides.

The study of the circulation or diffusion of sap in plants has engaged the attention of many scientists. On February 2nd, Mr. F. T. Shutt, who has carried on some interesting experiments at the Experimental Farm, will discuss this question. The address should be of especial value to teachers and students. On the same evening Dr. C. Guillet will read a paper entitled "Two

Springs," in which he will show how unusual the climatic conditions were this year.

All who have previously heard Dr. R. A. Daly lecture before the Club will be pleased to learn that he has consented to give an illustrated address on February 16th on "A Summer's Cruise on the Labrador Coast." The title sounds well and we feel sure that Dr. Daly will not disappoint those who go to hear him.

The last soirée, before the annual meeting, will take place on March 1st, when Dr. Sinclair will give a lecture on "Color in Nature." This address should be of interest to all naturalists, as color is what gives Nature much of her charm.

After the annual meeting, which will take place on March 15th, we shall have, on April 5th, an evening for practical demonstration of "How to Collect and Preserve Specimens," when short talks will be given while each demonstration is in progress. It is hoped that an evening of this kind will do much towards inducing the younger members to begin some work in Natural History, and to begin it in the right way.

During the winter soirées, the work done by the various branches will also be presented.

The Soirée Committee believes that it has one of the best programmes ever presented before the Ottawa Field-Naturalists' Club, and it is expected that the meetings will be well attended. Admittance is free to all the lectures, but the full privileges of the Club, including THE OTTAWA NATURALIST, which is published monthly, may only be had by becoming a member for the nominal fee of $1.

It is the desire of the President and Council of the Ottawa Field-Naturalists' Club to make the work of the Club as practical as possible, and while investigations in Natural History will continue to be the Club's main purpose there is a strong feeling that as much as possible should be done to assist those who are teaching or are about to teach the young people of this city and elsewhere to see and know and understand by means of Nature's object lessons. Already much has been done by the Club in this direction.

On behalf of the Club, I wish to express our appreciation of the grant which we annually receive from the Provincial Govern-

ment to help carry on our work and which has been of such great aid to us.

Last year we lost in Dr. McCabe one who was a good friend to us. We miss him at our opening meeting where he was usually on hand to give us words of welcome. We have good cause to feel, however, that his successor, Principal White, is in close sympathy with us, and we have found him ever ready to do what he could to further the work of the Club. The fact that Mr. White has invited us to hold all our winter soirées in the Normal School is sufficient guarantee of his good will.

Members of the Club, ladies and gentlemen, I trust that we shall continue to have a successful year and that you will do your part as I hope to do mine to make it so.

MOLLUSCA.

Helicigona arbustorum in Newfoundland.

Adult living specimens of this common British and European land snail were collected by Dr. Robert Bell in the middle of July, 1885, on grassy slopes facing the sea, near the narrows of St. Johns Harbor, Newfoundland. So far as the writer is aware, this is the first time that this species has been found, in a living state, on the American side of the Atlantic. Dr. Bell says that many wrecks of vessels take place on this part of the coast, and that a little farther to the south of the locality where these snails were found, there is a small patch where the common heather (*Calluna vulgaris*) grows. This marks the spot, he adds, where an emigrant ship was stranded, and the beds of the emigrants, which were stuffed with heather, were taken ashore and emptied out.

Dr. Pilsbry has pointed out that *Helix arbustorum*, as this land snail used to be called, is the type and only known species of *Arianta*, Leach, (1831) which is now regarded as only a section of Ferussac's genus *Helicigona* (1819), and which is separated from *Helix* on purely anatomical grounds Von. Martens changed the name *Arianta* to *Arionta*, for etymological reasons, but *Arianta*, (Leach) is not the same as the *Arionta* of American authors.

J. F. WHITEAVES.

Ottawa, Dec. 4th, 1903.

MEETINGS OF BOTANICAL BRANCH.

A meeting of the Botanical Section of the Ottawa Field-Naturalists' Club was held at the residence of Mr. D. A. Campbell on Friday evening, Nov. 20th, 1903. The following members were present: Messrs. Attwood, Blackadar, Carter, Clarke, Eifrig, Leibner, W. T. Macoun, Whyte, Dr. Fletcher and Prof. Macoun.

It is gratifying to see the interest taken by the members in those fascinating problems of plant life which present themselves for solution at every outing. To the general public the plant at the flowering stage is everything. To the dilettante, those fleeting aspects of a plant's life, its color and its odor, are all-absorbing. Interesting as these may be, they are merely a few of the numerous points considered by anyone pretending to take more than a superficial view of the subject.

One of the questions discussed at the meeting was why so many plants at one stage of their season's growth produce what is called the "rosette" arrangement of leaves. Specimens of the following plants were shown: Wild pepper grass (*Lepidium apetalum*), horseweed (*Erigeron Canadensis*), common thistle (*Cnicus lanceolatus*), common mullein *Verbascum Thapsus*), spiny-leafed sow-thistle (*Sonchus asper*), ox-eye or white daisy (*Chrysanthemum leucanthemum*), common evening primrose (*Œnothera biennis*).

These plants, widely different species, exhibit a striking uniformity of plan in the arrangement of the cluster of leaves which they produce in the autumn. Each has a very short stem and many leaves arranged in whorls close to one another. In order to prevent overlapping the lower leaves have longer stalks which push their blades beyond those above them. They were collected about the 10th of November, after the blossoming season. Many plants at that season were caring most, perhaps, for the distribution of their seeds and therefore for posterity, but, in the case of these plants, and of other biennials in general, a preparation of another kind was going on with the same end in view. The rosettes were using the rays of the late autumn sun to build material for an early start the following spring. It was

explained that the rosette arrangement, while not the best, on account of overlapping of the leaves, was, nevertheless, a good one, since the leaves comprising it obtained a large share of sunlight and by the close arrangement held possession of the soil.

Another topic discussed was the relation between the slope of the leaf and the type of root the plant has. In the case of the tap root, which goes deep into the soil, it is an advantage to have the leaves shed the rain toward the main axis ; in the case of fibrous root, which spreads out in all directions, it is better to have the water shed out toward the growing tips of the roots. The latter type of root is able to take the water from a larger area than the former. It is manifestly an advantage to have the water shed over this area about the centre of the plant. Of course the main business of a leaf is to place itself in the best possible relation to light, but the above incidental relation—viz., the slope of leaf to type of root—is important also. The plantain was cited as a probable exception by Mr. Attwood. Since the discussion, a number of specimens of the plantain have been examined at the Geological Survey and the roots were found to belong to an intermediate type.

A branch of a cork elm, brought from the Aylmer Road, was exhibited, and elicited the statement from Prof. Macoun that these trees are now curiously confined to fence corners and roadsides. Seeds are blown into these sheltered places where a better chance is given them to survive. This tree is one of the smaller species of elm. It has a beautiful shape but has not such slender, swinging branches as other species, owing to the disposition of cork.

Mr. Whyte referred to an elm about eighteen feet in circumference standing north-east of McKay's Lake, and advised a pilgrimage to so venerable a patriarch of the suburbs.

A discussion on the size of trees brought out the statement that larger trees grow on the western coast of the Dominion than in the east. Thus, in British Columbia there is a species of maple with leaves and top of enormous size. One of the leaves, measured by Mr. Carter, was 19½ inches by 23 inches. The diameter of the top of a tree, measured by Dr. Fletcher, was 200 feet. This large top and leaf is evidence of absence of wind storms which would play havoc with such an immense tree. The

firs of the coast also present a peculiarity in that their gigantic trunks have a small bushy top and a comparatively small root system. This shows again that the wind force is slight.

The fall blooming of such spring flowers as strawberry, hepatica, and the prairie anemone, was again warmly discussed. One view advanced was that these plants, after a period of rest due to a drought some time during the summer, and having their buds ready, were forced to flower by the recurrence of spring conditions in the autumn. Mr. Eifrig stated that in Cumberland Co., Maryland, he had observed that the fall always produced such flowers no matter whether the preceding season were wet or dry.

The fact that there were no acorns in this region this year was explained by Mr. W. T. Macoun as due to the frost which occurred early in May and killed the flowers.

Mr. Clarke brought up the question of the pendent position of the pods of the locust. Prof. Macoun stated that this was characteristic of the pods of the locust family. In the cress family, however, the pods usually do not hang down but stand erect. This erect position of the pods in the cress family would facilitate the escape of the seeds from the base of the pod which opens before the top. The weight of the pod on the locust, as compared with the strength of the peduncle bearing it, may decide mechanically what position the pod assumes.

The relation of the colors of flowers to their structure was briefly discussed, demonstrating the divergence of opinion among the members on this subject.

D. A.-C.

A MISPLACED RAINBOW.

The afternoon of June 2nd, 1903, was bright and pleasant at Innisfail, Alberta; above, there was a varying number of fleecy white clouds, with a good deal of blue sky exposed between. While driving towards the town about 5.30 p.m., a strange bird-song attracted my attention, and a little observation showed that the singer was high up on the wing. On beginning to search for

him, I noticed at once a most beautiful, and, to me, extraordinary rainbow, if one may use that name for a bow high in the heavens on a day when no rain had fallen. The bow was 25 or 30 degrees in diameter and was almost exactly overhead, lying perhaps 5 degrees north-west from the zenith, and there it hung, like a crown, over the earth—a complete circle, with every part brilliant and perfect. None of our party had ever heard of such a bow before, but reports have been made since then of similar phenonema having been seen in former years. It would be of much interest to know the causes of such an unusual occurrence, and any particulars as to locality and meteorological conditions attending its appearance.

W. E. S.

The killing of small birds by boys and young men has for some years been attracting the attention of bird-lovers, but it has seemed impossible to prevent or even restrict the slaughter of the little songsters, especially during the migratory season when they are most numerous. Cheap rifles and shotguns are responsible for much of the destruction as they are now in the hands of ten boys where one possessed them a few years ago. The members of the Club and all who are interested in preserving the birds and their young will learn with pleasure that, acting on representations made to him by a committee of the Club, the Hon. Frank Latchford has offered to appoint a special officer next spring whose duty it will be to see that the law is enforced. He will lay all informations and make the necessary prosecutions, but will in some degree be at the service of the Club's members in that they will be free to direct him to the districts in which the law is being broken. It is hoped that the services of this officer, aided by the activity of some of the Club's members, will do much to stop the killing of small birds and the destruction of their eggs, a scarcely less reprehensible pursuit.

NATURE STUDY—No. X.

MINERALOGY AND GEOLOGY IN SCHOOLS.

LORAN A. DEWOLFE, M.Sc.,
Teacher of Science, North Sydney Academy, N.S.

All earnest teachers will agree that Mineralogy and Geology should be taught in schools, but many feel their incompetence to teach it. To my fellow-teachers, however, I can say that ignorance of the subject need not hinder their attempting it. If you study a few rocks, and then teach what you have learned, the hearty co-operation of your pupils will aid you to surmount all difficulties. I hope to give you a few suggestions without giving material that can be found in any common text book. Supply yourself with an elementary text book, learn the general principles of geology, and start your class by giving oral lessons on what you have learned. Do not give them book facts. Take them to the brook or the beach where the bed-rock crops out in ledges or cliffs. Is it stratified or unstratified? Study its texture, hardness, durability, color, position—in fact everything you or your class can notice about it. How did it get into the position in which you now find it? What is its dip? When you learn these facts from your text book or from some friend, give them to your children, both by questioning and telling, and then request them to study some other ledge themselves and report their discoveries.

Besides the outdoor work in geology, study hand specimens of rocks and minerals in the schoolroom. After the first lesson, you will have no difficulty in securing specimens, for every pupil will bring in stones and pebbles to be named. If you cannot name them, you can study them and watch for a chance to learn the name later on.

I should begin this study with granite, both because it is common nearly everywhere, and because the origin of other rocks can be traced back to it. Give each child pieces of granite of different colors, and pieces of quartz, felspar and mica. On studying the lustre, fracture, cleavage, hardness, etc., of these specimens, the pupils will discover that the granite consists of different minerals, each resembling one of the other pieces given —quartz, felspar and mica. Are all three of these present in

every piece of granite? Which mineral gives granite its prevailing color? When a rock is studied, I should give talks on its uses. The child will look at the next granite tombstone or wall, to see if it is the kind he had in school. He will endeavor to learn something of the methods of quarrying, cutting and polishing—in fact will take an interest in one phase of industrial life that he had not thought of before.

The use of granite as a building stone suggests marble and sandstone, which are used for similar purposes. Let us study their properties, and then their origin. Is marble harder or softer than granite? Would it be more easily cut? How is it affected by dilute acids? There are certain acids in small quantities always present in the air. Decaying vegetable matter gives off *humus* acids, which, in presence of moisture, attack marble. This may be seen in old tombstones overgrown with vines, where the lettering is partly or wholly obliterated. Is marble, then, so durable as granite? In manufacturing cities, more acid is thrown into the air than is normally present. Would it be advisable to use marble for building purposes in such cities? Would granite be better? Would sandstone have any advantages over either? Is it easily affected by acids? Is it cheaper or more easily worked than granite? Fine-grained sandstone is better than coarse-grained, for it will not absorb so much water, which would cause chipping in the winter. Iron pyrites is injurious to sandstone, for, by weathering, it stains the stone and leaves it porous.

Now, for the origin of these stones, we shall return to granite again, and, in learning these two, we shall incidentally learn a few others. Granite, on weathering, breaks up into fragments of quartz and feldspar. The former grinds to sand, and the latter to clay. Since the clay is more finely divided, water will separate it from sand. These are washed into the sea in different layers; finally, by pressure and cementing material, the sand becomes compressed into sandstone and the clay into shale. Through further influence of heat and pressure, the sandstone becomes quartzite, and the shale, slate. These few facts can be elaborated by the up-to-date teacher, who will probably know where beds of some of these rocks are visible. Their dip will be explained in teaching the immediate origin of granite and other eruptive rocks.

Besides these mechanical changes of granite constituents, chemical changes also take place. Felspar contains, among other things, sodium, calcium and potassium. These dissolved out furnish the salts of the ocean. The sodium furnishes the common salt, which under favorable conditions is laid down as beds of rock salt. Teach this in connection with salt mines and salt springs of the geography lesson. The calcium, united with carbonic acid, gives limestone, which in solution is washed into the sea, where sea animals use it to make their shells. These animals die, and the shells collect on the sea bottom as ooze, shell-limestone, etc., according to the kind of animal. This shell mass may re-dissolve and be re-deposited as crystalline limestone cemented by its own material. Under right conditions of heat and pressure, marble is one of the forms of limestone thus originated.

You should now have in your school collection all the rocks and minerals above named—granite, sandstone, quartzite, shale, slate, marble, coral, shell limestone, compact limestone, as well as dolomite and gypsum, which are naturally studied with limestone. Samples of sand and clay of different textures, with the rocks they came from, are necessary to teach the origin of soil.

It would be advisable, too, to make a mineral map of your province by taking a large table, marking off an outline map of the province, and covering it with rocks distributed as they are in the province itself. Mountains should be piled up with their proper rocks. Place a piece of iron ore for each iron mine, but do not place, say, hematite where limonite is mined. Indicate the locality of other minerals, mines and quarries in the same way. A glance at such a map gives the child a good understanding of the mineral wealth of his province, the association of minerals, the reason for location of centres of industry, and a knowledge of the farming lands, for the soil depends largely on the kind of rocks and their durability. On such a map do gold and coal occur in similar rocks? What about coal and limestone? What are the associate rocks of coal? Ask similar questions with reference to other minerals. The boy has learned now that rocks break up to form soils. Does he find in the field or the river-bed rocks different from those of the surrounding country? How did

they get there? Perhaps from their nature it could be guessed where they probably came from, but what about the means of transportation? Here is a chance for lessons on glaciers. Show the children the parallel striation marks on exposed surfaces of bed rock. Are they equally well preserved on different kinds of rock? Compare their direction with that of lakes, hills and valleys, both in your neighborhood and on the map of Eastern North America. If the child can be shown that all harbors and river valleys have probably been gouged out by glaciers, he will know that the gouged out material had to go somewhere,—and the mystery of the gravel hills and drift boulders is, in part at least, solved. The melting of glacial ice, and its southern boundary, are very well shown in the mass of stones and gravel beaches off the New England coast, and in the comparative absence of deep harbors south of Chesapeake Bay.

Innumerable questions arise both to the teacher and the pupil, all of which furnish valuable subjects for lessons. Trace such changes as a pond filling to a swamp, a bog, and finally to a level field. This explains the formation of peat and coal. In Carboniferous rocks, fossils of vertical trees show proof of such filling. Diatomaceous earth (Tripolite), so much used for polishing powder, making dynamite, naturally suggests itself here. So does petrified wood. The next time your children walk across a bog they will have more than mischief to occupy their minds, for you have taught them to read the interesting book of Nature, whose stories have always something new.

Lack of space compels me to leave the subject here. I should like to go into the details of cave formation, growth of stalactites and stalagmites, and call attention to the varied scenery of limestone and gypsum countries. Extremely interesting to the boy, too, would be the manufacture and uses of the common metals. In connection with mineralogy, one could teach such things as the coloring of glass, the glazing of porcelain, the hardening of steel, the manufacture of paints, the making of fireworks, the making of bricks, and scores of other equally instructive facts. The flame tests and bead tests illustrate many of these points.

The teacher who will undertake this work, will find it a pleasant diversion from the more ordinary schoolroom routine. The students will search everywhere for specimens and those on the sea coast will find on ballast heaps some foreign rocks which will be useful for exchanging with teachers of neighboring districts, and in a short time the schoolroom will be adorned with a beautiful and instructive mineral collection.

[The above is an abridgment of a series of papers now being written in The Educational Review, St. John, N.B.]

THE OTTAWA FIELD-NATURALISTS' CLUB, 1903-1904.

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