

MARCH, 1904.

VOL. XVIII, No. 12

THE
OTTAWA
NATURALIST.

Published by the Ottawa Field-Naturalists' Club.

CONTENTS.

	PAGE
1. Some Canadian Antennarias.—I., by Edw. L. Greene....	201
2. The Horned Lark	203
3. A Night's Collecting for Moths at Meech Lake, Que., by Arthur Gibson	204
4. Celebration of the Twenty-fifth Anniversary of the Founding of The Ottawa Field-Naturalists' Club	207
5. Soirées	209
6. Meetings of Botanical Branch	213
7. Meetings of Entomological Branch	216
8. Nature Study—No. 11	221
9. Index	226

(ISSUED MARCH 4, 1904.)

OTTAWA, CANADA.
OTTAWA PRINTING COMPANY (LIMITED).
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THE OTTAWA NATURALIST.

VOL. XVII.

OTTAWA, MARCH, 1904.

No. 12

SOME CANADIAN ANTENNARIAS.—I.

By EDW. L. GREENE.

Several good species not yet described occur in that fine collection of plants which Mr. James M. Macoun brought from the Chilliwack Valley, British Columbia, in the year 1901. Excellent specimens were communicated to me two years since for determination; and I have too long deferred that critical study of them, some of the results of which are subjoined.

A. STEXOLEPIS. Stems of pistillate plant slender, a foot high or more: basal leaves small for the plant, about 1 inch long, narrowly cuneate-obovate or -oblanceolate, acutish, scarcely mucronate, appressed-silky on both faces, most densely so beneath, the indument of the upper face less permanent, commonly lying in rolls in the old age of the leaf; cauline leaves linear and oblong-linear, very acute, erect, an inch long and just equalling the internodes: heads about 8 or 10, large, turbinate, long-pedicelled, forming a very lax cyme; pedicels woolly but not in the least glandular or viscid; base of involucre only very scantily woolly, the narrowly linear bracts only slightly scarious-tipped but the tips acute.

Chilliwack Valley, at 2,000 ft., 30 June, 1901, J. M. Macoun; Geol. Surv. No. 26,187. This has the habit of the rather rare Oregonian *A. pedicellata*, but as to characters of involucre it is very different. The pedicels also, in *V. pedicellata*, are glandular and very viscid, of which peculiarity there is not the faintest trace in the Chilliwack plant.

A. CALLILEPIS. Of nearly the size, and quite the slenderness of the last, the basal leaves larger by one-third and tapering to

almost a petiole, green and nearly glabrous above, this face quite glabrous in age; cauline leaves spreading: cyme of 8 to 12 heads rather compact, the short slender pedicels less woolly, greenish and viscid: heads subcampanulate, much imbricated, the outermost bracts oval, the next longer but very obtuse, only the inner lance-linear, not even these very distinctly scarious-tipped, nor even the outermost notably woolly, all of a satiny light-greenish hue.

Chilliwack Valley, at 3,500 ft., 8 Aug., 1901, by Mr. Macoun, No. 26,186. Remarkable for the greenish and glossy involucre, more like those of certain *Gnaphaliums* than of any other *Antennaria*.

A. ACUMINATA. Obviously suffrutescent, but the ascending woody and naked basal branches slender and not rigid; flowering branches 9 to 12 inches high and slender; stolons also slender, long and sparsely leafy, their leaves about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long, narrowly spatulate, very acute, thinnish, finely but not very deasely appressed-silky on both faces; cauline leaves an inch long, erect or ascending, broad at the sessile base, but slenderly acuminate, the almost caudate tips twisted: cymes rather compact, of 6 to 12 heads; involucre greenish and lightly woolly at base, the outer and hardly scarious-tipped bracts oblong, obtuse, the next series more elongated and with broad acutish tips, the innermost series linear and acute, the scarious tips of all these deep pink and slightly incised: male plant not seen.

At 4,000 ft. in the Chilliwack Valley, 8 Aug., 1901, Mr. Macoun; No. 26,179. Only the pink involucre recall the common *A. rosea*, the long soft foliage loosely clothing the stolons, and especially the slenderly and subcaudately acuminate stem leaves mark it as very distinct. No. 26,181 of the same collection, from an altitude of 5,000 ft., I refer here, though it is a smaller plant, and at a younger stage of development, and with involucre that show but a tinge of pink. Again, No. 26,209, also from 5,000 ft., and too young, has almost rose-red bracts. All these plants show old foliage perfectly glabrous above, which is very foreign to the character of *A. rosea*.

According to a collection made in southwestern Ontario, in 1901, by Prof. John Macoun, the following species occur there :

A. NEODIOICA, Greene, Pitt. iii, 184. This was obtained on Cedar Creek near Leamington, 3 June, in good condition, but only the pistillate plant. I have seen no specimens before from any point so far westward.

A. MESOCHORA, Greene, Pitt. v, 111. The type specimens of this western-midland species being from southern Michigan, and the plant being common over quite an extensive range, it was to have been expected from western Ontario lying so closely adjacent to southern Michigan; and Mr. Macoun's numbers 26,198 and 26,19, represent well this species, the former being from Point Edward on Lake Huron, the latter near Leamington on Lake Erie.

Washington, D.C., Feby, 1904.

THE HORNED LARK.
(*Octocoris alpestris pratincola.*)

The horned lark has arrived this year, in spite of the cold and depth of snow, about its usual time in North Frontenac. Yesterday (Feb. 26th) I saw a small flock of six on the road.

Last year (1903) I first observed it on February 11th, five; and the nest with young birds on April 20th, just hatched.

In 1902, on March 4th; and the nest with young, just hatched, on April 17th.

There has been a large migration of pine grosbeaks this winter; I have seen many flocks. They came early; I first saw them on November 4th.

C. J. Y

A NIGHT'S COLLECTING FOR MOTHS AT MEECH
LAKE, QUE.*

ARTHUR GIBSON.

On the invitation of Mr. C. H. Young, I paid a visit to the above charming place on the evening of the 14th of August last. Leaving Ottawa on the evening train I was met at Chelsea by Mr. Young, and after a lovely drive of half an hour or so, we reached his cottage on the west shore of Meech Lake. As it was my first visit to this delightful, uncrowded, summer resort, I enjoyed the outing immensely and only regretted that I could not spare the time to stay longer.

After we had attended to the inner man, we immediately began to arrange our poison bottles and other collecting apparatus. This done, we started out to "sugar" a number of trees, which had already been used by Mr. Young for that purpose. The term "sugar" has a special entomological meaning; the "sugar" itself is a mixture of molasses and sour beer, which is smeared on to the trunks of trees, fence posts, etc., at dusk, for the purpose of attracting moths belonging chiefly to the family Noctuidæ. Some collectors thin the molasses by adding a small quantity of rum or brandy, but the sour beer is just as good, and is cheaper. This method of collecting moths will be found to give the best results on warm, moist, cloudy nights. As soon as we had sugared about thirty trees, and placed our poison bottles in convenient pockets, we started out on the first round. When two are sugaring it is always best for one to hold the dark lantern, while the other does the bottling, or catching. Care must be taken not to direct the light too strongly, or too suddenly, upon the tree bearing the mixture; if this is done many of the moths will be frightened away. It is also well to have several good poison bottles on hand, to be used alternately after four or five specimens have been caught.

On completing our first round, we emptied our catch into a large poison bottle and were then ready to make the trip again. After having gone the rounds about five times and deposited our

* Read at meeting of Entomological Branch, 19 January, 1903.

specimens in a safe place, we fixed up a large acetylene lamp, which we use specially for attracting night-flying moths, and proceeded up the lake about half a mile from Mr. Young's cottage. Having reached our destination, an unoccupied cottage on the slope of the mountain, we placed the lamp on the southern edge of the verandah, so that the rays would illuminate the front portion of the house. The reason this cottage was decided upon was because it had been painted white, and with the light from the lamp directly along the front of the verandah from which it was reflected, much greater attraction was thus extended to insects flying in the immediate vicinity. During good evenings we have collected large numbers of specimens by this method. On the night in question we netted some very acceptable things in the couple of hours spent at this pleasant work.

There is no doubt, however, that sugaring is the most productive way to collect moths. If one wants large numbers of specimens there is no reason why, in a good season, several hundred specimens could not be taken during any favorable evening. On the other hand, however, all night-flying moths will not come to sugar, but many of these may be attracted by lights. Around cities and towns, particularly in the outskirts, the electric light furnishes a splendid hunting ground for many species which one never meets with at sugar. Noctuid moths of many kinds frequent flowers in early evening attracted by the rich nectar, and while there is still natural light, specimens may be captured quite easily.

As to the specimens collected at sugar, *Noctua normaniana*, Grt., and *Trigonophora periculosa*, Gn., with its variety *v-brunneum*, Grt., were extremely plentiful and in perfect condition. Luckily, I had previously never met with either of these species at all commonly, so I took a good series of each. Some of the other very common noctuids were *Hadena dubitans*, Walk., *Feltia subgothica*, Haw., and *Noctua smithii*, Snel. The latter species could have been taken by the hundred. Every now and then one of the large *Catocala* moths would be seen eagerly sipping up the sugar. All the moths of this genus are beautiful creatures, the larger species being particularly striking in appearance. As many as six different kinds of these attractive insects were flying, viz., *Catocala*

briseis, Edw., *unijuga*, Walk., *concupens*, Walk., *cerogama*, Gn., *ultronia*, Hbn., and *ilia*, Cram. The latter is a new record for the Ottawa district. Only one specimen was seen and this was collected by Mr. Young. Among the more interesting species taken at sugar mention may be made of *Rhynchagrotis alternata*, Grt., *Mamestra vicini*, Grt., *Ulolonche modesta*, Morr., *Noctua rubifera*, Grt., *Ipomorpha pleonectusa*, Grt., *Caradina multifer*, Walk., and *Tricholita signata*, Walk. At light we netted a few nice examples of *Arctia caia*, L., var. *americana*, Harr., *Apantesis perthenice*, Kirby, *Autographa selecta*, Walk., *Achatodes zeae*, Harr., *Euerettagrotis perattenta*, Grt., some interesting varieties of *Mamestra olivacea*, Harr., as well as several other acceptable species, including some uncommon geometers. *Polystachotes punctatus*, Fab., a well known neuropterous insect, was fairly plentiful.

The following morning we pinned our captures and I found that my share numbered over 200 specimens, all in good condition. On the afternoon of the 13th we took a tramp up the mountain towards Kingsmere, our object being chiefly to collect larvæ. As the late Dr. Riley said: "The careful entomologist who prides himself on the appearance of his specimens, will rely largely on collecting the early stages and on rearing the insects, for his material." Our chief plan for collecting larvæ was by beating the foliage, holding in one hand a beating net so as to catch any larvæ which might fall. In this way we collected caterpillars of *Schizura ipomæae*, Dbl., *Pyrrhia umbra*, Hufn., *Automeris io*, Fab. (from basswood), *Heterocampa manteo*, Dbl., *Autographa biloba*, Steph., etc. Feeding within the stems of the common dock, *Rumex occidentalis*, S. Wats., we found nearly full grown larvæ of *Papaipema cerussata*, G. & R., the mature insect of which is a very beautiful moth of a rich brown color with purplish and reddish areas and conspicuous whitish spots on the fore-wings. An interesting form of this species, which lacked the white spots on the primaries, was reared by Mr. Young.

The Raspberry Clearwing, *Bembecia marginata*, Harr., seemed to be very plentiful, as I secured, from different plants, six specimens within half an hour. These little wasp-like moths delight in exposing themselves to the full heat of the sun, being

found resting on the upper surface of the leaves. The larvæ are often very destructive, and as little can be done to prevent the damage, canes infested invariably die.

Meech Lake is a most interesting locality from an entomological standpoint. Mr. Young during his two summer's sojourn there, has collected many insects new to the Ottawa district. Doubtless others also will find the place a most profitable one to explore.

CELEBRATION OF THE TWENTY-FIFTH ANNIVERSARY
OF THE FOUNDING OF THE OTTAWA FIELD-
NATURALISTS' CLUB.

(Ottawa Field-Naturalists' Club founded March 22nd, 1879.)

The first of this year's soirées was held in the Normal School Hall on December 15th, 1903. In place of the usual conversation it was thought best to celebrate at that time the 25th anniversary of the organization of the Club, and to bring together as many of the original members as possible. A very enjoyable time was spent at this meeting in recalling interesting facts relating to the early years of the Club.

The Principal of the Normal School, Mr. J. F. White, gave an address of welcome, in which he spoke of his appreciation of the work the Club was doing and of the assistance being rendered to students of the Normal School by its members. The President's address, which was published in the February number of *THE NATURALIST*, followed, after which five members of the original Council of the Club made short addresses. The first President of the Club, Lieut.-Col. W. White, C.M.G., spoke on "The Study of Natural History at Ottawa before the formation of the Club." The following is part of what he said: "When, in 1865, the seat of government was transferred from Quebec to Ottawa those of us who had been members of the Natural History Society of Quebec were most agreeably surprised to find that in the new Capital there was not only a Mechanics' Institute, with the nucleus of a museum, but also a Natural History Society in good working order with a number of very active members, amongst whom may be mentioned Dr., now Sir James Grant, Professor Webster, the Rev. T. D. Phillips, Dr. Van Courtlandt, Mr. James

Ogilvy, Mr. Rowan and Dr. McGillivray, and in those days activity was very active." Among the expeditions participated in by Col. White were a visit to the cave at Pelissier's, a visit to East Templeton to inspect plumbago and a tramp through the mica districts in the Gatineau hills.

Mr. R. B. Whyte's subject was "Botanical conditions around Ottawa twenty-five years ago." He said that there had been great changes in the collecting grounds during that period. Houses were now standing where good botanizing grounds used to be. Twenty-five years ago there was a small bog in the woods in the neighborhood of Beechwood cemetery in which he found *Cypripedium spectabile*, *Sarracenia purpurea* and *Ledum latifolium*, plants which have long disappeared from that vicinity. The pitcher plant was also found at that time near the old race course along the Bank street road.

Dr. Fletcher spoke of "Ottawa as a Natural History locality twenty-five years ago." He mentioned the old localities where the rarer specimens used to be collected, and said that the rapid growth of the city had destroyed some of the best of these. He stated that there was abundant opportunity for doing good work still, and good localities within easy reach of the city. He referred to the great aid the Geological Survey staff had been to the study of Natural History in the Ottawa district.

Lieut.-Col. Anderson's address related to "The workers in Natural History at Ottawa twenty-five years ago." He said that Dr. James Fletcher had most to do in suggesting and organizing the Ottawa Field-Naturalists' Club, and had been one of the most energetic workers from the beginning. Others who did good work in the early years were Mr. W. H. Harrington, Mr. R. B. Whyte, Dr. H. B. Small, Mr. Walter Billings, Hon. Frank Latchford and Mr. W. L. Scott.

Dr. H. B. Small, in speaking of "What the Ottawa Field-Naturalists' Club had accomplished," gave incidents of the early years of the Club. He brought with him dried specimens of plants collected twenty-five years ago, and said that each plant recalled the place where it had been obtained and other incidents connected with it, and took him back to the time when he was actively engaged in work for the Club. He considered that the Club had

done splendid work in studying the Natural History of the district. The results of the labors of the members were contained in the printed transactions of the Club and the volumes of THE OTTAWA NATURALIST. The Club had, during the past twenty-five years, given thousands of Ottawa's citizens pleasant outings in the country, where those who loved Nature had splendid opportunities for study.

Short speeches were also made by Dr. Robert Bell, the Director of the Geological Survey, and Prof. J. Macoun. A vote of thanks was proposed by Mr. W. H. Harrington and seconded by Mr. James Ballantyne.

W. T. M.

SOIRÉES.

At the meeting of the Club held in the Normal School January 5th, the Rev. C. Eifrig lectured on "The Differences and Correspondences between the Avi-fauna of Ottawa and the Maryland Alleghanies." The speaker endeavored to show that, although the region under discussion is six to seven hundred miles south of Ottawa, there are not only marked differences in the status of the ornithology of Ottawa and the Maryland Alleghanies, but also many and surprising correspondences. This production of suitable conditions for birds, as well as plants, of otherwise widely distant regions, is brought about by the great differences in altitude in that section. And while it is well known that among the high peaks of the Rocky Mountains all the different conditions and areas of floral and faunal life, from the tropic to the arctic, may be found close together, it seems surprising that somewhat similar conditions should exist in the much lesser altitudes of the Appalachian Mountains. The valleys in the westernmost part of Maryland, which are crossed by the Alleghanies, are from 500 to 1,000 feet above tidewater and are in the Carolinian life zone. This is where the differences between here and there come in. The Carolinian belt of the Austral or southern life zone is characterized by such birds as the cardinal (*Cardinalis cardinalis*), tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Parus carolinensis*) and

others being permanent residents there. The bluebird (*Sialia sialis*) also is found there all winter. Higher up, in an altitude of from 1,500 to 2,500 feet, especially on the northern slopes of mountains, we find the animals and plants of the higher and lower transition belts of the Austral life zone, characterized by an overlapping of northern and southern species. In the highest elevations in that section, along the backs of the highest mountains, notably in the primeval hemlock and spruce stands and in the sphagnum and cranberry swamps, in an altitude of from 2,500 to 3,400 feet, the highest attained in this section, we find many Canadian and boreal species of both fauna and flora. This is where the correspondences between here and there comes in. Of Canadian mammals, *e.g.*, we find there the Canadian white-footed mouse (*Peromyscus canadensis*), redbacked mouse (*Ecotomys gapperi*), jerboa (*Zapus hudsonius*), varying hare (*Lepus americanus* v.) etc., found only in these boreal islands. Of Canadian birds we find breeding there the Canadian warbler (*Wilsonia canadensis*), the magnolia warbler (*Dendroica maculosa*), redbreasted nuthatch (*Sitta canadensis*), hermit thrush (*Hylocichla guttata pallasii*), solitary vireo (*V. solitarius*), raven (*Corvus corax principalis*), etc. The plants showing that here Canadian conditions of climate, etc., must exist are, *e.g.*, black spruce (*Picea mariana*), tamarac (*Larix americana*), yew (*Taxus minor*), moose-wood (*Dirca palustris*), cranberry (*Vaccinium macrocarpon*) and many others. Altogether this is a very beautiful and extremely interesting part of North America.

Before an attentive and appreciative audience of Field-Naturalists and their friends, in the Normal School, on the evening of the 9th February, Mr. Frank T. Shutt, M.A., Chemist of the Dominion Experimental Farms, gave a lecture on sap and sap movement, which was academic both as to substance and form. The display of charts, used to make clear difficult points, reminded one of University halls.

After explaining that the term "circulation" was inappropriate as applied to sap movement, the lecturer described the various anatomical structures through which the movement took

place, viz., the root-hairs, where the water enters; the deeper tissues, the fibro-vascular bundles of root and stem, through which the water ascends; the veins of the leaf, along which it proceeds to the intercellular spaces, at the exit of which stand the guard cells of the stomata.

It was pointed out that sap is a dilute solution of food, partly of a mineral nature, taken from the soil, partly of an organic nature, derived from carbonic acid absorbed by the leaves from the atmosphere. The chief mineral constituents are phosphates, silicates and nitrates of potassium and calcium. The chief organic constituents are sugar, soluble proteids and organic acids, with sometimes coloring matters. These are conveyed or carried about in the water, which has the double function of dissolving and distributing this food material. An enormous amount of water takes part in these two processes. Besides the above uses of the water, it is itself food material, and also serves to render the plant turgid, thereby enabling succulent plants to stand erect. The proportion of water in plant tissues is very large, from 40% to 90%, but the amount of water so represented is very small compared with that which passes through the plant or tree and is lost by transportation. For every pound of dry matter stored up in the tissues between 300 and 400 pounds of water pass out into the atmosphere by the stomata.

The causes of the upward movement of sap were next dealt with. The water enters the root-hair from the soil by osmosis. This osmotic action may be experimentally illustrated by placing a strong sugar solution in a glass cylinder (lamp glass), one end of which is covered by a bladder, and suspending the cylinder in water. To eliminate purely hydrostatic action which might produce movement, have the level of water inside the bladder the same as that without. In a short time the level inside rises, showing that, if an interchange is taking place, more water is entering, than escaping from, the bladder. Some sugar makes its way to the outside liquid. Thus, on purely physical grounds, one may see how water enters the root-hairs of plants. Having entered, it filters through to the deeper cells, and, in the case of the higher plants, ascends chiefly by means of the Xylem elements of the fibro-vascular bundles. This ascent is aided by osmotic

attraction due to transpiration at the leaf above, and also by "root-pressure" from below. Mr. Shutt stated that root-pressure was not well understood, that it could not be accounted for on physical grounds alone, and that we must assume that the vital activity of the cell plays an important part in the rise of the sap.

The flow of sap in the maple was then discussed in detail. For many of the facts upon which he based his statements, Mr. Shutt said he was indebted to Bulletin 103 of the Vermont Agricultural Experiment Station, copies of which, to a limited extent, the Director of that Station had kindly placed at his disposal for distribution among the members of the Club. At the Vermont Station it was established that pressure and flow went hand in hand. Pressure is a cause of the flow, but not the sole cause. Cold nights followed by warm days make the ideal sugar weather. Uniform temperatures, whether high or low, do not favor a flow of sap. The higher temperature, following cold nights, seems to excite the protoplasm to activity. The root-hairs absorb water, and since there is no transpiration, as the buds have not opened, the water accumulates in the tree, setting up a high pressure. Pressure is further increased by the expansion of the gases in the tree due to the rise in temperature. Tapping the tree relieves this pressure. The water, in escaping, carries out with it in solution the sugar which was stored from the previous season in the tissues of the sap-wood. The direction of the movement is principally through the Xylem vessels and downward through the phloem elements, but it is also in every direction, more or less, depending upon pressures, and these again chiefly on changing temperatures. In summer the movement is generally upwards.

The lecturer closed his interesting address by pointing out the utility of a knowledge of plant physiology. To instance but one of several illustrations, he gave his studies and experiments on apple twigs, which showed him that the greater the water-content of the twigs the less hardy they were. This being true, it is obviously advantageous to reduce, if possible, the amount of water in the tree, at the close of the summer, to enable it to withstand the severe conditions of a winter season. Cultivation of the soil of an orchard should not, therefore, be continued in the autumn. A "cover" crop, sown in July, withdrew the moisture

from the soil at that season when the wood was ripening and also served other useful purposes.

The stimulating nature of the lecture was shown at the close by a volley of questions from the members present, and a vote of thanks was heartily endorsed by the audience.

D. A. C.

MEETINGS OF BOTANICAL BRANCH.

A meeting of the botanical section was held at the home of Prof. Macoun, December 10th, 1903. The subject of the evening was "Weeds and the causes that lead to their dispersion." Prof. Macoun introduced the subject by remarking that our weeds were "Aliens" and not "Natives," and remarked that on one occasion while showing an eminent English botanist around the city and its suburbs, the visitor remarked that there was a wonderful similarity between Canadian plants and those of England. He was very much surprised when told that all he saw were aliens and he must go to the woods to see the native plants.

Prof. Macoun further developed his subject by showing that Canadian plants, native at Ottawa, were necessarily incapable of occupying our roadsides and cultivated fields, and hence in the struggle for existence in the open they had no chance with the immigrants. Numerous illustrations were brought forward in support of this, then seed dispersion was taken up and a warm and interesting discussion took place, which was joined in by nearly all present. Dr. Guillet brought up the subject of "Sheep Burrs," to illustrate the methods adopted by various species to assist in the dispersion of their seed, and other members supported his views by many apt illustrations which showed that most of the members held his opinions. After a very animated discussion, Prof. Macoun, as chairman of the meeting, said that while admitting the ability of burrs and seeds of like nature to be dispersed by this method, he denied their necessity and disputed their utility. He showed that the sheep burr had not a general distribution, that it was largely a roadside plant, was hardly ever found in fields, and in fact, was very limited in its distribution.

The burdock and "beggar ticks" were of the same character and were also limited in their distribution. As a contrast to this Prof. Macoun mentioned the mustard family as a weed producer and showed that this order had no special means of dispersing its seeds, and yet the worst weeds we had belonged to this family. Another animated discussion took place and the conclusion was reached that the *Cruciferae* produced great numbers of small seeds that could lie in the ground for years, and germinate just when the right conditions existed. It was shown by Mr. Hamilton that seeds of *Polygonum* must have lain in the soil in Montreal for at least 30 years. Earth which had been thrown out when making a drain produced a full crop, although for 30 years it had been covered by a building. Dr. Fletcher mentioned the case of *Thlaspi arvense* in Manitoba, which appears just when it is suited with the conditions and when its chances are poor it disappears.

Many side issues were introduced and discussed, and the general opinion was reached that weeds like the house sparrows had been battling for centuries against all manner of adverse circumstances, and on this account were better able to succeed in the battle of life than our native plants, which never had any trouble to overcome, hence when their environment is disturbed they fade and die and only live in the memory of woodland dreamers. Amongst other subjects discussed was the modes of dispersal of *Nasturtium officinale*, and it was decided that seeds were only secondary in this. This led to talk of other members of the same genus and Dr. Fletcher cited *N. lacustre*, which formed little rosettes in the autumn. Another member mentioned the bladder wort, and explained how the extreme tips of the stems fell into the mud after the first frost and became the new plants the next season. In a few words Prof. Macoun showed that nature never failed in its work, that when the seeds could not ripen they formed buds or bulblets, that the tips of many plants ceased to grow in the late summer and the plant stored up in them concentrated food. These tips sank to the bottom of stream or pond and became the new plant in the spring.

Colds, absence from the town, prior engagements, etc., made the attendance very slim at the meeting of the Botanical section of the Field-Naturalists' Club held at Mr. Guillet's house, 8 First avenue, on the 28th January. Only the following attended: Dr. Blackadar and Messrs. Whyte, Campbell, Attwood and St. Jacques. Mr. Whyte brought a great package of beautifully illustrated works on plants and gardening. From these and a few others Mr. Attwood made a bibliography which will be published in *THE NATURALIST*. The opinion was expressed that popular works on botany are of little use to any earnest student, as they take him but a little way and then leave him to grope as blindly as at the beginning, simply because they are not systematic or comprehensive, but give mere scraps of information. The proper way to learn plants is to get a systematic work on classification, a good handbook such as Gray's or Britton's, and then begin at once to make a herbarium, pressing and classifying one's plants as one learns them. Ten plants clearly mastered in this way are worth a hundred hazily named with the aid of Mrs. Dana's pictures of flowers or Mr. Matthew's pictures of leaves.

Mr. Guillet showed the members two charming works on the natural history of two regions of South America, namely, H. W. Bates' "The Naturalist on the River Amazons," 1863, and W. H. Hudson's "The Naturalist in La Plata," 1895. There are several other excellent works similarly named, viz., Belt's "The Naturalist in Nicaragua," 1874, and W. Saville-Kent's "The Naturalist in Australia," 1897. Darwin's "A Naturalist's Voyage Around the World," 1845, might also be mentioned, as well as Wallace's "The Malay Archipelago," 1868. Who will write a book worthy to rank with these and entitle it "The Naturalist in Canada"? Seton-Thompson might have done it, had he not, like Grant Allan, turned aside to work doubtless more remunerative, but certainly less solid, worthy and permanently interesting.

Before reading his paper, the convener made a few remarks concerning the conduct of such a little club within a club as is the Botanical section. He thought that as far as possible the topics of each meeting should be announced beforehand for the sake especially of the more inexperienced members, who would have a chance to prepare to discuss or at least to listen the more in-

telligently. He also thought it would not be out of place for the section now and again to resolve itself into a seminary for the hearing and criticism of one of the papers in preparation for the public soirées of the Club; that such papers might be made more truly representative of the best the Club had been able to do during the year. The convener then read his paper on "The Relationship between the Weather and Plant-growth," and received several helpful criticisms from the members.

While the members were discussing some Northern Spies from the convener's native county of Northumberland—the finest apple-growing district in the world—he showed them some views illustrating the natural history and other out-of-doors work done by his pupils.

Several interesting botanical and zoological specimens were shown, most of which, on account of the absence of Prof. Macoun and Dr. Fletcher, had to remain unidentified. Mr. Campbell had a pretty mounted specimen of the shed skin of a frog's foot. An hepatica was shown just coming into bloom. Two of Mr. Guillet's pupils have succeeded in getting hepaticas, and one, Spring Beauties to bloom in the house this winter.

On account of the absence of the above-named members, the topic "Protective Color Changes in Animals" was left over for another meeting, as these gentlemen were expected to contribute original observations on the subject, and Mr. Guillet had only the observations of others—especially Pouchet and Biedermann—to offer.

MEETINGS OF ENTOMOLOGICAL BRANCH.

Meeting No. 5 was held on March 12th, 1903, at Mr. Harrington's; eight members present. Dr. Fletcher said that he had forwarded to Mr. Needham a drawing of the dragon-fly nymph-case shown at the previous meeting by Mr. Halkett, and that it proved to be that of *Hagenius brevistylus*, not previously recorded from so far north as Spanish River. Mr. Halkett showed a water-bug (*Corixa* sp.) which had been received with whitefish eggs from Selkirk, Man., and stated he had seen these water-bugs in immense numbers when visiting the hatchery there. Mr. Richard

showed some butterflies, including *Pamphilus manitoba*, from Isle Verte, Que.; *Grapta gracilis*, from Langevin, Que., and *Argynnis cybele*, *A. atlantis* and *A. aphrodite*. Dr. Fletcher pointed out how these species could be distinguished, and discussed their range. Mr. Gibson and Mr. Metcalfe also spoke of the abundance of the last named at Toronto. Dr. Fletcher read a note on *Deilephila galii*, and made some useful observations on incorrect terminations of specific names. He also spoke of the so-called rarity of insects, pointing out that, while there are certain species which seem actually to be rare wherever they occur, the majority of so-called rarities are taken in abundance when what may be called the metropolis of the species has been found. He instanced *Liparocephalus brevipennis* and *Egialites debilis*, beetles of which only a few specimens had been known until Rev. J. H. Keen had taken them abundantly; the first at Masset, Q. C. Islands, and the second at Metlaka'lah, B.C., where he had carefully studied its habits. Mr. Harrington exhibited specimens of *Blastophaga psenes*, a curious little Chalcid wasp which pollinates the Smyrna figs, and read a note on the efforts made by the fig-growers of California to establish this insect in their orchards, so that the quality of their figs might be improved.

Meeting No. 6 was held at Dr. Fletcher's on March 26th, 1903; four members present. Mr. Metcalfe exhibited a fine series of four species of *Argynnis*, and mentioned the great abundance of *A. cybele* at Grimsby upon flowers of Teazle (*Dipsacus*), to which also three species of day hawk-moths were attracted. Dr. Fletcher exhibited, as representatives of the Satyridæ, which had been discussed at a previous meeting, a collection of very fine *Morphos*, and made some remarks on the flight and habits of certain species of these large and brilliant butterflies. He also showed a Denton tablet mount of the magnificent *M. cupris*, and similar mounts of *Gonepteryx mæricula*, *Callidryas lurina*, *Papilio troilus* and *Parnassius apollo*. Mr. Harrington reported on the progress he had made in rearranging his Ottawa coleoptera and showed the last case prepared, containing about 75 species, commencing with *Tricopterygidæ* and ending with *Cucujidæ*, many of the smaller species being yet undetermined. Some discussion followed upon

Coccinellidæ; Mr. Metcalfe instancing the occurrence of *Megilla maculata*, at Grimsby, upon dandelions in such numbers as to give the flowers a pink appearance. Dr. Fletcher said the beetle had been abundant in 1902 upon corn in his garden. He then read a letter from Mr. J. W. Cockle, of Kalso, B.C., enclosing a list of over 600 species of moths collected by him at that point, and including many new and rare species. An interesting paper was received from Mr. Wickham, entitled "The Beetles of an Oregon Sea-beach."

Meeting No. 7 was held at Mr. Harrington's on April 9th, 1903; six members present. Mr. Metcalfe exhibited a box of coleoptera from Grimsby, Toronto and Port Hope, including many interesting species, such as *Carabus sylvosus*, *Notiophilus æneus*, *Hister militaris*, *Ryssodes exaratus*, *Phymatora pulchella*, *Corymbites virens*, etc. Dr. Fletcher read a paper, newly received from Dr. Scudder, on "Hunting for Fossil Insects," the account of a trip to the celebrated Florissant beds. After some discussion of the occurrence of fossil insects in Canada, and on some of the insects which had been already noted this spring, Dr. Fletcher gave, incidentally, the description of a visit to a heronry in the Moose Mts., Man., the herons being locally known as fish-ducks. The question was considered of special lines of work for the collecting season and the members selected as follows: Halkett, aquatic insects; Gibson, basswood insects and arctians; Metcalfe, hemiptera; Richard, butterflies; Harrington, spruce insects and sawflies; Fletcher, Geometridæ, Plusiidæ and dragon-flies, with special attention to the life-histories of insects. Mr. Harrington showed 65 species of insects which he had obtained from a little moss collected in the swamp on the Experimental Farm near the canal.

Meeting No. 8 was held at Mr. Halkett's on April 23rd, 1903; six members present. Mr. Gibson and Mr. Halkett exhibited insects taken at the Club excursion to Blueberry Point, Aylmer, on the previous Saturday; among these were *Cychnus lecontei* and *Aphorista vittata*. Mr. Halkett also spoke of the mosquito larvæ he had there collected. Mr. Richard showed some beetles recently captured, including three specimens of an undetermined elater.

The species had been taken at the same locality near Rockcliffe by Mr. Harrington in April, 1883. Mr. Gibson read a paper on "Hunting for Caterpillars," describing their hiding places and traps that can be placed for them. Dr. Fletcher exhibited root-galls, from a Japanese rose in his garden, produced by *Tribalia rufigaster*. The galls had been so abundant as to seriously injure the bushes. Our native roses are also subject to the same infestation. Mr. Harrington mentioned that he had sent similar galls some years ago to Mr. Ashmead, who had expressed his pleasure at ascertaining the food-plant of this gall-fly. Dr. Fletcher read an article by Capt. Brown of Auckland, N. Z., on "The Wharf Borer," which had caused serious loss in Auckland by the depredations of the larvæ in paving blocks and wharf timbers. The insect in question, *Nacerdes melanura*, has been found in Ottawa, but is more abundant in seaports. Mr. Harrington showed a series taken by Prof. Macoun on Sable Island, and also examples of all the other CEdemeridæ known to occur in Canada.

Meeting No. 9 was held at Dr. Fletcher's on May 7th, 1903; eight members present. Mr. Harrington showed some beetles, including *Anisodactylus sericeus*, new to Ottawa and not on the lists of the Ontario Entomological Society, and a *Platynus* taken at Aylmer and apparently not previously found at Ottawa. Mr. Metcalfe exhibited specimens of *Emphytus cinctus*, a rose-saw-fly, which he had found common in Mr. Scrim's rosehouses on April 26th. Dr. Fletcher spoke on a fine series of the hitherto very rare beetle *Ægialites debelis* received from Rev. J. H. Keen of Metlakatlah, B.C. Mr. Metcalfe exhibited beetles and hemiptera recently captured, including *Eurymycter fasciatus*, *Mysia pullata*, *Donacia equalis*, etc. Mr. Halkett showed a living larva of *Hydrophilus triangularis* and pupæ and imago of mosquito from larvæ collected at Aylmer excursion. Dr. Fletcher showed *Orthesia insignis*, or white-fly, from greenhouses; also *Bruchus rufimanus*, the bean-weevil, and explained the difference in habits of this species and of *B. pisi*, the pea-weevil. The latter lives singly in the peas and does not attack the dry or stored seeds, while the former attacks dried beans and several may infest one bean, and it also infests seeds of tares. The larvæ of the pea-moth attack the

seeds externally, being thus easily recognized. Mr. W. T. Macoun showed specimens of the pea-weevil from peas grown on the Experimental Farm, and said only one variety appeared to be attacked. Dr. Fletcher exhibited eggs of the rare moth *Apocheima rachelæ*, and a male imago. The female he said was wingless. He showed, also, examples of a rare moth (*Leucobrephe*) which had been taken by Mr. Hanham and Mr. Criddle. He suggested *Colias philodice* as a desirable species for any person wishing to make a start at breeding lepidoptera; the food-plant, clover, being easily obtained and the butterfly passing through all its stages within a month. Mr. Gibson showed several species of lepidoptera.

Meeting No. 10 was held at Mr. Harrington's on June 10th, 1903; seven present. Mr. Gibson showed a female of *Hypantria textor* mounted as in the act of ovipositing, with egg-mass on leaf; also examples of *Phragmetobia rubicosa* bred from larvæ exhibited at meeting No. 8. Dr. Fletcher made the following exhibits: *Lixus concavus* from Harrietsville, Ont., in which district the beetle has been found boring in the stalks of rhubarb; *Apocheima rachelæ*, male, female and inflated larva; blackberry canes, covered with and killed by, the scale-insect, *Lecanium Fitchii*, whose habits were outlined; three species of horse-flies (*Tabanus*). He mentioned that, at the sub-excursion on the previous Saturday to Leamy's Lake, *Podisus modestus* had been observed feeding upon canker-worms, which were abundant, and that the beetles of *Hoplia trifasciata* were numerous on viburnums of two species. Mr. Metcalfe showed three boxes of hemiptera recently collected and including, apparently, some forms not before observed from Ottawa. Mr. Richard exhibited some lepidoptera, among which were *Platypteryx arcuata*, *Nisoniades juvenalis*, and *N. icelus*. Mr. Halkett showed a wasp's paper nest, and nymphs of some species of dragon-flies. Mr. Harrington showed several of the large pear-shaped cocoons of the spider *Argiope riparia*, which had been found in the tops of spiræa in the Beaver Meadow at Hull. He also showed two boxes, chiefly hymenoptera, diptera and coleoptera, collected recently, and pointed out several species which appeared to be new to our collections. Among these was a handsome Chrysops, the flies of which genus are very aggressive and are generally known as deer-flies. An interesting beetle was a female *Monohammus scutellatus*, a species of pine-borer, having an extra front leg.

NATURE STUDY—No. XI.

NATURE STUDY AND RURAL EDUCATION.

J. W. HOTSON, M.A., Principal, Macdonald Consolidated School,
Guelph, Ont.

Few things are of more vital importance in moulding the destiny of a nation than the system of education in its rural districts. The most progressive nations of to-day have recognized this fact, and are making strenuous efforts to raise the standard of efficiency in rural education. Canadians, perhaps, more than any others, should not be slow in recognizing the importance of this phase of education, or in availing themselves of improvement in it. The geographical position, the climate, the vast prairies of the West, make Canada's greatest industry essentially agricultural. Nearly seventy-five per cent. of her population live in the country and are educated in rural schools. The greatness, the stability, the very backbone of this nation is its rural population. More than ever before, the future of this country depends upon its public schools. Since this is true, how important it is that the education of the rising generation of this great nation should be carefully and jealously guarded! I have great faith in the rural school, in its power to mould and build up a national character; but new educational methods must be employed before we can hope for the best results.

The public school system of to-day is a product of the university. "The greatest achievement of modern education," says Payne, "is the gradation and correlation of schools whereby the ladder of learning is let down from the university to the secondary schools and from there to the schools of the people." If this be true, it is no wonder that the present system of education has failed to produce the best results in the lives of the boys and girls of the country. Our educational system tends to lead to professions rather than to the farm. City things have been taught rather than country things, and, by ignoring the farm and the farm home, our greatest industry, farming, and our best institution, the farm home, have been discredited. Our modest farm homes stand as our greatest bulwark. Guard them!

If education is a preparation for real life, and I believe it

should be, and seventy-five per cent. of our population are in the rural districts, depending directly on the soil and its products, and if we believe in the principle of "the greatest good to the greatest number," then, rural education should be a preparation, at least in some degree, for life on the farm. It should lead the child into a more sympathetic relation to his daily life "to the end that his life may be stronger and more resourceful." This does not mean that these schools should teach only the art of cultivating the soil. Rural education should be broadened not narrowed. It cannot be broadened by teaching agriculture only; boys and girls must have a knowledge of language, history, mathematics, etc. Language is a mind tool; the hoe a hand tool. Training in the use of either may be education; but, for best results, they must go together.

In order to develop the trained hand and cultivated mind, more emphasis should be laid on the method of acquiring the information than on the information itself. Mere facts, however important, are not all of education—they are of secondary consideration. How the child acquires those facts, is of vastly more consequence from a pedagogical point of view. The pupil should, as far as possible, be led to rely upon his own resources. He should be led to investigate problems for himself and thus acquire his knowledge first hand. It is the thinking man, "the reasoning and the reasonable man," that makes "the good citizen and the honest neighbor"; so it is the child that is taught to see things as they really are, and to think for himself regarding the things he sees, and is thus led to draw correct conclusions from what he sees, that makes "the reasoning and the reasonable man," "the good citizen and the honest neighbor." In training the eye to see, the ear to hear, and the mind to perceive, we have done much to aid the child in understanding the more complex things in real life. It may not be true "that only those things are useful which one finds out for himself," but no one will deny that from the ideal as well as from the economic point of view of education, those things are of most use which one finds out for himself. But the world is too wide and life too short to turn a child out by himself and expect him to come, unaided, to even a fair understanding of the mysteries of nature; yet, give him a wise and careful instructor, and he may be led to see how nature solves her problems and thus be better prepared to solve those problems of life which confront everybody, and which each individual must solve for himself.

Is all being done that can be done to improve rural educa-

tion? I fear not. It is certainly gratifying to know that the educational authorities in most of the provinces have recognized the necessity of doing something to improve it. Never before in the history of Canada have the prospects looked so bright for an honest effort on the part of the best educators to solve this problem. The solution lies, it seems to me, in the proper presentation of Nature Study, or rather that phase of Nature Study that will tend towards agriculture. This can be presented to the best advantage by establishing a school garden in connection with each school. Nature Study and the School Garden are inseparable if we wish the best results. This does not mean that technical agriculture is to be taught, far from it. Nothing would be more disastrous to the cause of rural education than to attempt to teach technical agriculture or technical science in the public school. We have agricultural colleges and high schools for that purpose. Nature Study in our public schools would interest the children in the common every-day things about them; in things they have been seeing all their lives, yet not perceiving; in the songs of birds and insects they have been hearing, yet not appreciating. They would find themselves in a new world, or rather in their old world made new, by a living, loving sympathy and interest in everything about them. Their eyes would be trained to observe, their ears to hear, and their minds to seek the truth for the truth's sake, and in seeing, in hearing, and in seeking for truth, they would be trained to draw right conclusions from what they see and hear.

During the first five or six years of a child's existence he has created for himself a little world. He has attempted to solve many knotty problems. In fact, he has been on a tour of original research, as truly as the best investigator along the line of science, and no one will deny that in many cases he has been more original. He has started out along the right line to make himself "the good citizen and the honest neighbor," and to acquire those things that go to make up a "successful life." Why not continue these experiences in the school? Why not begin to build on what he already knows, rather than thrust him, as is too frequently the case, into a new and strange world—the school—a world in which he searches in vain to find something to link with his past? Alas! he finds himself as totally amidst new surroundings as if he had been suddenly set down in a foreign land. There is nothing in the school life that he can associate with his own little world—his past experiences. He has, as it were, to start life again and create another world totally different from the first. There is little wonder that teachers find such great difficulty with their primary classes, with the beginners in this new life.

Let me make an appeal for more natural teaching in our rural schools—teaching that will look to the pleasure and comfort of the child, and also that will tend to prepare him for the life he is to live. This can be done best, as already stated, by the proper use of Nature Study and the School Garden.

If, then, the rural school is to fulfil its mission to the community, as the handmaid of agriculture, it must be a school adapted to the needs of the community. *It must be an adaptation of education to need.* Whose needs? The farmer's. To meet these he must have the advantage of the best schools; and the best schools for him are those which teach him the things that he needs to know. What does he need to know? What are his educational needs? As a man and a citizen, he needs to know just what other people do—no more, no less. He needs to know how to read, to write, to compute, etc. As an agriculturist, his needs are more special. He deals with the natural world. His enjoyment and his livelihood depend largely upon his understanding of the laws that control the world about him. He must therefore know Nature. He can know her best by becoming interested in her. When he is young is the time to engender an interest that will continue throughout life. The farmer above all others should be a thorough nature student, and one of the purposes of the public school should be to help and direct him in these studies.

One of the great aims of Nature Study is to interest the child in agricultural problems. The School Garden more than anything else will achieve this purpose. Such a garden will be indispensable in the schools of the future. Ere long it will be as much a part of the regular equipment of the school as books, blackboards, charts and apparatus are. The making of a School Garden is an epoch in the life of each school; it marks the progress of the school in pedagogical ideas. Its prime motive is not to be ornamental, but to be useful. In many parts of England and Germany it is rapidly becoming the "school"—the place where most of the instruction is given. This is the ideal method, "a school in the country, where hardihood of life can be cultivated, and where life is simple and varied; a school where masters lead a common life with the boys, working at gardening or plowing, as well as with books. In such a school, work consists of interchange of occupation—continuous but varied; some lighter, some severer, some taxing muscles and some brain. In such a school there is established a collective, corporate life, in which each member learns self-reliance, individual responsibility and constant adjustment of the relation of self to other people. The virtue that here grows up, will not be negative—constrained by external forces—but active virtue that springs from having lived in a well-organized community.

THE OTTAWA FIELD-NATURALISTS' CLUB.

UNDER THE DISTINGUISHED PATRONAGE OF THE RIGHT HONORABLE
THE EARL OF MINTO, GOVERNOR-GENERAL OF CANADA.

PROGRAMME OF WINTER SOIRÉES, 1903-1904.

1903.

- Dec. 15.—TWENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE CLUB.
Address of Welcome, by Principal J. F. White, of the Normal School.
The President's Address.
The Study of Natural History at Ottawa before the Formation of the Club. Lieut.-Col. W. White, C.M.G.
Botanical Conditions Round Ottawa twenty-five years ago. R. B. White.
Ottawa as a Natural History Locality twenty-five years ago. Dr. James Fletcher.
The Workers in Natural History at Ottawa twenty-five years ago. Lieut.-Col. W. P. Anderson.
What the Ottawa Field-Naturalists' Club has accomplished. Dr. H. B. Small.

1904.

- Jan. 5.—*The Differences and Correspondences between the Azvi-fauna of Ottawa and of the Maryland Alleghanies.* Rev. G. Eitrig.
Report of the Geological Branch.
Jan. 19.—*The Recent Landslide on the Lièvre River.* Illustrated by lantern slides. Dr. A. E. Barlow.
Report of the Ornithological Branch.
Feb. 2.—*Sap and Sap Circulation.* F. T. Shutt, M.A.
Two Springs. Dr. C. Guillet.
Feb. 16.—*A Summer's Cruise on the Labrador Coast.* Illustrated by lantern slides. Dr. R. A. Daly.
Mar. 1.—*Colour in Nature.* Dr. S. B. Sinclair.
Report of the Entomological Branch.
Mar. 15.— **Annual Meeting.**
Report of the Zoological Branch.
Report of the Botanical Branch.
April 5.—Short Talks on how to Collect and Preserve Specimens, with Practical Demonstrations by various members of the Club.

All the meetings will be held in the Normal School, at 8 o'clock p.m. sharp, on the first and third TUESDAYS of the month.

President, W. T. MACOUN.

Treasurer, A. GIBSON.
(Central Experimental Farm.)

Secretary, W. J. WILSON.
(Geol. Surv. Dept.)

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INDEX

TO THE

OTTAWA NATURALIST, VOL. XVII, 1903-4.

	PAGE		PAGE
Anniversary, Celebration of 25th	207	Entomological Society of Ontario,	
Antennariæ, Some Canadian	201	Report of meeting	112
Attwood, A. E., Summer course		Evans, A. W., Yukon Hepaticæ	13
at Norway Beach	113	Excursion, General, to Chelsea	95
Beetles of an Oregon Beach	49	Experimental Farm, Nesting of	
Bird Study	97	birds at	24
Book Notices	128, 142	Fletcher, James, Nature Study	45
Botanical Branch, Report of meet-		Notes on Macrae's Coral-root	76
ings..38, 58, 93, 178, 180, 193,	213	Gibson, Arthur, A night's collect-	
Botanical Section, Report of	71	ing of moths at Meech Lake	204
Burman, Rev. Wm. A., Moose		Hunting for Caterpillars	77
with Elk Antlers	57	Greene, Edw. L., Some Cana-	
Campbell, D. A., The Need of		dian Antennariæ	201
Nature Study	61	Grosbeak, Pine	163
<i>Cardioceras</i> , Description of a spe-		Grouse, Canadian ruffed	163
cies of	65	Guillet, Cephas, Curiosity of	
Caterpillars, Hunting for	77	Hummingbird in captivity	55
Chickadee, Hudsonian, Notes on		Hawk, A red-shouldered, in cap-	
nesting habits of	92	tivity	53
<i>Corallorhiza striata</i> , Lindl.	76	Hay, G. U., It is the spirit which	
Council, Report of	7	gives Nature Study effect	145
Creeper, Brown, Notes on nest-		Hedley, R. T., A red-shouldered	
ing habits of	92	hawk in captivity	53
Crows, My Pet	101	<i>Helicigona arbustorum</i> in New-	
Dent, W. A., Bird Study	97	foundland	192
DeWolfe, Loran A., Mineralogy		Hepaticæ, Yukon	13
and Geology in Schools	147	Herring Gull's Eggs	112
Dowling, D. B., How Peat is		Holm, Theo., Biological Notes	
manufactured into fuel	175	on Canadian species of <i>Viola</i>	149
<i>Dryptosaurus incrassatus</i> , The		Hotson, J. W., Nature Study and	
lower jaw of	133	rural education	221
Eagles and Ospreys, Our	186	Hummingbird, Curiosity of	55
Entomological Branch, Reports		Hunting for Caterpillars	77
of meetings	36, 216	Halkett, A., Note on <i>Hagenius</i>	
Entomological Branch, Report of,		<i>brevistylus</i>	56
for 1902	107	Note on Herring Gulls	112
		<i>Hagenius brevistylus</i> , Selys.	56

	PAGE		PAGE
Introduced plants, Some	144	Odell, W. S., Winter growth of a water lily	106
Kells, W. L., Nesting of some Canadian Warblers	68	Oregon Beach, The Beetles of ..	49
Lambe, L. M., The lower jaw of <i>Dryptosaurus incrassatus</i>	133	Ornithological Branch, Report of	32
Lark, The horned	203	Orthoptera, The, of Indiana	142
Lily, Winter growth of a water ..	107	Ottawa District, Map of	52
<i>Lituities undatus</i> , Additional notes on	161	Perrin, Emery, A robin story ..	122
<i>Lituities undatus</i> , Notes on some Canadian	117	A self-healing wound	112
Lizard, Note on blue-tailed ..	60	Peat as a fuel	175
Lochhead, Prof. W., Nature Study with advanced classes	129	Peat bog, A woman's visit to ..	172
Macoun, W. T., Nesting of birds at Experimental Farm	25	Petrography of some igneous rocks	85
The practical aspect of Nature Study	181	President's Address	188
Map of Ottawa District	52	Rainbow, A misplaced	195
Marsh dwellers, Remarks on some	169	Rat, A, as an entomologist	57
<i>Matheria</i> , New species of	32	Robin story, A	122
Meech Lake, A night's collecting of moths at	204	Scott, M. McK., A woman's visit to a peat bog	175
Members, List of	4	Silver, L. P., Petrography of some igneous rocks	85
<i>Mesoptychia</i> , New genus	15	Smith, L. H., My pet crows	101
<i>Mesoptychia Sahlbergii</i> , (Lindb. & Arnell.)	15	Soirées, Reports of	209
Mineralogy and Geology in Schools	197	South, A visitor from the	177
Moose with elk antlers	57	Squirrel, Red, as an insect col- lector	73
Moths, A night's collecting of, at Meech Lake	204	Sub-excursions	42, 73, 110, 140
Nature Study papers, 45, 61, 77, 97, 113, 129, 145, 165, 181, 197, 221		Summer course at Norway Beach	113
Nature Study and rural educa- tion	221	Terrill, L. M., Notes on nesting habits of brown creeper and Hudsonian chickadee	92
Nature Study, It is the spirit which gives it effect	145	Remarks on some marsh dwellers	169
Nature Study, The need of	61	Treasurer's Report	12
Nature Study, The practical as- pect of	181	Truffles, The artificial cultivation of	128
Nature Study, The proposed course in, in public schools ..	165	Viola, Biological notes on Cana- dian species of	149
Nature Study with advanced classes	129	<i>Viola lanceolata</i> , L.	59
Nesting of birds at Central Ex- perimental Farm	24	Warblers, Nesting of some Can- adian	68
Norway Beach, Summer course at	113	Weed A, worth growing	143
		Whiteaves, J. F., Additional notes on <i>Lituities undatus</i> ..	161
		Description of new species of <i>Matheria</i>	32
		Description of a species of <i>Cardioceras</i>	65

	PAGE		PAGE
Whiteaves, J. F., <i>Helicigona arbustorum</i> in Newfoundland.	192	Young, Chas. H., A visitor from the south.	177
Notes on some Canadian specimens of <i>Littites undatus</i>	117	Young, Rev. C. J., Our eagles and ospreys.	186
Wickham, H. F., The beetles of an Oregon beach	49	Yukon Hepaticæ	13
Williams, J. B., Notes on the blue-tailed lizard	60	Zoological Branch, Report of.	34
Wound, A self-healing	112		

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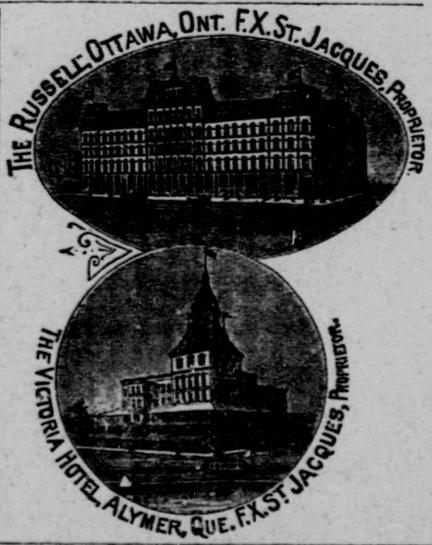
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