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THE
OTTAWA NATURALIST

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TRANSACTIONS

OF THE

OTTAWA FIELD-NATURALISTS' CLUB.

Organized March, 1879.

Incorporated March, 1884

The Ottawa Field-Naturalists' Club.

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THE OTTAWA NATURALIST

VOL. XXIV.

OTTAWA, APRIL, 1910

No. 1

OUR MEMBERSHIP.

Another milestone has been passed in the history of the Ottawa Field-Naturalists' Club. Since the Club was organized in 1879, the membership has grown from 94 to 320. The Club is unique in many ways. The work it accomplishes through its excursions in the field, lectures and branch meetings during the winter, and the publishing regularly of THE OTTAWA NATURALIST each month, is truly remarkable, and indicates the varied interests and wide scope of its activities. This work has proved and is proving itself most helpful and inspiring to its members.

There is probably no other natural history society in America which does more work than the Ottawa Field-Naturalists' Club. There is, however, still much to do. Instead of having a membership of 320, we should at least have double this number interested in our work in the city of Ottawa alone. The new Council of the Club is a particularly strong one and every member will do his or her utmost to make the year a success. The members themselves, it is hoped, will assist the Council in making known more widely the workings and nature of the Club.

A larger membership means better returns in every way. Particularly would it mean a better OTTAWA NATURALIST. In these days of high living, the cost of printing has gone up in company with almost everything else, and it is really beginning to be quite a serious matter to keep up the size of the NATURALIST with the present revenue. If additional funds were available more illustrations could be used and of course many more articles.

It is to be hoped that the year of 1910-1911 will be a record one. The work of the society should appeal to almost everyone, and if our present members would only induce their friends to join, the Council would be much encouraged and the Club very much strengthened.

REPORT OF THE COUNCIL OF THE OTTAWA FIELD-
NATURALISTS' CLUB FOR THE YEAR ENDING
MARCH 15TH, 1910.

In accordance with proposed amendments to the Constitution of the Club, the following report is largely a compilation of reports submitted by the various branches of the Club and the Standing Committees of Council.

MEMBERSHIP.

During the year 28 new members have been elected, making the present membership 320, composed of 312 ordinary members and 8 corresponding members.

PUBLICATIONS COMMITTEE.

In accordance with the recommendation of the Council, action has been taken by the Publications Committee toward devising some practicable scheme whereby the publications received by the Club might be of greater service not only to our members, but to the public as a whole. As a result, arrangements have been made with the Librarian of the Carnegie Library whereby practically all regular periodicals received in exchange are now placed on file in the reading room of the Library and subsequently laid away to be used as directed by the Club.

The following is a list of the publications which are now being received by the Carnegie Library on behalf of the Club:—

1. The Nature Study Review,
2. The Auk,
3. The Canadian Entomologist,
4. Journal of the New York Entomological Society,
5. The Journal of Geography,
6. Le Naturaliste Canadien,
7. Journal of the Elisha Mitchell Scientific Society,
8. Transactions of the Botanical Society of Edinburgh,
9. Publications of the Field Museum of Natural History,
10. The Ohio Naturalist,
11. Torreya,
12. The Wilson Bulletin of Ornithology,
13. The University of California Chronicle,
14. Queen's Quarterly,
15. Bulletin of the New York Botanical Garden,
16. Bulletin of the American Museum of Natural History,

17. Proceedings of the Boston Society of Natural History,
18. Transactions of the Wisconsin Academy of Sciences,
19. Proceedings of the Indiana Academy of Science,
20. Missouri Botanical Garden Annual Reports,
21. Proceedings of the Hamilton Scientific Association.

In addition to this list of periodicals, a considerable number of miscellaneous publications are received during the year. Some of these are of much interest and value, but, as a rule, they constitute reports of proceedings of meetings, catalogues of birds and mammals, annual reports of societies, etc., and are available elsewhere. There is on hand at present an accumulation of a number of years representing some six or seven hundred pamphlets, etc. These are practically all in the basement of the Normal School and have been carefully examined and sorted. The Committee suggest that these publications be made available for free distribution to members of the Club on a certain date and that due notice of this offer be made in the OTTAWA NATURALIST. It is suggested further that after two weeks have expired from the date on which this offer opens that the remaining publications be placed in a convenient place in the Normal School and made available to the students and to the general public.

The Librarian of the Club reports that approximately one dozen complete sets of the NATURALIST are now on hand, none having been sold during the year. Several single copies of back issues and of the Fletcher Memorial number have been disposed of.

Owing to the renovation of the Carnegie Library, the Club's books are now in the basement but will be placed in a special section of the stack room in a short time. The Committee recommend to the new Publications Committee that all publications of the Club be properly stamped, and that a select list of the bound copies be placed on file in the reference library of the reading room, providing this meet the approval of the Librarian.

THE OTTAWA NATURALIST.

Volume XXIII of THE OTTAWA NATURALIST, the official organ of the Club, has been published monthly under the editorship of Mr. Arthur Gibson. It contains 230 pages and three full-page plates.

The following are among the papers that appear in this volume:—

On Geology—

1. "A Canadian Stepheoceras," J. F. Whiteaves.

2. "The Ornamentation of *Periglyptocrinus priscus*," Wm. A. Parks.

On Botany—

1. "Canadian Species of *Thalictrum*," Edward L. Greene.
2. "Certain Biological Principles and their Practical Application in the Improvement of the Field Crops of Canada," L. H. Newman.
3. "New Contributions to Canadian Bryology," N. C. Kindberg.
4. "Contributions from the Herbarium of the Geological Survey," James M. Macoun.
5. "German Field Methods of Botanical Excursions," John Craig.
6. "Some of the Best Native Plants for Cultivation," W. T. Macoun.

On Ornithology—

1. "Winter Birds at Point Pelee," W. E. Saunders.
2. "Bird Notes from Northern Ontario," Rev. C. G. Eifrig.
3. "Birds of Stony Plain, Alberta," S. S. Stansell.
4. "Everyday Ornithology," Norman Criddle.
5. "The Passenger Pigeon," W. Lochhead.

On Entomology—

1. "Discourses upon the Lepidoptera," F. H. Wolley-Dod.
2. "Snow Worms," Arthur Gibson.
3. "Tent Building Habits of Ants," C. Gordon Hewitt.

On Zoology—

1. "The Prong-horn Antelope," E. E. Prince.
2. "A Rare Weasel at Ottawa," W. E. Saunders.
3. "A Shrew new to New Brunswick," W. H. Moore.

On Archaeology—

1. "Algonkin and Huron Occupation of the Ottawa Valley," T. W. E. Sowter.

EXCURSIONS COMMITTEE.

The programme of spring excursions was as follows:—

April 24th—Experimental Farm.

May 1st—Beechwood.

May 8th—Blueberry Point.

May 15th—Britannia.

May 22nd—Beaver Meadow, Hull,

May 29th—Carp (General Excursion).

June 5th—Chelsea (General Excursion).

June 12th—Beaver Meadow.

June 19th—Stittsville (General Excursion).

Some of these excursions were cancelled because of unfavorable weather; reports of those which were held appeared in the June and the July numbers of *THE OTTAWA NATURALIST*, most of the reports having been prepared by Rev. C. G. Eifrig, Chairman of the Committee.

The programme for the fall months was:—

September 18th—Mckay's Lake and outlet.

September 25th—Experimental Farm.

October 2nd—Blueberry Point.

The planning of an excursion programme is becoming more and more difficult from year to year. The rapid extension of the city and the development of suburban resorts are greatly restricting such valuable collecting grounds as Rockcliffe, Dow's Swamp, Blueberry Point and Britannia.

The Council, desiring to extend the sphere of the Club's work, proposed to establish branches in some of the centres near Ottawa, such as Carp and Stittsville. It was thought that valuable field work could be done by members of such branches, the results of which would appear in *THE OTTAWA NATURALIST*. It was thought also that leaders from the parent Club might occasionally direct local excursions, and that a joint field day could be arranged for at least once a year. An attempt was made to establish such a branch at Carp. Two members of the Council, Mr. J. W. Gibson and the Secretary addressed a public meeting at Carp on May 28th, outlining the proposed plan. A local committee was then elected for the purpose of organizing a branch. On the following day the Club held an excursion to Carp, and gave a demonstration of its methods of field work. Although there was a large local attendance and much interest was manifested, no organization has followed this experiment. Under the circumstances the Council deemed it unwise to attempt similar work in other localities.

SOIREES COMMITTEE.

A comparison of the programmes for the season 1908-9 and 1909-10 shows the varied character of the addresses, lectures, and exhibition of specimens given under the auspices of the Club. The Club has now contributed three lectures to the joint course which has proved to be a success. During the season which expires to-night, six of the meetings were held in the

Assembly Hall of the Norman School and three, including this or the annual meeting, in the hall of the Carnegie Library. The first lecture for 1909-10 entitled "Home Birds and Wanderers," was given by Mr. W. E. Saunders, of London, Ont., and was illustrated with prepared birds' skins. The opening meeting, which followed this lecture a few evenings later, took the nature of a conversazione at which short addresses were delivered by a few members of the Club, besides which there was an exhibition of zoological and botanical specimens, including some minute forms shown under the lens of the microscope, and an account of this meeting has already appeared in a recent issue of THE OTTAWA NATURALIST. We were next favoured with an address by our President entitled "Instinct and Education," in which was presented a great deal to stimulate our thinking faculties; and following this was an admirable lecture given by Mr. A. H. W. Cleave, F.R.M.S., entitled "Life," which was illustrated with a series of beautiful lantern slides. A very instructive lecture entitled "The Flora and Fauna of the West Coast of Vancouver Island," was delivered by Professor John Macoun and was illustrated with a great variety of interesting specimens. For the first time under the auspices of the Club, Dr. C. Gordon Hewitt and Mr. H. T. Gussow, F.R.M.S., each contributed a lecture: the former on "House Flies and their Relation to Public Health," and the latter on "A Plant Doctor and His Work." A series of slides at each of these lectures was shown upon the screen. The Club's lecture for the joint course entitled "Bacteria in Relation to Plant Life" was given by Professor F. C. Harrison, of the Macdonald College, and this lecture also was fully illustrated with slides. Altogether the Club is to be congratulated in that such an able body of specialists was secured, and we owe to them a debt of gratitude for the selection of their subjects, all of which proved to be most interesting and instructive.

THE FLETCHER MEMORIAL COMMITTEE.

This Committee has met many times during the Club year which closes to-night.

As has already been mentioned in the pages of THE OTTAWA NATURALIST, there has been a very warm response to the appeal of the Committee for subscriptions, from members of the Club and friends of the late Dr. Fletcher. On the evening of November 9th last, the Committee reported that by far the larger number of subscribers had favoured the suggestion that the memorial take the form of a drinking fountain to be erected at the Central Experimental Farm. It was then therefore moved by Mr. F. T.

Shutt and seconded by Dr. Wm. Saunders and unanimously carried, "That the tribute about to be made to the memory of the late Dr. Fletcher, take the form of a drinking fountain, consisting of a granite shaft, with bronze medallion, inscription, etc., to be erected at the Experimental Farm, Ottawa, and that the Committee is hereby empowered to make all necessary arrangements for carrying out the work."

At a meeting of the Committee held on February 7th, it was decided to place this work in the hands of Dr. R. Tait McKenzie, of the University of Pennsylvania, Philadelphia. Dr. McKenzie has an enviable reputation, more particularly in mural bronzes and plaques, in the salons of Paris and London, and his work was highly commended to the Committee. On the 10th instant Dr. McKenzie came to Ottawa to meet the Committee, bringing with him plans and specifications of the proposed memorial, as well as a small model in plaster. The Committee considered these very carefully and suggested some changes, which, if made, it was thought would improve the appearance of the memorial. Further plans, drawings and photographs of the work will be submitted to the Committee from time to time as they are ready. It is hoped that the memorial will be finally completed and ready for unveiling towards the latter end of May, or early in June.

The following is a statement of the amounts subscribed to the Fletcher Memorial Fund:—

Total amount subscribed.....	\$1,807.85
" " paid in.....	1,681.85
The \$1,807.85 subscribed is divided as follows:—	
Subscribed by members of O.F.N.C., in Ottawa.....	\$ 661.50
Subscribed by members of O.F.N.C., outside of Ottawa in Canada.....	307.50
Subscribed by members of O.F.N.C., in United States, etc.....	88.00
<hr/>	
Total amount subscribed by members of O.F.N.C.....	\$1,007.00
Subscribed by friends, not members of Club, in Ottawa.....	213.35
Subscribed by friends, not members of Club, in Canada outside of Ottawa.....	397.50
Subscribed by friends, not members, in United States, etc....	190.00
	<hr/>
	\$1,807.85

REPORTS OF BRANCHES.

THE GEOLOGICAL BRANCH.

The Geological Branch have not much to report except the ordinary work done at the excursions. Members of this branch attended the excursions and pointed out the interesting features to be seen in the localities visited. At Britannia a good illustra-

tion of conglomerate rock in the process of formation was noted in the gravel pits near the railway. Several fossils were collected at the quarries on the west side of Beaver Meadow near the contact of the Black River and Trenton limestones. The fossils showed that the quarries are situated in the Trenton. During the visit to Carp interesting specimens of curved apatite crystals were collected. These crystals were curved by a constant steady pressure, so that some of them are not even cracked. Others are broken on the convex side.

Marine shells were collected at nearly all the places visited; they were particularly abundant in the clays and gravels at Carp.

We feel that a special effort should be made to interest our young members in the study of geology, as no more healthy or useful work could be enjoyed by them.

THE BOTANICAL BRANCH.

While there were few botanical workers in the field during the past summer, the Botanical Branch continues to be one of the most active in the Club.

Apart from the help rendered at the excursions by the botanical leaders, most of the field work was done by two or three individuals. Mr. W. H. Harrington has added the names of two new species to the Ottawa flora, namely, *Potentilla tridentata*, found at King's Mountain, Que., and *Mimulus moschatus*, obtained at Kingsmere, Que. Mr. H. U. Morris found the weed *Eruca sativa* at the Experimental Farm; this is a new record for the Ottawa district. Mr. H. Groh made a study of the local hawthorns (*Crataegus*) during the past year. He examined fifty trees in different localities and collected flowering specimens from each, and later in the season obtained the fruit. He found marked differences in the number of stamens and styles, the color of the anthers, and the number of flowers to a corymb on different trees. The specimens were sent to a specialist for identification, and the names of the species will be reported later.

Nine winter meetings of the Botanical Branch were held at the homes of the members, much interesting material having been presented. Six of these meetings have already been reported in THE OTTAWA NATURALIST, and others, no doubt, will be. The following is the list of subjects presented at these meetings:—

1. "The Stems of Seed Plants," by Mr. D. A. Campbell.
2. "The Adaptation of Plants to their Environment as Shown by their Internal Structure," by Mr. J. W. Gibson.

3. "Reports of Field Work," presented at the home of Mr. R. B. Whyte.
4. "Some of the best Native Plants for Cultivation," by Mr. W. T. Macoun.
5. "The Formation of Peat Bogs," by Mr. J. M. Macoun.
6. "The Trees of the Ottawa Valley," by Prof. John Macoun.
7. "The Value of Seeds as a Means of Identifying Plants," by Mr. G. Michaud.
8. "The Correlation of Characters in Plants, and its Economic Importance to Plant Breeders," by Mr. L. H. Newman.
9. "Some Herbaceous Perennials at the Experimental Farm," by Mr. W. T. Macoun.

THE ENTOMOLOGICAL BRANCH.

The Entomological Branch has had a fairly active year. Unfortunately, as yet, only one evening meeting has been held during the winter, but it is hoped to hold others before the spring work begins. During the summer of 1909, the local members of the Branch did considerable collecting, many interesting species being met with, some of which are new records for the district. Many insects too were collected in other districts far distant from Ottawa, by some of the local members. Mr. C. H. Young, while assisting Prof. Macoun, at Departure Bay and Ucluelet, B.C., found time to collect many species of interest. Mr. Andrew Halkett made a small collection in Nova Scotia. Mr. D. H. Nelles collected in the vicinity of Stewart River, Yukon Territory, and Mr. Arthur Gibson brought back many specimens from Prince Edward Island.

THE ZOOLOGICAL BRANCH.

The most interesting event of the year was the meeting at Winnipeg, Man., of the British Association for the Advancement of Science. Some members of the Branch attended the meeting and exchanged notes with eminent visiting zoologists. A section of the Association, conducted by Prof. Prince, visited the Biological Station at Departure Bay, the curator of this station being the Rev. Geo. W. Taylor, a member of this Club.

Mr. A. Halkett, after spending the summer months in Nova Scotia investigating the life-history of the lobster, *Homarus americanus*, visited New Westminster, B.C., where he had charge of an exhibit showing the hatching of the eggs of Pacific Salmonoids.

Prof. John Macoun, assisted by Mr. C. H. Young, made

extensive collections of fishes and invertebrates on the coast of Vancouver Island.

Mr. E. E. Lemieux reports the success of an experiment to introduce earthworms near the Upper Lievre lakes, where formerly anglers were unable to obtain bait. He also reports the abundance of the porcupine in the same district.

Mr. E. Le Sueur now has what is perhaps the finest private collection of turtles on the continent, including as it does, many Canadian species and a number of exotic forms.

Mr. W. E. Saunders contributes an interesting record in the capture of a diminutive specimen of Bonaparte stoat (*Putorius cizonani*) near Ottawa.

CONSTITUTION OF CLUB.

Early in the year the Council appointed a committee composed of the President and Messrs. Kingston, Newman, and Shutt, to prepare a revised constitution. The committee has prepared a carefully detailed constitution, which has been discussed at great length in the Council, and which will be submitted to the Club.

The President, Mr. A. E. Attwood, M.A., represented the Club at the May meeting of the Royal Society of Canada.

The Treasurer's report shows a balance on hand of \$31.85, the smallness of the balance being due to the slow payment of membership fees.

The thanks of the Club are due to Principal White for the use of the Normal School Assembly Hall, to the Library Board of the City Council, and to the Librarian, Mr. Burpee, for the use of the Lecture Hall of the Carnegie Library, to the Ottawa Electric Company for assisting in making the microscope demonstrations a success, and to the Press of the city for its co-operation in furthering the work of the Club.

All of which is respectfully submitted.

T. E. CLARKE,
Secretary.

SUBSCRIPTIONS FOR THE NEW CLUB YEAR ARE NOW DUE, AND SHOULD BE PAID TO MR. HERBERT GROH, EXPERIMENTAL FARM, OTTAWA.

It is to be hoped that members will carefully examine the advertisements in this volume of THE OTTAWA NATURALIST, and make a point of dealing with those firms who thus help the Club.

TREASURER'S STATEMENT FOR YEAR ENDING
15TH MARCH, 1910.

RECEIPTS.

Balance from previous year.....	\$ 58.64
Subscriptions:—	
Arrears.....	\$ 81.00
1909-1910.....	224.00
1910-1911, in advance.....	31.00
	336.00
Advertisements in OTTAWA NATURALIST.....	129.30
OTTAWA NATURALISTS sold.....	3.25
Authors' extras sold.....	26.26
Maps of Ottawa sold.....	.10
Government Grant.....	200.00
	\$753.55

EXPENDITURE.

Printing OTTAWA NATURALIST, Vol. XXIII, 12 Nos., 232 pp., including cover.....	\$460.13
Illustrations.....	15.60
Authors' extras.....	48.60
Miscellaneous printing: circulars, mailing envelopes, post cards, etc.....	40.68
	565.01
Postage on OTTAWA NATURALIST.....	36.51
Editor.....	50.00
	651.52
Less 2 per cent. for cash on some accounts of printer....	1.80
	649.63
Honorarium, Librarian.....	10.00
Soiree Expenses.....	31.52
Loss on General Excursion to Carp in May.....	16.60
Sundry expenses, postage, etc.....	13.95
Balance.....	31.85
	\$753.55

ARTHUR GIBSON, Treasurer.

Examined and found correct.

R. B. WHYTE,) Auditors.
J. BALLANTYNE.)

STOMACH CONTENTS OF SOME CANADIAN BIRDS.

BY C. W. G. EIFRIG, ADDISON, ILL.

The appended list gives the stomach contents of a small number of birds, the stomachs of which I have examined. In most of the stomachs of small birds, like finches, vireos, and warblers, the investigator who has not unlimited time at his disposal can usually only tell whether the contents is of vegetable or animal origin; in the latter case it takes expert knowledge of the microscopic parts of small insects to enable one to tell what insects have been eaten. The following birds have been selected either for their rarity or because they are well known. The majority have been taken near Ottawa, the others at least in Canada. Several in the list have been bought in the market. The contents of the stomachs of the birds near the end of the list, of which the percentage of the different parts is stated, have been kindly determined for the writer by the Bureau of Biological Survey, Washington, D.C., under the direction of Dr. A. K. Fisher, to whom the writer would extend his sincere thanks.

HOLBÆLL'S GREBE, *Colymbus holbællii*; October 17, 1905, a large bunch of its own feathers.

HORNED GREBE, *C. auritus*; October 10, 1905, a bunch of its own feathers.

LOON, *Gavia imber*; May, 20, 1907, bones of fish, including at least one of the *Catostomidae* (the Suckers). Some of the gravel stones, also found, are at least half an inch long.

BITTERN, *Botaurus lentiginosus*; 1. May 12, 1904, several large beetles and other insects; 2. ?, 1905, 1 frog, 2 mice, 8 leeches; 3. October 30, 1906, 2 frogs, 2 small sunfish.

BLUE HERON, *Ardea herodias*; July 25, 1905, 1 fish, six inches long.

SPRUCE GROUSE, *Canachites canadensis*; October 31, 1904, pair, male and female, both full of spruce tips.

RUFFLED GROUSE, *Bonasa umbellus togata*; 1. September 30, 1904, clover leaves; 2. October 22, 1904, leaves, gravel and sand; 3. October 15, 1904, hawthorn (*Crataegus*) leaves; 4. April 25, 1905, leaves of Goldthread (*Captis trifolia*), and sharp-edged pebbles of quartz; 5. October 10, 1905, leaves of Aromatic Wintergreen (*Gaultheria procumbens*) and clover; 6. October 19, 1905, clover leaves only.

WILLOW PTARMIGAN, *Lagopus lagopus*; 1. January, 1907, (market), stomach filled with ends of willow twigs; 2. January, 1909, completely filled with oats.

MARSH HAWK, *Circus hudsonius*; September 17, 1907, 2 sparrows (Vesper, or Song?).

SHARP-SHINNED HAWK, *Accipiter velox*; January 16, 1904, 1 English sparrow.

GOSHAWK, *Accipiter atricapillus*; 1. December 17, 1904, 1 red squirrel; 2. November 1, 1906, 1 grouse.

BROAD-WINGED HAWK, *Buteo latissimus*; May 8, 1908, several large beetles.

SPARROW HAWK, *Falco sparverius*; July 26, 1905, remains of small bird.

LONG-EARED OWL, *Asio wilsonianus*; October 28, 1904, 2 mice.

SHORT-EARED OWL, *A. accipitrinus*; October 20, 1904, a chipmunk or similar small rodent.

SNOWY OWL, *Nyctea nyctea*; January 1, 1906, 1 whole mouse, a large pellet of mouse hair, and 5 skulls and bones of mice or similar small rodents.

HAWK OWL, *Surnia ulula caparoch*; October 9, 1906, a sparrow.

ARCTIC THREE-TOED WOODPECKER, *Picoides arcticus*; November 21, 1904, 8 large grubs.

PILEATED WOODPECKER, *Ceophlæus pileatus abieticola*; November 1, 1906, two specimens, both stomachs filled to bursting with large black ants.

EVENING GROSBEAK, *Hesperiphona vespertina*; 1. December 20, 1908, seeds of *Vaccinium*, 5 per cent., cotyledons of ash and some other seed that had been enclosed in a hard shell, 95 per cent.; 2. February 13, 1909, seeds of sumach 8 per cent., seeds or rather cotyledons of a species of ash 92 per cent.; 3 and 4 February 13, 1909, cotyledons of a species of ash.

PINE GROSBEAK, *Pinicola enucleator*; 1. March 18, 1909, seeds and fragments of *Rubus*, 8 per cent., pulp or seeds, probably of conifers, but so thoroughly ground up as to be further unidentifiable, 92 per cent; 2. February 27, 1909, seeds of *Rubus*, 75 per cent., strips of something like bark, probably the remains of birds, 25 per cent.; 3. November 12, 1908, seeds of *Rubus*, 5 per cent., seeds of *Vaccinium*, 20 per cent., seeds all ground up to a pulp but probably of conifers, 75 per cent.; 4. November 12, 1908, seeds of *Rubus*, 5 per cent., seeds of *Vaccinium*, 20 per cent., remainder, like 3; 5. January 18, 1909, seeds of *Fraxinus americana* more or less broken; 6. February 27, 1909, undeveloped flowers, probably of a poplar, 92 per cent., pulp of fruit, probably of apple, 8 per cent.

PINE SISKIN, *Spinus pinus*; April 24, 1909, a few remains of ground-up seeds.

SAVANNA SPARROW, *Passerculus s. savanna*; bits of a beetle, probably a Tenebrionid, 12 per cent., skins of caterpillars, 13

per cent., seeds and fragments of *Echinochloa crusgalli*, 75 per cent.

FOX SPARROW, *Passerella iliaca*; 1. April 22, 1908, seeds of *Phleum pratense*, and 2 or 3 of a small *Rumex*; 2. April 24, 1908, a hash of beetles and true bugs in about equal proportions, 50 per cent., small larvæ, probably lepidopterous, but too badly crushed for positive identification, 40 per cent., bits of seeds of *Lithospermum*, 10 per cent.; 3. April 24, 1908, remains of beetles all broken up, in which can be distinguished a weevil and an *Aphodius*, 66 per cent., trace of a bug, remains of spiders, 10 per cent.; 2 small millipeds, 6 per cent., one beetle larva, probably an Elaterid, 3 per cent., seeds and fragments of *Lithospermum*, *Panicum*, and *Polygonum*, 15 per cent.

CEDAR BIRD, *Ampelis cedrorum*; June 11, 1907, full of cherry blossoms; 2. Full of *Eulecanium fletcheri*, a parasite on the white cedar (named after Dr. Fletcher).

BOHEMIAN WAXWING, *A. garrulus*; 1. March 1, 1909, pulp, skin and one seed of apple; 2. Same date, pulp and skin of apple.

NOTES.

THE BLACK RAIL IN ONTARIO.—In a review of Macoun's "Catalogue of Canadian Birds" by "W. E. S." who is, I presume, W. E. Saunders, the statement is made with regard to the Black Rail that "the three records given are none of them thoroughly reliable, one was a bird seen in flight; another refers to the taking of a number of specimens in the Dundas Marsh, which have since proved to be the Virginia Rail; and the third depends upon the ability of a gentleman the honesty of whose intentions is not open to question, but who may have fallen into the same error as did Mr. Nash regarding the Virginia Rail."

As I am responsible for the record of the Black Rails taken by me in the Dundas Marsh on the 18th of August, 1874. I should be glad if W. E. S. will let us know when and by whom it was proved that my specimens were Virginia Rails, and upon what evidence he has based his statement.

C. W. NASH.

A FEW WINTER BIRD NOTES.—Mr. Eifrig's note on the abundance of Redpolls in the spring of 1909, which appeared in the September number of THE OTTAWA NATURALIST, reminded me that these same birds were exceedingly numerous in this

district at the same season; as stated, they were most common at Ottawa in April, whereas in this district they were seen in enormous flocks early in March. They frequented orchards and meadows overgrown with weeds. I examined the crop of one and found it to be filled largely with the seeds of *Amaranthus* sp.

Meadow-larks are not in this district strictly migratory; a few individuals are to be seen during the winter frequenting stock yards and other sheltered spots. In the winter of 1908-09, during the colder periods, I found seven of these birds frozen to death in a barley stack.

Another bird that was more than usually abundant was the Bohemian Waxwing. These birds were to be seen in large flocks during the winter. They move rapidly from spot to spot, producing a loud whirring sound with their wings, each bird taking flight at the same instant and alighting with the same wonderful precision. They are attracted to the berries of the Mountain Ash, descending in clouds upon the trees and removing every berry. They then descend to the ground and pick up what has been shaken down.

E. P. VENAPLES, Vernon, B.C.

BIRDS OF ALBERTA.—In the October number of THE OTTAWA NATURALIST, appears a list of birds of central Alberta, by Mr. S. S. Stansell, and in the contemporary number of the Auk, there is a similar list with more complete notes, by the same writer. Neither of these two lists agree with my experience in those districts, nor do they agree with each other, and I would suggest a revision of the remarks made in regard to the following species:—

American Golden-Eye, "Very rare." In the Auk this is stated to be quite common, which it doubtless is in the migrations and probably breeds in some numbers.

Rusty Blackbird, "Most common Blackbird." In the Auk it is stated that this species is outnumbered by Brewer's Blackbird and this is doubtless true, although both of them should be fairly numerous.

White-winged Crossbill, "Common breeder." In the Auk this species is marked "Once seen." Doubtless this bird is considerably irregular in the West, as in the East, and it is altogether probable that it may breed in that territory.

Evening Grosbeak, "Quite common breeder." Stated in the Auk to be quite rare. The latter remark is probably correct.

Gray-crowned Leucosticte, "Abundant winter visitor." Stated in the Auk to be quite rare. This is probably an irregular species whose numbers will vary in different seasons.

Nelson's Sparrow, "Once seen." The note in the Auk reads,

"Fairly common," which it probably is in suitable locations.

Whooping Crane. Stated in the Auk to be common, but omitted from the list in THE OTTAWA NATURALIST. This is doubtless exceedingly rare as Mr. Preble in his "Birds of Athabasca-McKenzie District," reports that "it has now become almost extinct in the north."

Lincoln's Sparrow. This bird is not mentioned in either list. Mr. Preble calls it "The common song sparrow of the region," referring to a district not very far from Mr. Stansell's location, and it is certainly a common breeder in the Red Deer district and becomes less so farther south, the inference from which is, that it would be more common in the north.

It is unfortunate that so many errors should have crept into such an interesting paper, and it is to be hoped that Mr. Stansell will have an opportunity of revising this work in the near future.

W. E. SAUNDERS, LONDON, ONT.

THE PARASITIC JAEGER NEAR OTTAWA. In the first part of September of last year (1909), Mr. George Smith brought me a bird with the remark that he had a "web-footed hawk." The bird had been shot on September 4th on the Ottawa River, near the mouth of the Lievre. Although the bird did not turn out to be the astounding monstrosity the captor had pronounced it, it is, however, a remarkable capture for the Ottawa district, it being nothing less than a Parasitic Jaeger, *Stercorarius parasiticus*, a new record for the vicinity. It is a bird of the year, that is, in the brown plumage, in which the young gulls and their allies are often so puzzling. I have identified it beyond doubt by comparing the skin with material in the Field Museum, Chicago, kindly placed at my disposal by Mr. C. B. Cory and Mr. Wilfrid H. Osgood.

It may also be worth mentioning that we have both the species and the subspecies of the Palm Warbler, *Dendroica palmarum*. On comparing the skins in my collection with those of the Field Museum, I find that the species *D. palmarum* is here at least as a migrant, one of my specimens being taken on May 10th, and one probably belonging here taken on Sept. 20th. The form breeding in the district, however, that is at the Mer Bleue only, so far as I am aware, is undoubtedly the subspecies, the Yellow Palm Warbler, *Dendroica palmarum hypochrysea*.

G. EIFRIG.

SPRING EXCURSIONS.

At a meeting of the Excursions Committee held on the 5th inst., the following Spring sub-excursions were decided upon:—

April 16th—Rockcliffe.

April 23rd—Britannia.

April 30th—Billings' Bridge.

May 7th—Blueberry Point, near Aylmer.

May 14th—Beaver Meadow, near Hull.

CORRESPONDENCE.

EDITOR, OTTAWA NATURALIST,—

Not having a photo I send a rough pencil sketch of a freak of nature in the shape of two cedar trees (*Thuja gigantea*) naturally grafted together on the property of my brother, Mr. A. B. Anderson, South Saanich, B.C., the like of which I have never previously experienced in all my travels through the forests of Oregon, Washington and British Columbia. The butts of the original trees are about 15 feet apart and the point of junction I judge to be about 18 feet from the ground; the size of the butts being respectively about 2 and 3 feet in diameter. Apparently the larger tree had fallen over (probably in youth) on to the smaller and presumably by continual friction had effected a junction; the larger tree then taking precedence and forming the head, the top of the smaller being eventually forced out of place.

This is not a case of a tree having grown on the trunk of a fallen tree and the roots thus forming an arch after the disappearance of the dead trunk, as is frequently the case, as can easily be seen by the distance of the trunks from each other and the height at which the junction is effected.

It would be interesting to learn whether any of your readers know of a similar case.

J. R. Anderson, Victoria, B.C.

MEETING OF THE BOTANICAL BRANCH.

The ninth meeting of the Botanical Branch was held at the home of Mr. W. T. Macoun, Experimental Farm, on March 5th, 1910. There were present, in addition to the Chairman, Messrs. G. H. Clark, R. B. Whyte, L. H. Newman, H. Groh, A. E. Attwood, W. H. Harrington, Dr. Blackader, and Prof. J. Macoun. The subject chosen for the evening was "Hardy Herbaceous Plants," with especial reference to the habitats of the

herbaceous perennials tested at the Central Experimental Farm, of which over 2,000 species and varieties have been grown. These have been obtained from the wild, from nurserymen, and from many persons who have collections of herbaceous perennials. A large number of species have been grown from seeds which were donated by botanical gardens and private individuals in many parts of the world; among these being the botanic gardens at Kew, Dublin, Copenhagen, Upsala, Lausanne, Nancy, Lyons, Tabor, Jurjew, St. Petersburg, Odessa, Tiflis, Siena, St. Louis, Tokio. Miss Willmott, of Warley, England, has been very generous in supplying seeds. Most of the plants are raised from the seeds in beds outside, a lath screen being used to shade the beds, making conditions better for the young plants.

It has been noted that annuals are most abundant in climates where there is a wet and a dry season, the reason apparently, being that seeds are able to withstand extremes of drought and heat better than roots. Seeds also appear to withstand extremes of cold better than roots. There are comparatively few annuals which are natives of Canada, and most of these are found in the dry districts. Most biennials appear to be natives of temperate climates where there are no very low temperatures and where there is an abundance of moisture. There are few biennials native to the colder parts of Canada. There are few troublesome biennial weeds in Canada. The sappy shallow roots do not seem to stand the sudden changes of temperature. Herbaceous perennials are most abundant where there is a good distribution of rainfall, and where the cool weather of autumn favors the development of roots. The deep-rooted perennials are, many of them, natives of the coldest and also of the drier climates where their deep roots are able to withstand extreme conditions. The shallow rooted perennials spread much more rapidly, as a rule, than the deeper rooted ones. Most of the shallow fibrous rooted species do best in moist ground; but those which bloom in the spring when the ground is moist are, for the most part, natives of rocky or mountain regions. The shallow rooted perennials with fleshy roots, such as *Aquilegia*, are not long lived as, like biennials, fleshy roots are exposed to sudden changes of temperature. They do best in well drained ground.

There was considerable discussion in regard to the observations which had been made as to the habitats of herbaceous plants, the members present agreeing on the whole with the conclusions drawn. It was thought that if gardeners studied more the habitats of the plants they cultivated better success would be obtained.

W. T. M.





THE OTTAWA NATURALIST

VOL. XXIV.

OTTAWA, MAY, 1910

No. 2

CANADIAN SPECIES OF THALICTRUM.—III.*

By EDWARD L. GREENE.

A most difficult chapter in the past history of Canadian meadow-rues is that relating to the summer-blooming white-flowered kinds; tall plants, usually inhabiting wet meadows or banks, and not coming into flower until early summer, their panicles often ample and of a plummy whiteness, making their fine display at a time when the early kinds, always green-flowered and inconspicuous, have passed to the fruiting stage.

The whiteness of the panicles of these white-flowered kinds is due to the fact that the numerous filaments that make up the bulk of the flowers are flattened, or at least thickened above, and are of a pure white, thus resembling in some degree narrow petals; and they even stand upright, after the manner of petals, whereas the filaments of the vernal green-flowered sorts are finely capillary and altogether pendulous.

Some member of this white-stamened group appears to have been the first among American meadow-rues to gain a place in European gardens. As early as the year 1635 there grew and flowered in Paris a Canadian meadow-rue with upright white stamens, and the name of it as *Thalictrum Canadense* was published in that year, at Paris, in a book on Canadian plants with the Latin title: *Canadensium Plantarum Historia*. If the printing of the name had been accompanied by an adequate description of the plant, we should have had here the beginning of the written history of some one of the several white-stamened meadow-rues of Canada; for, by such description the competent botanist of to-day might have identified some one or another of them as the *T. Canadense* of Cornut. That early description is not, however, of the least help to us in that direction, and all for the reason that said author, at least as to the fruit, describes precisely that of a familiar white-stamened European species

* C. Ott. Nat. xviii. 17, 37.

long known as *T. aquilegifolium*. By some one's blunder, the fruit of the well known Old World plant was placed before the botanist for diagnosis instead of that of the new Canadian species. Presumably the two were growing side by side in that Paris garden, and,* by the time the plants were in fruit, the one became mistaken for the other; but the result was that we can make no use of the rather full description of Cornut in our attempt to identify that particular Canadian *Thalictrum*.

As regards the plant itself, its fertility on Old World soil, its free dissemination to other gardens near to and far from Paris, and its universal recognition as an American and even a Canadian species, there is copious evidence. We trace it easily in the published records of various European gardens and in other prints, all the way from Cornut in 1635 to Moench in 1794, a period of 160 years. It is mentioned usually as *T. Canadense*, Cornut, in the works of Hermann, Tournefort and others on the continent, and in those of Parkinson, of Ray, of Morison and of Philip Miller in England. Meanwhile Linnæus had arbitrarily altered the name to *T. Cornuti*. It was in no respect more appropriate than the original, and in Linnæus's time already long established *T. Canadense*. A mere caprice often seems to have ruled the mind of that nomenclator, so that changes in nomenclature were made as if in sheer defiance of the principle of priority. But Philip Miller very soon restored the original name put forth by Cornut. Nevertheless so abject was the Linnæolatry of the after years that, until almost the end of the nineteenth century the name *T. Cornuti* was the one that stood in almost all the books, whether of American or of universal botany. Moench, indeed, in the year 1794, displaced both names, averse as he was to using either personal or geographic specific names. He called the plant from Canada *T. confertum*; and so a third appellation had been assigned, yet all the while no such description of the species had ever been published as would enable the most expert descriptive botanist to identify the plant. *T. Canadense*, *T. Cornuti* and *T. confertum* were all three little or no better than *nomina nuda*, names only, and therefore without any title whatsoever to adoption in any kind of systematic botany.

In respect only to the *T. Canadense* of Philip Miller will this comment of mine be likely to be called in question. Miller devotes quite a paragraph of his Dictionary to an informal account of the plant. It is the fifth of his meadow-rues, and he says of it:

"The fifth sort grows naturally in North America. This has a fibrous root of a dark colour. The stalks are smooth, of a purple colour, and rise three or four feet high, branching toward the top. The leaves are like those of the Columbine, of a

grayish colour, and smooth. The flowers are produced in large panicles at the top of the stalks; they are larger than those of the former sorts, and have five white petals which soon fall off, and a great number of white stamina with yellow summits. This flowers in June, and the seeds ripen in August."

As a description, this is specious rather than definitive; yet it comes twenty times nearer being definite than all which had ever been printed about the plant during the 135 years that had intervened between Cornut and Miller. Let us see what this description tells us that may help somewhat toward a placing of the plant. That its roots are fibrous and dark-coloured may assure us that it was not one of our numerous meadow-rues that are yellow-rooted. Its attaining the height of three or four feet is a statement that might be helpful; for, in Canada where this thing came from there are white-stamened kinds that commonly attain that height, and more, and there are others that are exceptionally large plants of their kind if two feet high. That its leaves were those of columbines is of no moment. Most American meadow-rues, and many of those of Europe and of Asia, are columbine-leaved. But when we are informed that the *T. Canadense*, Mill., has leaves that are "grayish" and also "smooth," we are compelled to picture in our minds a *Thalictrum* with glaucescent foliage, that is, if we are instructed as to the terms that were in use in Miller's day and earlier for designating that which we of a later time know as glaucous. There are white-stamened Canadian *Thalictrums* in plenty, the foliage of which is deep-green or dark-green, and one or two that are glaucescent-leaved. We have now the word of Miller that the real *T. Canadense*, involving *T. Cornuti*, Linn., is a plant with light blue-green foliage, and glabrous, at least above. Another very useful item in his account of the plant is, that its flowers are produced in large panicles. This definitely excludes several rather northerly Canadian meadow-rues the leafy stems of which can not be said to end in any panicle at all, but in an umbel of only two or three—sometimes solitary—large white-stamened flowers; yet all these manifestly distinct plants were formerly catalogued as *T. Cornuti*, which, by Miller's testimony, they can not be. And, finally, it is evident by the same authority that the plant as they had it in Europe in the seventeenth century and in the eighteenth was hermaphrodite, for the authority seems to say that stamens and pistils were in all the flowers. Miller's account does not indeed define anything. We can not, in the light of it, enable ourselves to say just what one of the Canadian white-stamened *Thalictrums* it was, though by the same token we can seem to see in the Canadian flora a number of members of that group which can not be referred thereto.

To most botanists of this generation the name *T. Cornuti* is unfamiliar. They meet with it nowhere in the newer books but in synonymy; and in the older herbaria they are apt to find it erased, and the name *T. polygamum* written in its stead. It had been in constant use among American botanists for more than a century when, late in the nineteenth century it was remanded to synonymy by Asa Gray. The condition of meadow-rue nomenclature was not thereby improved, for *T. polygamum* had been from the first a *nomen nudum*, that is, it had been printed in a catalogue, without any accompanying description. All that Dr. Gray was able to cite by way of diagnosis was "smooth, polygamous;" so that any kind of *Thalictrum* showing glabrous herbage and a tendency to polygamy would have to be *T. polygamum*. Yet despite all this, the author at once began to include in his own *T. polygamum* plants glabrous and plants pubescent, and that in several different ways. They who use the name *T. polygamum* use it on the mere dictum of authority. There is less reason for it than for the old name *T. Cornuti*. Yet even Muhlenberg, the inventor of the vacuous name *T. polygamum*, had admitted *T. Cornuti*, holding *T. polygamum*, whatever that may have been, to be distinct from it; thus by no means intending to make a name that should be substituted in place of *T. Cornuti*.

The discovery of the invalidity of the name *T. Cornuti* was not made by Dr. Gray. That point had been made clear by Augustin Pyramus De Candolle away back in 1818, long enough before the time of Gray; and De Candolle, suppressing the unauthenticated *T. Cornuti*, gave a new name, and therewith a description that is intelligible. I do not think I can do students of Canadian *Thalictrums* a better service here than to give them an English version of De Candolle's description; for the author says that his specimen was from Canada.

"*THALICTRUM CORYNELLUM*. Stem erect, terete, finely striate, hollow; leaves twice or thrice ternately divided, the segments oval, at apex obtusely 3-lobed, otherwise entire, upper face dark green, the lower glaucous, and beset with scattered hairs, especially on the veins and veinlets; panicle erect, sub-corymbose; flowers dioecious erect; sepals oval; filaments clavate at summit; anthers oval-oblong; fruits 12 to 15, sessile, striate, oblong." [A. D.C. *Systema*, I. 172, 173].

M. De Candolle drew up the description from herbarium specimens. He does not seem to have known that the filaments are white. They seldom remain so in old specimens. The specimens were in the herbarium of Vaillant, and the plant was from Quebec, by Sarracenus. It is to be noted that he supposed the species to be dioecious; and so it is, in the main. Rarely

does the pistillate plant in flower show a stamen or two, or three, in some of the flowers; but the staminate plants appear to be always purely staminate. Truly hermaphrodite individuals are a rarity.

In the Herbarium of the Geological Survey *T. corynellum* is well represented, and I cite a few of the numbers: 32,763, from King's Co., N.B., A. P. Chadbourne, July, 1883; 66,630, Port à Persis, Que., 18 Aug., 1905. Macoun, pistillate plants, with no trace of stamens; Cache Lake, Algonquin Park, 5 July, 1900, two numbers, 23,260 a purely staminate plant with ample panicle, 23,259, several small panicles of truly hermaphrodite flowers, but stamens very few nevertheless; 32,755 is a sheet from Southern New Hampshire, by Miss M. A. Day, at Jaffray, 23 July, 1896. The two specimens are strictly male and female; and in two or three points they fall short of responding to De Candolle's diagnosis of *T. corynellum*, for the traces of pubescence in the lower face of the leaves are very faint, while the carpels, instead of being glabrous are distinctly though sparsely setulose-hairy; also they are fairly, though shortly stipitate, thus inclining to *T. dasycarpum*, to which, however, they do not seem to be referable.

THALICTRUM LEUCOCRINUM. Stout and large, the thick hollow stems both angled and striate, green and glabrous, the branches of the panicle sparsely and minutely setulose; lowest leaves not known; middle cauline sessile, not large, of a deep but not dark green above and beset with scattered short setulose hairs, underneath of a yellowish rather than glaucous green, and subtomentulose with yellowish hairs, these more copious along the veins; terminal leaflets hardly $\frac{3}{4}$ -inch long, round-ovate, obtuse at base, 3-lobed at apex, the lobes obtuse, the large middle one mucronate, lateral leaflets smaller, oval, entire; panicle of staminate plant ample, its branches ascending, copiously floriferous, the flowers large; sepals oval, obtuse; filaments strongly clavate, the outer series thicker at summit than their oblong obtuse anthers; panicle of pistillate plant smaller, compact; immature carpels slenderly fusiform, substipitate, sprinkled with a few minute setulose hairs, the stigmas straight.

Specimens in the herbarium of Mr. John Donnell Smith, collected by himself on Campobello Island, N.B., between 17 July and 20 Aug., 1888. They are labelled *T. purpurascens*, and for the usual reason, no doubt, that the plant is strictly dioecious, the clavate character of the stamens of course failing to be noted. The peculiar hue of the herbage, and the characteristic pubescence, this on both faces of the leaves, precludes our referring this to either *T. corynellum* on the one hand, or *T. dasycarpum* on the other.

THALICTRUM ZIBELLINUM. Usually a foot high, sometimes larger, slender but firm, with striate stem leafy to the summit, glabrous below the summit; leaves of a dull bluish green above, glaucous beneath, all except the floral glabrous on both faces, the floral with traces of some minute pubescence; terminal leaflets about $\frac{3}{4}$ -inch wide above the middle, the length a trifle less, rather deeply and not very unequally 3-lobed, the lobes broader than long and very obtuse, laterals smaller, oval, mostly entire; panicles small, rather compact; sepals of staminate plant round-ovate, very obtuse; filaments gradually clavellate from the base, at summit not approaching the width of the anthers, also not very long; anthers oblong, obtuse; sepals of pistillate plant oval, obtuse or abruptly acute, glabrous, deciduous; immature carpels short pubescent.

The type specimens of this small member of the white-stamened group are in Herb. Geol. Surv., No. 21,134, and were obtained on Sable Island, off Nova Scotia, July 26 to Aug. 8, 1899, by Mr. Macoun. These appear to represent a plant strictly dioecious.

HOUSE-FLIES AND THE PUBLIC HEALTH.*

BY C. GORDON HEWITT, D.Sc., F.E.S.,
Dominion Entomologist, Ottawa.

In a city like Ottawa and in many other Canadian cities the house-fly problem and the dangers resulting therefrom are of far greater and more vital importance than one is accustomed to find in other cities of less rapid growth and longer establishment. Certain facts, to which reference will be made later, are present which increase the potential danger, already very great, of these ubiquitous pests. Whether you penetrate the huts of the Lapps or swelter in the burning heat of an equatorial clime you will not be permitted to forget the existence of the "domestic" house-fly; there are no means of escape; by street-car, by Pullman or by liner it has a free pass. A fearless, dashing and careless mass of heat-infused vitality. Let the day be cool or dull *Musca domestica*, as the great name giver Linnæus described it, is obsessed with inertia, but an hour's sunshine or a warm room and it is as attentive as ever. The activities of most living beings, not excluding man, are dependent on the great source of energy, the sun, but the question of temperature is a matter of

* An abstract of a lecture delivered before The Ottawa Field-Naturalists' Club on Feb. 1st, 1910.

most vital import to the fly and to those stages of its life history through which it passes in hidden preparation for its great adventure, the crowning of its career, its emergence as a fly.

How many people are acquainted with the lives of the things around them? The house-fly is too humble, too common a creature to stimulate thought on its origin, use in life and destiny; we are too concerned, those of us who have time to be concerned, in these questions in their personal relations and the house-fly is dismissed with a word of comment on its power of provocation and possible unknown utility. But public interest does not always slumber. Science disguised as the Prince Charm- ing has at last succeeded in awakening this Princess. The mantle of mystery and veil of ignorance have been torn off, and the house-fly stands alone, known and condemned with clear convincing proof that it must be classed with the mosquito as one of the scourges of man and destroyers of his children. Instead of being the harmless, bright little insect, though annoy- ing by its attentions, it is the embodiment and emblem of filth swathed with the germs of decay.

What are the facts? They are that no house-fly can be caught indoors or out of doors that is not carrying on its legs and body bacteria of all kinds and the spores of moulds and other organisms which accompany decay. No living fly is free from germs: the existence of such would be more than a miracle. Its legs and body, proboscis and wings are covered with small hairs and bristles, so that its legs may be compared to fine bristle brushes; it frequents every kind of filth imaginable and be- smirches itself with the microscopic bacteria and other decay- producing organisms of which it cannot possibly rid itself, and flies about a winged and wandering bundle of bacteria. All this might be expected as a result of reasoning alone, but such would not be proof, and the proof is astonishing in its vindication. Any house-fly, whether caught in one's room or out in the open and allowed to walk over a medium suitable for the growth of bacteria and moulds, will deposit the germs of these organisms in its tracks, which in a short time will yield colonies of bacteria and decay-producing fungi. This experiment has been performed times innumerable, and not only does this take place in the warm summer months, but I am able to show you a collection of bacterial fungal colonies obtained from the feet of a fly caught in one of my rooms at the Experimental Farm a few days ago. One of the most interesting and convincing experiments to prove that house-flies normally carry about the spores of fungi and bacteria was made by my friend and colleague, Mr. H. T. Gussow, who caught three flies, the first in his room (in London, England), the second in the street, and the third on a household dust bin.

From the first of these he obtained 30 colonies comprising six kinds of bacteria and six colonies of four species of fungi. From the second he obtained 46 colonies comprising 8 kinds of bacteria, and 7 colonies of four species of fungi, and from the fly caught on the dust bin he obtained 116 colonies comprising 11 kinds of bacteria, one of which is only found in the intestinal tract, and 10 colonies of six species of fungi.

It does not require any play of the imagination therefore, to appreciate the ability of house-flies, if they normally infect themselves in this manner and carry about such germs, to infect themselves with the bacilli of typhoid fever, tuberculosis, infantile diarrhoea, and other similarly infectious diseases. Typhoid bacilli have been obtained from flies frequenting places where the disease existed. It has been found that such flies will remain infected for some time, and also that typhoid and tubercular bacilli can pass through the digestive tract of the fly in a virulent condition and that their dejecta are infective. It has further been demonstrated that flies reared from maggots which have been bred in matter infected with typhoid bacilli are infected with the bacillus. In the South African and Spanish-American wars flies were responsible for more deaths than bullets. Enteric fever in those wars carried off its thousands, which was not to be wondered at, in view of the prevailing sanitary conditions with open latrines frequented by incipient cases of enteric and myriads of flies swarming indiscriminately about the latrines and the mess tents. On a smaller scale similar conditions occur in the unsanitary districts of our towns and cities where the house-flies frequent indiscriminately and in turn the privies and kitchen tables. Once typhoid establishes itself in such places the house-flies will account for the subsequent spread of the infection. The warmer the weather the more active will the flies be, and with greater ease and rapidity will the disease be spread.

An allied disease, infantile or summer diarrhoea, is responsible for the greatest mortality among young children during the summer months or third quarter of the year. The specific cause of this disease has not been satisfactorily determined as yet, but it is probably a germ allied to the typhoid bacilli, and, in the same way that we know that the mosquito carries the germ of yellow fever, although it has not as yet been discovered, it is fairly certain from statistical and circumstantial or epidemiological evidence that house-flies are the chief agents in the dissemination of this disease. I have prepared a chart extending over a period of twenty years and giving the number of deaths per thousand living due to this disease, and the mean temperature during the third quarter of the year in a large English city, and

it will be seen that with the exception of one year, wherever there has been a rise or fall in the mean temperature for the third quarter of the year, there has been a corresponding rise or fall in the number of deaths: associated with a rise or fall in the temperature would be an increase or decrease in the number of flies, as the two are intimately connected. A high temperature is responsible for a more rapid development of flies, and therefore for an increase in their numbers. The shortest time in which I and other investigators have been able to rear house-flies through all the stages of their life history, that is through the egg, larval or maggot and pupal stages, is slightly over eight days by keeping them at a constant high temperature. It was also found that in ten to fourteen days these flies could lay eggs. As each fly is capable of laying from 120 to 150 eggs in a single batch, and may lay six or even more batches of eggs during its life, it is an easy matter to understand how a single fly may be responsible for an incredible number of descendants during a single season, and in the light of these facts, the enormous number of flies present in a hot season ceases to be a matter of wonder, and still more so when it is learnt "where they all come from."

The chief and favourite breeding place of the house-fly is in stable refuse, which may sometimes be found to be literally alive with the "maggots" of the house-fly. In a city like Ottawa where stables are located behind houses in almost every street, and each single horse stable has its pile of refuse, is it to be wondered at that house-flies are so numerous? It is little use complaining about these pests, and potentially the most dangerous pests we have, while such conditions are allowed to exist. A single refuse heap will supply a whole street with flies; a single, unclosed, and not frequently emptied refuse bin will colonise a house, for they breed in incredible numbers in waste and decaying vegetable products, such as accumulate in the household refuse bin. All decaying and excremental substances, provided the temperature is suitable, serve as breeding places for house-flies, and in these facts lies the solution to the house-fly problem which we are compelled to face if we would reduce the infantile mortality rate and the death rate of typhoid fever. There are two ways of dealing with a nuisance, the one is to abolish it; the other to render it innocuous. Boards of health and local authorities should make it *illegal* to keep stable refuse exposed for more than *six days*, that is, a period of time less than that required by the fly to pass through its complete development from egg to fly. Within that time it should be compulsorily removed to well without the boundaries of the city. Refuse bins should be similarly treated. Refuse should

be burnt in public and municipal destructors, and it should be made compulsory to keep refuse receptacles closed, and consequently fly-proof. The alternative, to render such nuisances innocuous, can be accomplished by the provision of darkened fly-proof pits or chambers for the reception of stable refuse, to be frequently and periodically removed. Flies may be prevented from breeding in such refuse by treating it with such substances as chloride of lime or kerosene. By scattering chloride of lime over the refuse after each addition in the closed chamber, or spraying with kerosene (which is not so effective), the flies are prevented, should they have access, from breeding in the excremental or vegetable refuse. But the removal method is the most successful wherever it can be accomplished; and in the case of small stables this is not impossible.

These may seem somewhat utopian suggestions, but success has followed their adoption, and drastic initial measures are essential if it is desired to reduce, so far as is humanly possible, this evil in our midst. Until such measures are adopted the public must hold the offending parties responsible for the dangers resulting from the germ-carrying powers of the house-fly; and it is no small matter to be responsible for an unnecessarily high and reducible infantile mortality, not to mention the increased possibility of the rapid spread of outbreaks of typhoid fever, to which new and rapidly growing cities are especially liable. In houses it is not sufficient to provide fly screens to windows and doors, but such foods as milk and sugar, to which flies are especially attracted, and which are more than usually suited for the reception of whatever germs they are carrying, should be carefully covered with muslin. A fly should be regarded in its true light as a winged carrier of disease and decay. The sooner this is realized the more speedy will be the advent of more healthy and less dangerous conditions. Time was when the fly acted as a scavenger, its larvæ destroying by disintegration decaying substances. Its function has now been superseded by health and sanitary authorities, and now its sole function is that of a danger signal. Wherever flies abound in such places will refuse and decaying substances be found, and on such occasions it will serve as a disseminator of the germs which are associated with such substances. If we are to reduce the mortality from these infectious diseases and make our towns and cities more healthy, the house flies must be reduced. The time is past when these ideas were considered the alarmist croakings of scientific cranks: we have the facts before us which condemn in no unmeasured terms this most serious pest—the common house-fly.

WINTER BIRDS AT POINT PELEE, ONT.

BY W. E. SAUNDERS, LONDON, ONT.

On February 1st, 1909, Mr. J. S. Wallace and the writer made an expedition to Point Pelee to determine what birds were passing the winter in that locality. This is the spot where a greater winter population may be expected than in any other part of the mainland of Ontario, on account of its being the most southerly extension, and although our observations were partly made during a cold blizzard, and the ground was snow covered during the entire visit, yet we found more than forty species, as detailed in a number of THE OTTAWA NATURALIST of last year.

The winter of 1909-1910 came on slowly, and there was really no very severe weather. The lowest temperature at London, up to the 19th of February, was about 10 below zero, and this would indicate that the lowest temperature at Point Pelee was about 10 above zero. This is approximately the same temperature that we met with last year on our winter trip. During the earlier parts of the present winter, the ground was comparatively free from snow, and yet, even in November, when winter had not yet begun, the dearth of birds, not only at Point Pelee, but all through Ontario, was striking.

During January and early February there was an unusual quantity of snow, and this is the only respect in which the winter has apparently been a difficult one for the birds. Moreover, snow itself is not supposed to be an inconvenience to many birds, except as it covers their food, and I noticed in November, as well as February, that the crop of berries at Point Pelee on the various species of *Cornus* and *Viburnum* was very large, so that food for a good many species must have been abundant. Nevertheless, we succeeded in recording only twenty-four species from February 11th to 14th, 1910, as against over forty in the first few days of February, 1909. The former winter was signalized by the influx of many northern species. Redpolls were abundant, and Crossbills, Evening Grosbeaks and others were seen; but along with them were found at the Point, Hermit Thrushes, Chewinks, and White-throated Sparrows in considerable numbers, which species were entirely absent during our visits in November, December, January, and February of the past winter. Robins, Bluebirds and Flickers, which were there in large numbers a year ago, were comparatively rare this year. Several other species which were seen the previous winter in small numbers, were absent, but this, of course, would be expected. The surprising part of the whole matter is

that nearly all of these birds vanished before November, and I have heard of only one Chewink having been seen in Ontario since the middle of last November, and absolutely none of many other species which were common at Point Pelee in the winter of 1908-1909.

These facts indicate that there is a great variation in the number of summer birds which are found there during the winter, or in other words, they prove that while Chewinks and other similar species may stay in considerable numbers during one winter, they may be entirely absent in the next, under circumstances which appear to us to be equally favorable.

Another peculiar feature of bird life on the Point, which was impressed on us very strongly during the recent trip, is that the birds change their location in a very decided and thorough manner, without reasons which appear adequate to the human observer. For instance, in our former visit, the Robins and Flickers were in the jungle, which is where the berries and grapes are to be found, and Bluebirds were in the open field nearby, feeding in the edge of the jungle, and around the mullein stalks. On our recent visit we found all that region to be absolutely deserted by such species, but they were living in a little section of Red Cedar forest, nearly three miles north of the old location, where their food was apparently limited to berries of *Celastrus* and Red Cedar.

Altogether, the visits of these two winters, instead of making migration and residence problems clearer, seem to have complicated them the more.

The list of birds noted in the four days of the last trip is as follows:—

Marsh Hawk.....	1	Blue Jay.....	5
Great Horned Owl.....	1	Prairie Horned Lark.....	25
Robin.....	20	Downy Woodpecker.....	20
Golden-crowned Kinglet..	10	Hairy Woodpecker.....	1
White-breasted Nuthatch.	8	Goshawk.....	1
Brown Creeper.....	12	Golden-eye Duck.....	38
Cedar Bird.....	80	Carolina Wren.....	20
Cardinal.....	15	Sharp-shinned Hawk.....	1
Song Sparrow.....	1	Crow.....	1
Junco.....	6	Purple Finch.....	10
Tree Sparrow.....	500	Flicker.....	4
Goldfinch.....	20	Snowflake.....	12

The numbers are taken from the day on which most were seen, and it is likely that these numbers include most, if not all, of those seen on the other days.

CONTRIBUTIONS FROM THE HERBARIUM OF THE
GEOLOGICAL SURVEY.

BY JAMES M. MACOUN.

SPERGULA SATIVA, Böenn.

Common on Vancouver Island and the only species collected there. Collected by Prof. John Macoun at Victoria in 1908, No. 78,504 and Ucluelet, No. 78,505, in 1909; Klondike River, Yukon, No. 58,406. The specimens collected at Victoria in 1885 by Dr. Fletcher and recorded under *S. arvensis*, Macoun, Cat. Can. Plants I, 499, are this species. In *Rhodora*, Vol. VII, p. 151, Dr. Fernald writing of this species credits Dr. Fletcher with having collected it at Ottawa in July, 1892, distributed as *S. arvensis*, and in the last edition of Gray's Manual it is credited to Ontario. While it is possible that Dr. Fletcher collected *S. sativa* at Ottawa none of the specimens from Ottawa in the herbaria of the Central Experimental Farm or of the Geological Survey are this species, and it is more than probable that in distributing specimens Dr. Fletcher mixed those collected on the Pacific Coast with those collected at Ottawa, the former being *S. sativa*, the latter *S. arvensis*.

LYCHNIS CORONARIA, Desv.

Common in the streets of Nanaimo, Vancouver Island in July, 1908, Herb. No. 78,534. (*John Macoun*). Probably a recent introduction as it was not seen at Nanaimo in 1887 or 1893 by Prof. Macoun, and is not recorded elsewhere in Canada though found in several places in Washington and the Eastern States.

ROSA ALCEA, Greene, Leaflets II: 63

Collected at Moose Jaw, Sask., in 1892 by Wm. Spreadborough and until recently in our herbarium without a name. Will probably be found in other localities in the dry prairie region. "Calyx-tube with not a few stout sharp spreading spines, but sepals quite densely glandular-prickly; corolla large, the petals obovate."

HIBISCUS OPULIFOLIUS, Greene, Leaflets II: 65.

H. Moscheutos, Macoun, Cat. Can. Pl. I: 87.

This fine *Hibiscus* recently described by Dr. Greene and represented in our herbarium by specimens collected by Prof. John Macoun at Point Pelee, Lake Erie, in 1882, and at Leamington, Ont., in 1892, is probably to be found in suitable situations from Point Pelee west to Windsor, Ont., as *H. Moscheutos* has been recorded from the Detroit River.

PLEUROGNE FONTANA, A. Nels.

P. rotata, Macoun, Cat. Can. Pl. Vol. I, p. 325, in part.

Easily distinguished from *P. rotata* by its greater height, linear leaves, the lower of which are soon deciduous leaving the stem below almost naked. All our prairie specimens are this species. Very fine specimens 15 to 18 inches high were collected west of Battle River, Alta., in 1906, by Macoun and Herriot. Herb. No. 78,463.

PENSTEMON PRO CERUS, Dougl.

St. Lazare near Fort Ellice, Man., No. 78,446. (*Macoun & Herriot*). Not recorded from Manitoba.

VERONICA TOURNEFORTII, C. C. Gmel.

In waste places, Portage la Prairie, Man., No. 78,451. (*John Macoun*). Not recorded from west of Ontario.

NOTES ON WINTER BIRDS IN HOCHELAGA AND COMPTON COUNTIES.

BY L. McI. TERRILL, WESTMOUNT, QUE.

While at Robinson, Compton County, Que., during two weeks in the early part of December, 1909, I found birds fairly numerous, chiefly Woodpeckers, the unusual birds being two flocks of Goldfinches, one Pigeon Hawk and one Goshawk. The Goshawk, an immature bird, was brought to me alive, by a farmer who informed me that he had caught it in his barn in the act of devouring one of his fowl. He had been attracted there by the outcries of the other poultry.

Returning to Montreal I found a scarcity of birds beyond the ordinary. From the 15th of December, 1909, to the 6th of March, 1910, during weekly walks, I have noted only the following:—

Dec. 19, 1909—One Pigeon Hawk.

Jany. 1, 1910—Flock of 25 Snowbirds and a few Chickadees.

Jany. 2, 1910—One Pigeon Hawk.

Jany. 16, 1910—Flock of 25 Cedar Waxwings, mostly immature birds, feeding on Mountain Ash berries.

Jany. 30, 1910—One Pigeon Hawk.

Feb. 6, 1910—Flock of 15 Snowbirds.

March 3, 1910—One Crow.

March 5, 1910—Six Prairie Horned Larks in song; as they were paired they have probably been here a week; Fifteen Crows.

March 6, 1910—Chickadees numerous, heard notes "sweet-sugar"; Prairie Horned Larks noted abundantly in pairs; Crows numerous, saw upwards of 200.

Owing to the very mild weather this winter one might have expected to see something unusual in bird life, or at least an early spring arrival; but, as the foregoing list will show, not even a Crow has remained in this district, whilst conditions in the north were evidently favourable enough to retain most of our winter visitors, such as the Redpoll and Grosbeak, leaving us with only a few stragglers of the later migrants.

The following is a list of the birds observed in Compton County:—

DECEMBER 5TH TO 20TH, 1908.

Can. Ruffed Grouse—These birds are fairly common in this district, but presumably on account of dark, stormy weather in December they keep well hidden, only coming out at dusk to feed in the birch tops.

Downy Woodpecker—Common, noted daily.

Hairy Woodpecker—Common, noted daily.

Arctic Three-toed Woodpecker—Several seen.

Pileated Woodpecker—Two heard.

Canada Jay—One seen.

Blue Jay—A few noted almost daily.

Redpoll—Common.

Pine Siskin—Numerous.

Snowbird—Several small flocks.

Am. Crossbill—Several flocks.

Pine Grosbeak—Common; noted daily; one flock of 20 with several bright males.

Brown Creeper—Several.

White-breasted Nuthatch—Three seen.

Red-breasted Nuthatch—Common; noted daily.

B. C. Chickadee—noted daily.

Golden C. Kinglet—Several small flocks seen.

DECEMBER 2ND TO 15TH, 1909.

Goshawk—Examined one immature bird.

Pigeon Hawk—One seen in flight.

Barred Owl—Found remains of one in woods.

Downy Woodpecker—A few seen.

Hairy Woodpecker—Common.

Arctic Three-toed Woodpecker—One or two seen almost daily.

Pileated Woodpecker—Noted on four occasions.

Blue Jay—Common; seen daily.

Am. Goldfinch—Saw a flock on each of two days, the 8th and 9th Decèmber.

Snowbird—Noted almost daily in small flocks.

Am. Crossbill—Saw two flocks in flight, presumably of this species.

White-breasted Nuthatch—One seen.

Red-breasted Nuthatch—Fairly common; seen on several occasions.

B. C. Chickadee—Fairly common; noted daily.

Golden C. Kinglet—Saw several flocks daily; apparently the most common bird here at this season.

Pileated Woodpeckers are a fairly common resident in this district; Canada Jays much less so, only an occasional pair remaining through the winter.

The feathers of a Barred Owl found on the crust in pine woods, pointed to an unusual tragedy; a hunter hunted. A clot of blood beneath the feather-laden limb of a large pine, almost proved that some carnivorous animal, possibly Pine Marten or Fisher, had crept out on the limb and caught the owl napping.

MEETING OF ENTOMOLOGICAL BRANCH.

Held at the residence of Mr. J. W. Baldwin, on the evening of the 7th April, 1910.

Mr. Baldwin had on exhibit most of his collection of local lepidoptera. This collection is becoming an interesting one and is considerably added to every season. Species of uncommon occurrence in the Ottawa District, and which had been collected during 1909, were pointed out. Among these the writer noted particularly, *Sphinx luciosa*, which is very rare at Ottawa. *Ampelophaga versicolor*, *Apantesis virguncula*, *Apatela retardata*, *Orthosia helva* and *Autographa rectangula*. Most of these specimens had been collected at the Electric Railway Power House on the Britannia line. The powerful electric lights at this place are wonderfully attractive to insects of many kinds and the above is, therefore, a favourite rendezvous for some of the local entomologists.

Mr. Groh showed two thorns of *Cratægus* on each of which a Lachnosternid beetle had been impaled, the work most probably of the Northern Shrike. These had been collected in June from a tree at Dow's swamp. This exhibit led to an interesting discussion on the attraction of certain plants to insects, as for instance Dogbane, Milkweed, Tarry Cockle or Sleepy Catchfly etc.

Mr. Criddle exhibited a box of rare Manitoban lepidoptera, all taken at Aweme. Among these was an interesting Sphinx which had recently been determined as a variety of *S. gordius*. The form had a conspicuous blackish band near the outside margin of the primaries, and showed other differences from eastern specimens of *gordius*. Mr. Criddle hopes by getting eggs of the form and studying the larvæ to decide whether it really is a variety of the above named species. Other specimens of interest in the box were: *Polia aedon*, *Mamestra scapularis*, *Xylina fletcheri* and *Tapinostola variana*. The latter species, although identified by Dr. J. B. Smith, looked different from other examples also named by Dr. Smith, from the east. Mr. Criddle will try and get other specimens for study.

Mr. Gibson spoke of a recent visit he had made to the home of Mr. J. D. Evans, a well known entomologist, at Trenton, Ont. He described in brief the nature of Mr. Evans' collections, and of the perfect order of the arrangement and most of the specimens. The collection of coleoptera is a particularly rich one, containing many very rare species. Mr. Gibson also showed a box containing an interesting series of the Arctiid moth, *Phragmatobia assimilans*, var. *franconia*. These had been reared from larvæ sent by Mr. Horace Dawson, of Hymers, Ont. The species is an uncommon one and notes on its life-history will soon be published.

A. G.

EXCURSIONS.

The first excursion of 1910 was held at Rockcliffe on Saturday, 16th April, when about a dozen members spent the afternoon in gathering specimens representing the different branches of the Club's work. At five o'clock the parties met, and under the direction of Mr. Andrew Halkett, the president, exhibited and discussed the material collected. Miss A. L. Matthews referred to nature study from the poet's point of view and briefly showed by quotations how Burns, Wordsworth and Tennyson had gone to nature for their best inspirations.

Mr. Groh, reporting on the afternoon's work in botany, exhibited about fifteen plants already in flower, as follows: *Hepatica*, *acutiloba* and *triloba*, Spring Beauty, Blue Cohosh, Wild Ginger, Dutchman's Breeches, a low sedge, and, among shrubs and trees; the hazelnut, "pussy" willow, aspen, red maple, American elm and white cedar. *Shepherdia canadensis* in full flower was also collected by the party. Mr. Groh called attention to the fact that many of the trees blooming at this early date

produced their stamens in catkins, and depended on the wind to transmit the pollen to the pistillate flowers; while later on when the leaves become an obstruction, insects are the chief pollenizing agents. An interesting series of seedlings of the white cedar showed clearly the transition which this tree undergoes, from its earliest lance-shaped, spruce-like leaves to the scaly covered foliage with which most people are alone familiar. The curious, inconspicuous flowers of the cedar, terminating its branchlets, were also pointed out.

Mr. Criddle spoke briefly of the birds and insects observed. These were all comparatively common species but of interest on account of their indicating the advancement of the season in comparison with other years. Among birds, crows, sapsuckers, juncos, American goldfinches, a phoebe, song sparrow, and numerous purple finches were observed in the order named. Mention was made of the somewhat destructive habits of the yellow-bellied sapsucker which punctures the tree in search of sap, and eats the inner bark, in some cases the injury being sufficient to kill the tree. These birds, however, compensate for the injury they do, by destroying many noxious insects. Two butterflies—*Vanessa antiopa* and *V. milberti*—both hibernating species, were recognized. A few beetles were dislodged from beneath stones; these included a specimen of *Cicindela sexguttata*, which had undoubtedly reached maturity last fall and hibernated.

The president spoke of the habits of the red squirrel, which he observed in a pine tree. He also referred to several of the birds and insects mentioned by Mr. Criddle, and to the larvæ of several species of aquatic insects, including larvæ of caddiee flies in their tubes or cases, made of little sticks and stones closely held together with silk.

The writer exhibited a number of well preserved fossils from the Black River and Trenton limestones of Governor's Bay and spoke briefly of the geological features of the park, referring specially to the granite boulders scattered over the surface of the ground.

W. J. W.

NOTES.

SHORT-EARED OWL.—Note on the flight of *Asio accipitrinus*, observed at the Eastern Sandbar, Toronto, September and October, 1909. During the period of migration the remains of forty-seven small birds were found on the beach. Enough feathers remained of the following to make identification possible:

Sora Rail, 1; Yellow-bellied Woodpecker, 3; Hermit Thrush, 1; Slate-colored Junco, 1; Tree Sparrow, 1; White-

throated Sparrow, 2; Myrtle Warbler, 4; Long-billed Marsh Wren, 1; Olive-backed Thrush, 1.

The stomachs of four specimens examined contained pellets of feathers and bird bones. Numerous pellets picked up on the beach were also examined and found to consist of feathers and bird bones.

Following are the dates on which the owls were seen:—September 28th, 6 seen; October 2nd, 9 seen; October 3rd, 20 seen; October 6th, 2 seen; October 16th, 3 seen; October 24th, 4 seen; October 25th, 1 seen.

J. A. MUNRO, Toronto.

PHALAROPES IN WESTERN ONTARIO.—These birds are sufficiently rare to make almost every occurrence worth recording. My collection contains only three skins from this part of the country, and it happens that these three are each of different species.

My Wilson's is the old one recorded in Macoun's catalogue, and I had no chance to add other Ontario specimens until the fall of 1906 when a friend at Rondeau sent me on October 10th a Northern Phalarope. This was followed on the 20th by a Red Phalarope, both in the juvenal plumage. This was a first record of either species for that district, although I have no doubt of their being there with as much regularity as can be expected from such stragglers from the north and west.

The Red Phalarope is a common breeder among the Arctic Islands of Northern Canada, but its migrations do not bring it this way, but take it out to sea.

W. E. SAUNDERS, London, Ont.

BRUNNICH MURRE, *Uria lomvia*.—One male bird was found in a dying condition in the snow, in the early part of December, 1908, near the village of Heaspeler, New Ontario, which is near the upper end of Lake Temiskaming, and sent by the one who found it, Mr. Levi Smith, to the undersigned to be mounted. It was a fine specimen; the stomach was quite empty. The bird had the appearance of having died from starvation.

On December 21st, 1894, I shot a Brunnich's Murre on the river at my place three miles below Port Sydney. The river is known as the north-east branch of the Muskoka River. It had been frozen over, but owing to a few mild days it had opened up down the centre, leaving a strip of ice along the shore about thirty feet wide. The Murre was sitting on the outer edge of this strip of ice when I shot it. On skinning it I found it to be in a very emaciated condition. This was the first Brunnich's Murre that I ever saw or heard of in these parts.

ALFRED KAY, Port Sydney, Ont.

YELLOW-FLOWERED VARIETY OF LARGE CORAL-ROOT.—Perhaps the finding of a yellow-flowered variety of *Corallorhiza multiflora* is a sufficiently rare occurrence to be of interest. I do not recall any Canadian record of it.

A very fine scape with thirty-two flowers was brought to me for identification by an artist associate here, and on going to the spot from which it had come I found a clump of about half a dozen scapes in very good condition and others bearing evidence of a considerable struggle with the dragged drift through which they had had to force their way.

The form is quite that of the common variety and the lip is similar in colour also—white with a few crimson spots, but the rest of the flower and the scape is a very definite but subdued yellow, such perhaps as one understands by "straw-colour," with only the faintest suspicion of green and without even a slight suspicion of the colour characteristic of the common *C. multiflora*. They were growing at the foot of a small hemlock in a dry pine wood, with Partridge Berry, Wintergreen and *Maianthemum canadense* among their nearest neighbours.

R. HOLMES, Toronto.

THE BLACK RAIL IN ONTARIO. In the April NATURALIST, Mr. C. W. Nash questions my conclusions regarding the Black Rail, as given in my review of Macoun's Catalogue of Canadian Birds.

I have a vague recollection of someone telling me that Mr. Nash now thought the Rails that he recorded as Black, were Young Virginia, but I could not say with whom the conversation took place, and on looking the matter up I find that the only published basis that I have for this conclusion is the statement in Fleming's list of the Birds of Toronto, (Auk, volume 23, page 453), under the heading Black Rail, that "Young Virginia Rails have been mistaken for this species." This, of course, does not necessarily refer to the specimens taken by Mr. Nash, nor have I authority to say that this statement was ever intended to refer to those specimens, but apparently I put two and two together, and made something out of them.

I was very glad to have Mr. Nash take this matter up, and will be still more pleased if he will tell us all that he knows and thinks about these Rails, recollecting that the Black Rail is about the size of the Song Sparrow, though a little shorter in length, with a bill of one-half an inch, whereas the Virginia has a bill of over an inch long.

W. E. SAUNDERS, London, Ont.





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PLANTS GROWING WILD AND WITHOUT CULTIVATION IN THE COUNTY OF LAMBTON, ONTARIO.

BY CHARLES K. DODGE, PORT HURON, MICH.

The County of Lambton is situated at the foot of Lake Huron and east of St. Clair River, having about 40 miles of Lake Huron shore and about the same amount of St. Clair River shore, and extending east from the river over 30 miles. One fact not generally known is that on the south it includes the Delta Islands of St. Clair River, belonging to Ontario, and lying immediately west of the northern part of Kent County, the largest being Walpole Island, Squirrel Island and St. Ann's Island. These islands include a number of miles of Lake St. Clair shore. The surface of Lambton County is generally low and level, there being very few hills and very little rolling land. The small rivers and creeks especially in the eastern part are often sunk below the general surface and have narrow flood valleys. The mouths of those flowing northerly into Lake Huron are usually closed during the dry seasons of summer with gravel and sand thrown up by wave and wind. The Aux Sables River, the largest of the small streams, and entering the county at the north-east, appears to flow continuously, but its sinuous course and the large number of its old and abandoned stream beds show conclusively that its course to Lake Huron has often been obstructed and changed. Many small streams flow southerly into Lake St. Clair. Outcroppings appear at Kettle Point, Rock Glen and a few other places, exposing fossil-bearing rocks of great interest to geologists. The Delta Islands of St. Clair River without doubt were mostly formed by the deposit of material carried down by the river into Lake St. Clair, and it has been estimated that about one-fourth of the original area of the lake has thus been filled up.* On the north shore bordering on the lower ends of these islands, the water for some distance is very shallow and the adjacent land recently made very wet and boggy. Parts away from shore are prairie-like, usually very wet in spring and fall, but very

*See report of Leon J. Cole on "The Delta Islands of St. Clair River." Geological Survey of Michigan, Vol. IX, Part I.

dry and spongy in summer and covered mostly with sedges and grasses. Sandy spots and a few low sand ridges are noticed at the upper ends. Tamarack swamps, marshy and boggy places, ponds and shallow lakes, are noticed in various parts of the county, but these have been greatly modified and have partially disappeared in recent years on account of drainage and fires. Along the Lake Huron shore for nearly the whole distance from Point Edward to the north-east limit of the county are sand hills and sand ridges, known also as sand dunes, usually parallel with the shore, ranging from a few to nearly 100 feet in height and extending back from a few rods to a mile. For a short distance near Camlaehie and Kettle Point, the latter place famous for its peculiar rock formation, sand ridges for the most part disappear and flat and naturally wet land covered with the prevailing forest of the county runs down to the shore. These dunes are pure sand and owe their origin exclusively to local conditions and the combined action of waves and wind. They are not so extensive as on the west coast of Michigan and not very prominent here except at and near Port Franks, where a vast amount of sand has been piled up and ridge succeeds ridge for a mile back from shore. Most of them are fixed, being covered with trees, shrubs and herbaceous plants that substantially hold the sand in place. Near the lake, especially at Port Franks, the dunes are still forming and being blown first one way and then another, but nowhere, so far as observed, are they encroaching upon good agricultural land. The lake shore of the county running quite uniformly north-east and south-west, the question naturally arises as to why the dunes are so much more prominent and massive at Port Franks than at any other point. On the west coast of Michigan it has been noticed that the largest dunes have been formed at the mouths of rivers.* This, perhaps, fully explains the situation at Port Franks. At this point the Aux Sables River enters the lake, brings down and carries into it immense amounts of sand, which is again washed up by waves and then blown up into dunes.

From the foregoing it will be seen that the district under consideration may be conveniently divided into three plant habitats: 1, Hydrophytic, the very wet; 2, Mesophytic, the medium wet; 3, Xerophytic, the very dry.

HYDROPHYTIC.

This includes lakes, rivers, creeks, parts of their shores, ponds and bogs. From the favorable situation of the locality

*The Ecological Relations of the Vegetation on the Sand Dunes of Lake Michigan, by Henry Chandler Cowles. Botanical Gazette, Vol. XXVII, Nos. 2, 3, 4 and 5.

this habitat is very interesting. On the border of Lake St. Clair, along the several mouths of St. Clair River and on the Delta Islands are bogs, coves, small bays and large areas of shallow and apparently stagnant and still water. These are the homes of the pondweeds (Potamogetons), no less than 27 species or forms having been noticed. In many places on the borders of Lake St. Clair and the mouths of St. Clair River, and extending out some distance into the water, the rush, *Scirpus occidentalis*, is so dense that it is difficult to row a small boat through it. With it will often be found an abundance of *Equisetum fluviatile*. Nearer the shore, sometimes however in shallow water, or in very wet places, *Scirpus validus*, *S. heterochaetus*, *Sparganium eurycarpum* and *Bidens beckii* are abundant. In coves and still water the pickerel-weed, *Najas flexilis*, water shield, *Nymphaea advena*, and *Castalia tuberosa*, are very frequent, and *Eleocharis quadrangulata*, occasional. In very wet places, and often as it appears in the beds of old but now mostly discontinued streams, the reed, *Phragmites communis*, is abundant and very striking in appearance when in bloom. The renowned Indian rice, *Zizania aquatica* and *Vallisneria spiralis*, known among sportsmen as wild celery, and both said to furnish much food for ducks, are found, the former plentiful in spots, the latter common everywhere. Another plant, *Sagittaria latifolia*, whose root or rootstock is said to furnish food for ducks and swan, and sometimes known as swan-root, is common in mud and shallow water. The advent of the white man is gradually bringing about permanent changes among both our wild animals and plants. Notwithstanding the modern humane laws for the protection of game, and the fact that it is naturally one of the finest feeding grounds, the number of water birds now visiting the once famous shooting grounds of the "St. Clair Flats" has much diminished in comparison with former times. "Proximity of cities and dense populations also tend greatly to destroy all wild plants, with beautiful flowers. About twenty years ago, Sarnia Bay, a piece of still water lying on the east side of St. Clair River between the cities of Sarnia, Ontario, and Port Huron, Michigan, was noted for its great abundance of the white water lily, *Castalia tuberosa*. Constant gathering by the people of both cities and the closing up of the bay by lumber companies, has about extinguished it. North-east of Sarnia, but a few years ago, there were large tamarack swamps, and a few smaller ones were noticed in other localities. Since then a complete change has taken place. A few trees only skirt the borders of the few swamps now left. Some fine meadows, cultivated fields of corn, other grains, and sometimes celery, have taken their places. Formerly on the borders of these swamps and among the trees, the pitcher plant was

abundant, *Cypripedium parviflorum*, and the beautiful species *C. hirsutum* (*C. spectabile*), common and *Pogonia ophioglossoides* and *Calopogon pulchellus*, frequent. At Port Franks, on the borders of old river beds, long ago abandoned by the Aux Sables River, the pitcher plant still exists, and in wet boggy spots the buckbean is abundant.

MESOPHYTIC.

In this habitat may be included by far the largest part of this region. Perhaps less than seventy years ago Lambton County was covered with an almost impenetrable forest. At that time conditions were such that it retained for nearly the whole summer season large amounts of water received in the form of rain and snow. The small rivers and creeks, being more or less clogged with rubbish, drained the surface very slowly and the forest was then known as "wet woods." Since that time a radical change has taken place. At present the whole region is fairly well drained, and most of the timber cut, there being left here and there "wood lots," partially showing former conditions, although generally very heavily pastured. The Indian reservations near Kettle Point, below Sarnia and on the Delta Islands, having undergone a less radical change, although parts are fairly cultivated, show and prove better than any other localities what the original vegetation was. From an examination of woods near Sarnia, Port Franks, Rock Glen, Wyoming, Watford, Alvinston and the Indian reservations, especially on the Delta Islands, these several places extending fairly well over the county, it appears that the original tree growth was as follows in order of abundance: American elm, black ash, white ash, red maple, basswood, beech, sugar maple, ironwood (*Ostrya virginiana*), blue beech (*Carpinus caroliniana*), silver maple, *Cratægus punctata*, red oak, bur oak, cottonwood, yellow birch, shagbark hickory, butternut, sycamore, peach-leaved willow, red ash, rock elm and slippery elm. Pin oak is the dominant tree on the Delta Islands in spots and here or perhaps in parts of Kent County reaches its northern limit. One large tree of the mocker nut hickory was noticed on Squirrel Island, probably its extreme northern limit for this region. In such wet forests the species of plant undergrowth are not very numerous. Among others were noticed the spice bush, moosewood, red-berried elder, lizard's tail, jack-in-the-pulpit, wild leek (formerly very abundant), wild garlic, ground nut (*Panax trifolium*), spikenard, wild sarsaparilla, *Circæa alpina*, wood nettle, *Cardamine douglassii*, *Claytonia virginica*. Much of the prairie-like land of the Delta Islands naturally falls within this division. Hundreds of acres there are covered with *Habenaria leucophæa*,

Liatris spicata, a beautiful plant in bloom, Indian grass, *Gerardia paupercula* and *Spartina michauxiana*. In spots are found *Asclepias sullivantii*, *Tradescantia reflexa*, *Viola sagittata*, *Vernonia missurica*, *Polygala incarnata*, *Panicum virgatum*, *Aster multiflorus*, and *Cypripedium candidum*.

XEROPHYTIC.

This plant habitat covers the sandy portion of Lake Huron shore, sand dunes, sand hills, sand ridges, flat, dry and sandy land, and all dry and sterile ground. The Lake Huron beach included under this division may be regarded as that part of the sandy shore frequently washed by waves. This part has a very sparse vegetation, plants peculiar to itself and not equally distributed. *Cakile edentula* is seldom abundant, but fairly well distributed, and often near the water. *Euphorbia polygonifolia* is abundant in spots and often in the drifting sand of the beach. *Artemisia caudata* is frequent, but this is also found on the dunes. One plant of the beach, perhaps deserving particular notice, is *Cirsium pitcheri*, a thistle known only, I believe, along the Great Lakes, and named for Dr. Zina Pitcher, an army physician stationed more than sixty years ago at Fort Gratiot, Michigan, now a part of the City of Port Huron. This plant, common at Port Franks, loves the wave-washed shore, and often creeps up the first shoreward dune, but very seldom beyond. *Ammophila arenaria* and *Calamovilfa longifolia*, two grasses often found in abundance on the beach, are true and efficient sand binders, both having a root or rootstock system which very effectually protects the sand from the action of wind and waves. The former is usually nearer the water, the latter farther up on the beach, but both are also noticed on dunes. So well adapted are these two grasses for holding down and binding the drifting sands or shores that governments in Europe and America have much encouraged their planting to protect sea coasts and to prevent the sand from encroaching upon good agricultural land. The beach pea also frequent at Port Franks is another strong sand binder and has been known to extend its rootstock in sand over nine feet horizontally. These three plants are said to be abundant in many places on the Atlantic shores. *Juncus balticus littoralis* frequently establishes itself as a strong sand binder, but is also found in other localities. The sandy beach and sand dunes are the least productive of any part of the county, at present the dunes being useful only for timber growth and a small amount of pasturage. Generally only such plants grow on the dunes as are adapted to dry sandy conditions. Here vegetation has not been much changed and hence is fairly primitive. Only those plants thrive there that can best endure the hard conditions

imposed upon them and have developed special powers of resistance. On account of these special modifications to fit the environment, the plants of the sand dunes are of great interest to the botanist and worthy of much study. The dune plant covering varies in many respects from point to point. Immediately east of Point Edward the dominant trees are white oak, yellow-barked oak (*Quercus velutina*), and red oak. Balsam poplar is often abundant on the dune nearest the lake, and is a good sand binder. Bur oak usually occupies rich ground, but here it is frequent on the shoreward dune and acts as a good sand binder and dune builder. In this situation, however, it is generally small and scraggy, often having its trunk buried several feet in the sand, but usually producing a great abundance of acorns. White pine and sassafras are also frequent. The common smaller trees and shrubs are the choke cherry, witch-hazel, *Rhus typhina*, *R. canadensis*, *R. toxicodendron*, *Amelanchier spicata*, black huckleberry, low sweet blueberry, and in spots, *Ceanothus ovatus*, bearberry, *Ceanothus americanus*, *Symphoricarpos racemosus pauciflorus*, *Rosa humilis*, sand cherry, *Vitis vulpina*, dewberry, and *Amelanchier oblongifolia*. On the upper beach near many of the summer cottages and along the first dune, *Salix purpurea* has been planted, thrives and is proving to be a strong sand binder. The prevailing herbaceous plants, many of them plentiful in spots, are *Sporobolus cryptandrus*, *Elymus canadensis*, *Agropyron dasystachyum*, *Bromus kalmii*, porcupine grass, *Lithospermum gmelini*, *L. angustifolium*, *Arabis lyrata*, *Liatris scariosa*, *L. cylindracea*, *Viola pubescens*, *V. fimbriatula*, *V. pedata lineariloba*, *Senecio balsamitac*, *Campanula rotundifolia*, *Helianthus divaricatus*, *Linum virginianum*, *Desmodium rotundifolium*, *Lespedeza capitata*, *L. frutescens*, *Acerates viridiflora lanceolata*, *Polygonum tenue*, *Draba caroliniana*, wild lupine, *Aster azureus*, *Lilium philadelphicum andinum*, *Asclepias syriaca* and *A. tuberosa*. Farther to the north-east beyond Kettle Point and toward Port Franks, the change in plant associations is very apparent. The shoreward dunes are still active and the fixed ones much larger and higher. Here the Norway pine (red pine), is well established and abundant reaching its southern limit for this locality. The white pine is more common, and near Thedford, formerly covered thickly, several large pieces of flat sandy land, as the remaining stumps now prove. *Juniperus communis* and red cedar become common. Two new oaks appear, *Quercus muhlenbergii* and *Q. prinoides*, not noticed elsewhere. *Q. coccinea* is occasional. *Celtis occidentalis pumila* is very common, and Rev. Mr. Currie, of Thedford, reports having seen one or two specimens of the species near there. *Salix glaucophylla* is abundant on the upper beach and dunes and is a substantial sand binder.

Shepherdia canadensis is also very abundant in spots. Many herbaceous plants, a few not seen elsewhere, find a congenial home here. On the shaded sides of high dunes are *Oryzopsis racemosa* and *Carex eburnea* and on the drifting shore and dunes, bugseed in abundance. In spots *Buchnera americana*, *Aster ptarmicoides* and *Viola arenaria* are frequent. In a few places on the Delta Islands, xerophytic conditions prevail. Within a small area on Squirrel Island the following association of plants was observed: *Liatris scariosa*, *Hieracium longipilum*, butterfly-weed, wild lupine, *Lespedeza capitata*, *Ceanothus americanus*, *Gentiana linearis*, *Bucknera americana* and *Andropogon scoparius*.

Without particular reference to habitat and divisions given above, some localities are noted for the appearance of one or more species seldom seen or not noticed elsewhere. At the north end of Walpole Island the scarlet painted cup and *Cerastium arvense oblongifolium* are abundant, the latter not noticed elsewhere. About the middle of the north half of the same island, several spots are thickly covered with *Silphium terebinthinaceum*, long ago reported by Prof. John Macoun, this, very probably, being its northern limit for our locality. On the bank of the Aux Sables River Mr. Newton Tripp, of Forest, found *Cacalia tuberosa* and *Astragalus neglectus*, both rare for this region. In and about a large pond north of Sarnia, *Utricularia resupinata* is abundant.

It is perhaps not best to go into the well known methods of plant distribution by means of seeds, and the various ways in which they are brought from one country to another, yet it is interesting to notice the great changes taking place in a comparatively new country. At Point Edward, where the Grand Trunk Railway formerly crossed into Michigan, the following introduced plants have been well established for a number of years in the streets and waste places: *Datura stramonium*, *D. tatula*, *Ambrosia psilostachya*, *Amaranthus blitoides*, Russian thistle, catnip, *Solanum carolinense*, *Euphorbia lucida*, *Artemisia vulgaris*, *A. pontica* L., *Echium vulgare*, *Ribes aureum*, matrimony vine, *Linaria vulgaris*, *L. minor*, *Verbena stricta*, *V. bracteosa*, *Cycloloma atriplicifolium*, *Chenopodium botrys*, *Erysimum parviflorum*, *Thlaspi arvense*, *Bromus brizaeformis*, *B. tectorum*, *Sisymbrium altissimum*, *Petalostemum purpureum* and others.

It is very natural for an observer in looking backward to contrast conditions existing before the advent of Europeans with those of the present time. The great change that has been going on from time to time in various parts of North America for 200 years and more, from a state of nature to one of civilization has occurred here in recent years. From an almost impassable forest, the country has been changed by the activity

and persistence of white men to one of the best agricultural districts. The soil is usually clay or clay loam and has been recovered by clearing and a fairly good system of drainage. The splendid farm buildings throughout and the prosperous appearance of villages and towns show activity, thrift and success. A few localities have become noted for apples and other fruits. Some of the finest apple orchards the writer has ever seen were noticed east of Arkona. The position of the county as to water front is unusually good. This, no doubt, as it becomes more and more appreciated, will induce hundreds of people to build cottages for summer residence on both lake and river shores. In fact, this is already actively going on. To an outside observer the suggestion is irresistible that the sand dunes at and near Port Franks would make a fine Government reservation which could be easily reached by electric railways from large cities.

The scientific names above used are according to Gray's New Manual of Botany. Where this work gave no common names, these were taken from Britton and Brown's Illustrated Flora and Britton's Manual. In writing specific scientific names, capital letters have in all cases been purposely omitted.

CANADIAN SPECIES OF THALICTRUM.—IV.

BY EDWARD L. GREENE.

Continuing our study of the white-flowered meadow-rues indigenous to Canada, a group of species which, if one regarded nothing else but their stout white stamens, might be thrown together as all one—as these had been for a hundred years formerly as *T. Cornuti*, later as *T. polygamum*—we take up next after *T. sibiricum* of Sable Island, two others which, so far as known, are of Newfoundland and Labrador.

THALICTRUM TERRAE NOVAE. Stems neither stout nor strongly angled or striate, glabrous throughout, copiously leafy and very few-flowered, 2 feet high or more; basal leaves not seen, the several cauline sessile, ample, deep-green above, glaucescent beneath, all except the uppermost glabrous, but these with a trace of scattered hairs beneath; terminal leaflets somewhat round-obovate, $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long, of nearly equal breadth above the middle, not deeply but very obtusely 3-lobed, the medium lobe in the staminate plant much the largest, itself usually 3-lobed (seldom so in the fertile plant), all lobes broader than long, the leaflet as a whole always obtuse at base unless obliquely cordate; lateral leaflets smaller, narrower in proportion, mostly either 3-lobed or 2-lobed, a few obliquely oval and

entire; staminate plants with flowers usually only 5 or 6 in a single terminal cyme; sepals 4, obovate, obtuse, glabrous; stamens about 20; filaments slenderly clavellate, the thickest part not as wide as the short merely oval anthers; fertile plant bearing a small terminal panicle of 10 to 14 flowers, these with a few stamens and numerous pistils; fruit not seen.

Vicinity of Balena, Hermitage Bay, Newfoundland, along streams, collected by William Palmer, 7 July, 1903; his No. 1398, as in U. S. Herb.; also on rocky banks of Rennie's River, by Robinson and Schrenck, 4 Aug., 1894; their No. 187, as in U. S. Herb. and Canad. Geol. Survey.

THALICTRUM LABRADORICUM. Stems not tall, stout, hollow, striate-angled, glabrous, or the upper part sparingly hirtellous; foliage thin and delicate, that of the lower part of the plant glabrous on both faces, but the upper leaves glabrous above, sparsely pubescent beneath between the veins, not along them; terminal leaflets rarely cuneately, usually subquadrately somewhat obovate, about 1 inch long, $\frac{3}{4}$ -inch wide just below the lobes, obtuse or subcordate at base, the 3-lobes neither decidedly obtuse nor very plainly acute, the middle one largest, often itself 3-lobed; flowers few, in one or two simple, corymbs of 3 or 4, or even solitary; the staminate very large, $\frac{1}{2}$ -inch in diameter, the stamens in no part capillary, their filaments clavellate almost from the base and little thicker even at summit, their greatest breadth not exceeding that of the anthers, these oblong-linear, obscurely mucronulate; fertile flowers with many pistils and usually 6 to 10 stamens; mature carpels gradually narrowed below the middle but sessile, thickest a little below the summit, therefore subclavate being only very slightly flattened, sparsely pubescent both at the flowering stage and at maturity.

Two sheets of specimens of this are before me, one belonging to the U. S. National Herbarium, consisting of two staminate plants and one fruiting one. These were collected in "Labrador" by W. E. Stearns in 1875. The other sheet is No. 4,335 of the Canadian Geol. Survey. This contains the upper portions of four plants, all fertile, the flowers, though hermaphrodite, consisting mainly of pistils. These specimens are from thickets along the Upper West Branch of Hamilton River, Labrador, by A. P. Low, 7 July, 1894. Both sheets had been labelled *T. dioicum*, in either case the result of a mere glance at the plants as small and very few-flowered, without the least attention to the fact that the stamens are all clavate and erect; and, in the living state, they must have been white, and therefore showy.

By the large size and the small number of these white-stamened flowers, the plant seems to recall more vividly than any other North American species the *T. aquilegifolium* of

Europe; and it is not at all impossible that some such plant as this, from far northward, may have been Cornut's original *T. Canadense*, and therefore the original *T. Cornuti* of Linnæus.

THALICTRUM TORTUOSUM. Stout, rigid, evidently tall, doubtless a yard high or near it, the stem angled and striate, also minutely appressed-pubescent, the upper and floriferous part more or less tortuous; basal leaves not seen, the largest cauline one sessile, very large, 8 inches long and 10 in breadth, every petiolule and ramification of it singularly tortuous; terminal leaflets an inch long, nearly as broad, of round-ovate contour, cordate at base, at summit variously but always broadly and not deeply lobed, the median lobe often exceeding the others and itself 3-lobed, as often only broader and entire, all lobes very obtuse; lateral leaflets broadly and very obliquely oval when entire, but some larger and with a lobe or two, all leaflets of firm texture, dark blue-green above and with scattered scaberulous hairs, beneath glaucous and thinly tomentulose; flowers of fertile plants in a rather naked but not large terminal panicle, the flowers 25 to 40, the several stamens with long filaments capillary at base, distinctly clavate above the middle, but nowhere of much more than half the thickness of the anthers, these oblong to oblong-linear, mucronulate; carpels numerous, nearly all maturing, small, sessile, scaberulous, their stigmas closely circinate.

Thickets at Baddeck, Cape Breton Island, Macoun, 28 July, 1898. Only the middle and upper parts of one or two plants were collected, all with mainly pistillate flowers, though with several stamens in each flower; but the species is strongly marked by its petioles and petiolules all of which are as contorted as those of a Clematis, and the texture as well as the indument of the leaflet is of a firmness not known in other meadow-rues of the farther North. The circinate character of the stigmas is striking, but occurs in one or more other species. The specimens bear the number 19,006 of the Geol. Survey.

THALICTRUM GLAUCODEUM. Rather slender, 2 feet high or more, with stem strongly striate-angled and glabrous, simple, leafy up to the small and rather naked panicle; leaves rather small and of many small leaflets, the basal not seen, the lower cauline petiolate, the upper sessile, all of firm texture, glaucous on both faces, but beneath almost white with bloom; terminal leaflets shortly and subquadrately obovate, the largest barely $\frac{3}{4}$ -inch long, $\frac{1}{2}$ -inch wide under the lobes, these 3, shallow, much broader than long, rounded, yet abruptly acutish, the base obtuse or subtruncate, the lateral leaflets not much smaller, mainly not very dissimilar, but a few quite small round-oval and entire, all leaflets marked underneath by a few very pro-

minently raised white veins and a thin indument of short white hairs; panicle of fertile plant small but rather many-flowered and dense, its branches glabrous, as also the calyx; pistils numerous, encircled by a row of 3 to 7 or 8 stamens; filaments abruptly clavate above, but not to the width of the mostly broad and merely oval (occasionally oblong) anthers; immature carpels fusiform, substipitate, glabrous.

The type specimen of this rather elegant and very pale meadow-rue is in the herbarium of the Geol. Survey, under No. 869, and came from Tignish, at the northern extremity of Prince Edward Island, where it was obtained by Professor Macoun, 25 July, 1888. The flowers, though mainly pistillate, are very fairly hermaphrodite.

A plant much like this in habit, quite as pale with bloom, and even with very similar foliage, is in the same herbarium from Boyleston, Nova Scotia, by Dr. Charles A. Hamilton, July, 1890. It also has hermaphrodite flowers, and in these the calyx is persistent and is of five or six narrow elliptical sepals. This plant also I refer tentatively to *T. glaucodeum*, and hope it may prove to belong with the more northerly and insular type.

BIRDS OBSERVED AT SHERBROOKE, QUE.—SPRING MIGRATION, 1909.

BY R. G. PRICE.

Crow.....	Feb. 28,	common.....	S.R.
Robin.....	Mar. 12,	".....	S.R.
Horned Lark.....	" 12,	fairly common (1)...	S.R.?
Bronze Grackle.....	Apr. 5,	common.....	S.R.
Bluebird.....	" 5,	".....	S.R.
Red-tailed Hawk.....	" 5,	becoming rare.....	S.R.
Red-shouldered Hawk....	" 6,	common.....	S.R.
Song Sparrow.....	" 6,	".....	S.R.
Marsh Hawk.....	" 5,	fairly common.....	S.R.
Northern Shrike.....	" 6,	".....	R.
Blue Jay.....	" 6,	common.....	R.
Red Crossbill.....	" 6,	fairly common (2)...	P.M.
White-winged Crossbill...	" 6,	rare.....	P.M.
Pigeon Hawk.....	" 7,	fairly common.....	S.R.
Junco.....	" 7,	".....	P.M.
Meadow Lark.....	" 12,	".....	S.R.
Sparrow Hawk.....	" 12,	".....	S.R.
Golden-eye Duck.....	" 12,	common (3).....	S.R.
Cowbird.....	" 15,	".....	S.R.

Phoebe.....	"	15,	fairly common.....	S.R.
Flicker.....	"	21,	" "	S.R.
Purple Finch.....	"	21,	" "	S.R.
Bald Eagle.....	"	21,	rare.....	S.R.
Osprey.....	"	21,	fairly common.....	S.R.
Chipping Sparrow.....	"	29,	common.....	S.R.
Field Sparrow.....	"	29,	fairly common.....	S.R.
Barn Swallow.....	"	30,	common.....	S.R.
Yellow Warbler.....	May	9,	fairly common.....	S.R.
Chimney Swift.....	"	10,	common.....	S.R.
Chebec.....	"	10,	fairly common.....	S.R.
Fox Sparrow.....	"	10,	" "	P.M.
Winter Wren.....	"	11,	" "	S.R.
Bank Swallow.....	"	11,	common.....	S.R.
Myrtle Warbler.....	"	11,	fairly common.....	P.M.
Goldfinch.....	"	12,	" "	S.R.
American Merganser.....	"	12,	rare.....	P.M.
Belted Kingfisher.....	"	12,	common.....	S.R.
White-crowned Sparrow..	"	12,	"	P.M.
Golden-crowned Kinglet..	"	12,	rare.....	P.M.?
Wilson's Thrush.....	"	12,	common.....	S.R.
Hermit Thrush.....	"	12,	fairly common.....	S.R.
Bobolink.....	"	13,	common.....	S.R.
Yellow-bellied Sapsucker..	"	13,	fairly common.....	S.R.
Jenny Wren.....	"	14,	" "	S.R.
Kingbird.....	"	15,	common.....	S.R.
White-throated Sparrow..	"	12,	"	S.R.
Purple Martin.....	"	14,	"	S.R.
Yellow-throated Vireo....	"	16,	rare.....	S.R.
Great-crested Flycatcher..	"	16,	"	S.R.
Blue Heron.....	"	17,	fairly common.....	S.R.
Maryland Yellowthroat...	"	18,	" "	S.R.
Water Thrush.....	"	18,	" "	S.R.
Black-sided Blue Warbler..	"	19,	" "	S.R.
Rose-breasted Grosbeak..	"	19,	" "	S.R.
Baltimore Oriole.....	"	19,	" "	S.R.
Bittern.....	"	20,	" "	S.R.
Sharp-shinned Hawk.....	"	20,	" "	S.R.
Red-eyed Vireo.....	"	22,	common.....	S.R.
Ovenbird.....	"	22,	fairly common.....	S.R.
Swamp Sparrow.....	"	26,	rare.....	S.R.
Whip-poor-will.....	"	26,	fairly common.....	S.R.
Ruby-throated Humming- bird.....	"	28,	" "	S.R.
Catbird.....	"	28,	common.....	S.R.
Cedar Waxwing.....	June	6,	fairly common.....	S.R.

Night Hawk.....	June 7, fairly common.....	S.R.
Cuckoo.....	" 14, rare.....	S.R.
Great Horned Owl.....	" 14, ".....	S.R.
Scarlet Tanager.....	" 14, ".....	S.R.
Indigo Bunting.....	" 16, very rare.....	S.R.
Chestnut-sided Warbler...	" 16, fairly common.....	S.R.
Black-capped Warbler.....	" 18, rare.....	S.R.
Blackburnian Warbler....	" 18, ".....	S.R.
Parula Warbler.....	" 20, ".....	S.R.
Barred Owl.....	" 20, common.....	R.
Hairy Woodpecker.....	" 20, fairly common.....	R.

Owing to rather limited time the foregoing observations are very incomplete, neither do they indicate the exact arrival of the birds. Abbreviations used:—P.M., passing migrant; S.R., summer resident; R., resident.

- (1) Have observed only 2 cases of breeding here.
- (2) Some years are quite numerous.
- (3) Breeds on Lakes St. Francis, Magog and Aylmer.

SVALOF SEED FARM.

BY GEO. H. CLARK, SEED COMMISSIONER.

Svalof is the name of a railway station in the south of Sweden. There is scarcely a village there, but there is a hotel that would do credit to most of our Canadian towns. A 5,000 acre seed farm at Svalof forms an attraction to agriculturists, not only from Europe, but from all over the world. There is where Nilsson has worked for 20 years. He is now 54 years of age and is reaping some of the fruits of his labors in the pleasure of having people from all over the world come to Svalof to study his methods.

There is also an agricultural high school at Svalof which would compare favorably, in building and equipments, with the best high schools in the smaller towns throughout Canada. There are 46 of these schools of agriculture distributed throughout Sweden, in a way so that they are conveniently available to the farming population of Sweden, which cultivates an area in all not exceeding 9,000,000 acres of land. Because of these schools of agriculture, the average intelligence of the Swedish farmers is perhaps superior to that of most other countries, and the Swedish farmers make good use of the results of the work done by their experimenters.

The 5,000 acre seed farm at Svalof is officered by a scientific staff of five experts and their assistants, who have a splendid

equipment of buildings and apparatus and about 30 acres of land which are devoted exclusively to plant breeding and seed selection work. This scientific staff works together with a commercial organization which is known as the General Swedish Seed Company. The superior selections of wheat, oats, barley, grasses, rye potatoes and other crops produced by Nilsson and his staff are increased on the larger areas of land and ultimately sold for seeding by the commercial company.

Sweden is a storm-driven and rust-ridden country. The climatic conditions are not dissimilar to those of the north of Scotland. Prior to 1890, Swedish farmers suffered heavy losses from their grain crops being driven down by storms and badly rusted. Dr. Nilsson conceived the idea of going to those storm-driven and badly rusted fields and selecting individual plants which had shown their ability to resist both the storm and rust and were otherwise of good quality. These individual plants of outstanding merit he calls mutants, or sports that will increase true to type. Such mutants he has found to be produced by natural cross fertilization, which occurs but rarely with wheat, oats and barley. He has found such sports the type of which was not fixed but would continue to vary in a manner quite similar to artificial crosses. The good grain from these individual plants is sown with hand drills in rows about seven inches apart, to correspond as nearly as possible with field conditions, both as to soil and thickness of seeding. Out of the 100 or more plants which were first selected and increased in these single rows, a few of the very best are selected and continued the next year on larger plots. From the larger plots the yield and the milling, feeding or malting qualities are determined and only the very best of the new selections—those which are superior for certain conditions of their soil or climate to any of their older sorts—are increased and handed over to the commercial company.

Formerly the average yield per acre of the cereal crops of Sweden ranked low when compared with the other countries of Europe. During the last three years Sweden has ranked in yield of cereal crops per acre among the first five European countries, which is somewhat remarkable considering her position to the far north. If we are to consider the south of Sweden alone, the yield per acre of her grain crops is second only to that of England. Practically all of the cereal crops now grown in Sweden are traceable to Nilsson and his staff, and in their publications the people of Sweden frankly acknowledge their indebtedness to Nilsson for the advanced condition of their agriculture.



NATURE STUDY.

NOTE.—The following article has been prepared for the NATURALIST by Mr. S. E. Percival, a student at the Ottawa Normal School. It is a straightforward statement of what he himself saw, and as such will commend itself to every naturalist and reader of this magazine.—J. W. G.

A WEASEL'S HOME.

Not long ago the opportunity was afforded me of discovering some very interesting facts concerning the life habits of our rather doubtful friend, the weasel. For the benefit of those who are not already well acquainted with this crafty little animal I shall narrate a few incidents as they were brought to my notice.

On one occasion as we were removing the sheaves from a large mow at a threshing bee, near the village of Burrit's Rapids, we were struck by the frequent appearance of a weasel at widely different points about the barn. The little creature seemed greatly distressed and agitated. The men regarded it with a certain amount of interest and amusement, wondering what in their work was causing the little animal so much of apparent worry and excitement. In a very short time, however, the problem was solved. About half way down in the mow the men opened up some peculiar but luxurious apartments which had evidently been the home of the uneasy weasel. The home was lined throughout with the soft fur of mice. The floor had an extra thick covering and in the centre, evidently to take the place of the modern rug, was neatly spread the skin of our pet kitten which had mysteriously disappeared some days before. This room appeared to be the main living room and was about the size of an ordinary water pail.

From this room a winding passage led into another room which presented a rather ghastly appearance, being strewn with the bodies of dead mice, bones, fur, etc. From this commissariat apartment, as well as from the living room, passages and cross passages extended in all directions horizontally forming quite a perfect system of highways.

The following incidents came under the notice of a friend of mine who reported to me all the details as he saw them:

One day while returning from the fields through a lane he heard, before him, a most distressed and dismal squealing. Approaching cautiously he observed two adult weasels each leading by force one of their incorrigible offspring, while two others came quietly along in the rear. There was evidently some cause for a sudden change of quarters. He was unable to watch them long enough to determine their destination, but knowing as we

do the nature of the most luxurious quarters they must have been forced to leave, we cannot blame the young ones for going so reluctantly from it. Again when we note with what determination the parent weasels persisted in placing their young ones in safety we can here at least find in this ever alert lover of blood so much dreaded by other wild and innocent creatures, at least one characteristic worthy of our admiration.

S. E. PERCIVAL.

EXCURSIONS.

The second excursion of the season was held on the afternoon of Saturday, 23rd April at Britannia. The day was beautiful, and there was a fairly good attendance of members and their friends. Mr. W. T. Macoun and Mr. Groh were the leaders of the Botanical Branch, Mr. Wilson of the Geological Branch and Mr. Halkett of the Zoological Branch. The observations and addresses at the close of the outing were of a general nature. Mr. H. T. Gussow was called on to speak and made some remarks chiefly on fungi, and Mr. Wilson showed some conglomerates. Toads were seen in their spawning beds, and some of their eggs shown. Among the pools were observed forms such as *Physa* and *Limnæa stagnalis* of pulmonate mollusks; phyllopod; water arachnids; and larvæ of caddis-flies, the tubes of these being made of bits of twigs instead of grains of quartz as were some of those of a species found in the creek at Rockcliffe at the excursion on the previous Saturday.

Those who attended the excursion expressed themselves as having enjoyed the outing thoroughly.

A. H.

On Saturday afternoon, April 30th, the excursion was held to Billings' Bridge and the district south of the Rideau River. Here a very pretty stream winds between high banks, the east side of the ravine being heavily wooded for some distance. The afternoon, although not very promising at first, turned out very fine, and although the attendance was not large all seemed to agree that the excursion was a most enjoyable one.

After having explored the district on all sides the various parties assembled at a beautiful spot on the bank of the stream. The president, Mr. Halkett, showed some Crayfish (*Cambarus*) which he found in the stream and its adjacent pools. At a previous excursion to Britannia he had shown a phyllopod with eggs attached to the abdominal somites and had referred to the way the lobster and the crayfish carry their eggs attached to

their swimmerets; and, as there was among the crayfish shown at Billing's Bridge a female heavily laden with eggs, he was able to verify his previous statement from the living specimen. Mr. Halkett also showed a living Brook Stickleback (*Eucalia inconstans*) which was caught in the stream, also the eggs of a mollusk, presumably *Physa*, embedded in a jelly mass which was attached to a stone. The tiny shells could be seen through the egg membranes.

Mr. Groh exhibited one of the first Amelanchiers (June berries) of the season taken from a small tree on the bank of the stream near by. The date was considered early as compared with last year when these were found in bloom a month later. He also showed some of the stems of the Climbing Bitter Sweet which, as he pointed out, had become so twisted and coiled as to choke the stems beneath its coils. The White Trillium was found in abundance in one woods near by. Other specimens exhibited were: Bishop's Cap, Squirrel Corn, Baneberry, Red Trillium, a stemless blue violet (probably *V. septentrionalis*) and many others collected on a previous excursion.

Mr. Brown distributed specimens of Beech nuts in various stages of germination and drew attention to the fine flavor of the cotyledons in the first stages of growth, a fact which first came to his notice when but a lad on his way to and from school in a beech country. He also distributed specimens of the Dog's-tooth Violet, showing the first year's growth, which consisted of a single leaf, a small bulb and a shoot penetrating downwards from this bulb, and the second year's growth which consisted of a pair of leaves, a flower and a much larger bulb which had formed several inches below the former small bulb.

Mr. J. W. Gibson referred to the advantages offered by such a locality for the study of geography and especially from the standpoint of river systems and the great work of erosion. Many of the tributaries of this stream may be traced to their beginnings some distance away in the more open country. He also pointed out the effect of the forest trees along the banks of the stream in preventing the erosion of the soil. The various species of trees found in this locality were also mentioned, attention being called especially to the American Yew Tree (*Taxus canadensis*), this being one of the few places about Ottawa where it is found.

Mr. Nichols spoke for the leaders of the geological branch and stated that the rocks exposed in the banks of the brook were of the Utica formation and were composed of black bituminous shale. One layer about three inches thick was much harder than the rest and contained an abundance of graptolites apparently of one species, and also beautifully preserved specimens of a small brachiopod, *Leptobolus insignis*. There were also

some specimens of obscure plant remains seen. Mr. Nichols pointed out a fault in the rock on the opposite side of the brook in view of the audience. The strata on the western side of the fault dips at a considerable angle and gradually becomes nearly horizontal at some distance away, while on the east side the layers are almost undisturbed. Attention was also called to the erosion of the clay beds and soft shale through which the small brook has cut a deep gully.

J. W. G.

BOOK REVIEW.

BIRDS OF NEW YORK, by Elon Howard Eaton; Part I, Introductory Chapters; Water Birds and Game Birds: New York State Museum, Albany, N.Y., Memoir 12.

This sumptuous volume of 390 pages, beautifully printed on the best of paper, has just recently appeared. It is in every way fully up to the high standard of the other excellent Memoirs of the New York State Museum, the authorities of which have done so much to stimulate research in natural history. The economic importance of a study of birds is now widely recognized. Much investigation into their feeding habits has proved beyond doubt that they are extremely important friends of the agriculturist, in fact, of the whole community at large.

At the present time it is stated that there are 411 species of birds which have been recorded as occurring in New York State. The species have been grouped into six classes, viz.: I. Residents, II. Summer residents, III. Transients, IV. Winter visitants, V. Summer visitants, VI. Accidental visitants. In an interesting chapter near the beginning much useful information is given on life zones, as well as charts to illustrate the distribution of the birds which breed in the three life zones of New York. In a chapter on "Increase and Decrease of Species," it is remarked that it is the general testimony of authors that there has been a marked diminution in the bird life of New York State during the past century. The reasons why this is so are clearly set forth and are only too well known. Modern agriculture is responsible for the death of many birds. Telephone and telegraph wires, electric lights, plate glass windows, cats and thoughtless boys, in cities and towns, all add to the danger to many species. "Perhaps the most destructive class are the thoughtless boys who go birds' egging and shooting indiscriminately; also foreigners, mostly Italians, who often kill all kinds of birds for food, as they have been accustomed to do in their native country; and the pot hunters and market gunners, who

exterminate our game without mercy." The author states that on one occasion he picked up 18 swallows which had been killed by a gunner who was returning home from a disappointed duck hunt. Such acts are, of course, "largely the result of thoughtlessness or ignorance, and it is hoped by spreading a knowledge of our native birds, thereby arousing a pride and interest in their welfare, we may overcome a large portion of this wanton destructiveness."

The tables of "Spring Migration: Arrivals," and "New York Birds: Local Lists" will be of much interest to students in Canada, as well as in the United States. 300 pages are devoted to the water birds and game birds. The species are treated of under the sub-headings "Description," "Distinctive marks," "Field marks," "Distribution," "Migrations," "Haunts and habits," "Food," and "Nests and eggs." The Diving Birds are given first attention. These are followed by an account of the Long-winged Swimmers; then, in order, the Tube-nosed Swimmers; the Totipalmate Birds; the Lamellirostral Swimmers; the Herons, etc., the Marsh Birds, the Plover, Snipe, etc.; Gallinaceous Birds, and Pigeons. Altogether 179 species are treated of. Throughout the text many beautiful illustrations from photographs have been incorporated. Those showing nests and eggs are of special merit and interest. At the end of the volume there are 42 full paged magnificent coloured plates, all of which have been drawn by Mr. Louis Agassiz Fuertes, the well known bird artist. For the last ten years Mr. Fuertes has made careful colour notes immediately after the capture of the birds used for illustrations. In this way he has been able to depict, wonderfully well, the different colours of the birds.

This work is a most important addition to the literature of North American ornithology, and will be greatly welcomed by students of birds everywhere. It will be of much interest to Canadian ornithologists on account of so many of the species occurring in our territory. Much credit is due to the author for the preparation of this immensely valuable Memoir, to the artist for his beautiful illustrations, and to the New York State Education Department for the publication of the whole work. Such a Memoir will be a source of authoritative reference for many years to come.

A. G.

CATALOGUE OF NEARCTIC SPIDERS, by Nathan Banks; Smithsonian Institution, United States National Museum, Bulletin 72.

This publication takes the place of the Marx Catalogue, prepared some twenty years ago. The author states that the

catalogue includes a little over 1,300 species. "The largest family is the Theridiidæ with 298 species; the Attidæ is next with 213; two other families, the Lycosidæ and Epeiridæ, have over 100 species in each. Sixteen families have less than 10 species apiece." This work will be a most useful one. Many of the species occur in Canada but comparatively few definite records are available. The publication of this catalogue will undoubtedly lead to more systematic work, and it is to be hoped that entomologists, or others, in Canada, who are interested in spiders, will do their share in working up local species. In the East a fair amount of work has been done in collecting these creatures, but in the West practically all records of captures would be of value.

A. G.

NOTES.

ANOTHER CASE OF NATURAL GRAFTING.—Mr. J. R. Anderson's note in the April number of THE OTTAWA NATURALIST, about an interesting case of natural grafting, prompts me to call attention to a somewhat different case which may be seen by any Ottawa member, when walking down Bank Street to the Glebe. On the west side of the street, between Roseberry and Strathcona Avenues near Patterson's Creek, there is a medium-sized maple, from the base of which a sucker or twin sapling was at one time growing. The "twin" is still there, but no longer as an independent stem. About a foot from the ground it becomes lost in the larger tree, the bark of which has closed completely over it. Several inches higher up, a branch three or four inches in diameter emerges obliquely from the trunk, and is evidently the re-appearance of the lost sapling; though now looking more like a normal branch of the tree. It is several times the diameter of the part below. The latter though making little, if any growth, is still alive; but any contribution which it may make to the life of the branch must be very small in comparison with that derived through the main trunk. Should one of our future naturalists have the good fortune to be present when this tree is cut down, he may be able to extend this note with some interesting information gathered from a study in cross section.

H. GROH.

The Publications Committee beg to announce that the miscellaneous publications, of which mention has been made, (p. 9, April number, 1910), will be available for free distribution to members of the club on June 21st next at 4.30 p.m., in the basement of the Normal School. L. H. NEWMAN, Ch. of Com.





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FERN HUNTING IN ONTARIO.

BY FRANCIS J. A. MORRIS,

(Trinity College School, Port Hope, Ont.)

A life-long lover of flowers and ferns, I had been ten years in Canada, roaming the country side for flowering plants before I ventured to tackle the ferns. The fact is I greatly over-estimated the difficulties of identification in these most beautiful of foliage plants. It was only because I had almost exhausted the lists of "finds" in Ontario flowers that I made up my mind to add the pteridophytes to my amateur botanist's list.

The beginning was made in Great Britain five years ago during a botany trip in North Wales and the Lake District. I was agreeably surprised to find identification comparatively easy. The A B C of the art, as I remember, was close and frequent scrutiny of the back of every fern I found. This in July meant inspecting the sori or clusters of spore cases and noticing whether they were covered by an indusium or not; and if so whether this was circular or oblong. By that means I soon grew familiar with the two kinds most rich in species in northern latitudes, the *Aspidia* or Shield Ferns (with circular indusium), and the *Asplenium* or Spleenworts (with oblong indusium). Two of the commonest of British are the Male Fern (*Aspidium Filix-mas*) and the Lady Fern (*Asplenium Filix-femina*); the first of these is not common in Ontario, indeed only doubtfully native to the province, having been found at Roystone Park near Owen Sound; but some other species of *Aspidium* are common to both countries, e.g., *A. spinulosum*, *A. cristatum*, and *A. Thelypteris*. Among the Spleenworts are many species of interest in Europe, though perhaps not more in number or interest than those of North America. The result of a most enjoyable 6 weeks' fern-hunting was familiarity with 13 species belonging to 7 genera. This was in 1905, and on a second visit to England 3 years later, after 2 seasons' collecting in Ontario, I got twice as many in the same time and over the same ground. The fact is, experience to a collector counts for more than anything else. The three genera I found most useful to know, by way of nucleus about which to

gather knowledge of our Ontario ferns, were *Polypodium* (including *Phegopteris*), a genus in which the indusium is wanting, *Aspidium* and *Asplenium*.

It was with no small curiosity that I set out next season to search for ferns in Ontario. I began in May and by the end of June had got 17 species. I found, however, that a beginner can seldom be certain of identification until the frond is in fruit. For instance, I got a young fern early in June whose frond tapered in both directions, the pinnae longest in the middle and shortening gradually above and below. I made sure it must be the New York Fern and transplanted some to a pot in my window stand. I was away all the summer, but my plants were cared for and on my return I found my New York Fern (*Aspidium noveboracense*) with the known contrariety of things taken for granted had fruited out into a Silvery Spleenwort (*Asplenium thelypteroides*). Mistakes like this are bound to occur in the case of a beginner, and some species more than ordinarily variable defy identification even by an expert until in fruit. In the case of the Silvery Spleenwort, however, an experienced eye will have no difficulty in determining; for it is covered on stipe and rhachis with white somewhat bristly hairs, while the New York Fern is perfectly smooth and the stipe itself is much more slender.

Altogether my first season yielded me 30 species, and more hours, days and weeks of solid enjoyment than anyone can be aware of who has never collected ferns. For not only are they beautiful in themselves but their haunts and homes are among the most charming in all nature. Ferns in their native surroundings are far more than ferns in themselves, even though the charm of surroundings, if not due to the ferns, is always enhanced by them. Emerson's "Each and All" will remind you how subtle and how complex a thing is environment. But even a fern in itself is a thing of beauty and a joy forever; and to the collector who cares to press and mount specimens of our native ferns, there is no plant that yields anything like as good results. Flowering plants when pressed generally lose their natural colours and always their distinctive outline and shape; ferns on the other hand if carefully pressed retain their natural green unchanged and are with few exceptions flat and growing in a single plane—ready pressed, so to say, by Nature. A green fern well mounted on a sheet of white paper or cardboard is a delight to the eye and in the grey days of winter a pleasant reminder of summer's golden prime.

My first collecting ground was in the neighborhood of Port Hope, a limestone district but with almost no rock, the limestone

chiefly showing as blue clay or marl about the streams; the woods are mostly hardwood, beech and maple; hardly any spruce, a good deal of hemlock and some white pine; cedar and tamarack abundant in swampy parts; the upper soil sandy or peaty; the country rolling and rich in springs. The fern-flora is in the main characteristic of limestone districts; in some of the higher parts the land is abundantly strewn with granite boulders of glacial origin.

My favorite haunt was a stretch of country from west to east, some 5 miles north of Lake Ontario; rolling country with rich hardwoods and upland pastures, peaty swamps in the hollows and crested above with ridges of pine. The best approach from the town to the west end of this rolling country is by the Midland Railway going north from Port Hope towards Peterborough; just west of the railway quite close to the town lies Monkey Mountain, a tract of sandy turf and grassy slopes, pine trees on the upper levels, and intersected by valleys full of springs and swamps, with running streams of cold clear water that harbour speckled trout. At the foot of the grassy slopes near swamp level are some fine colonies of 2 of our *Osmundas*, the Cinnamon and the Interrupted Ferns. These fruit early in June and before July the fertile fronds have begun to wither away; the more famous Royal Fern, *Osmunda regalis*, I did not find nearer than a tamarack swamp 10 miles away, though last summer I found to my delight a few plants of it just north of my rolling country and quite close to the railway track. The Royal Fern in maturity is a magnificent plant, but when young it has a singular beauty of its own; the frond is coppery in hue, lush and soft in texture, something like the young frond of the Maidenhair with its half-furled drooping bannerets of yellowish pink.

The Maidenhair (*Adiantum pedatum*) is quite common in our maple and beech woods in somewhat shaded situations, wherever the soil is peaty and rich; it requires less shade than the Oak Fern which otherwise is found in similar (or the same) haunts. It is hard to analyse beauty, nor is it advisable; in the Maidenhair Fern symmetry has much to do with its charm; the contrast of colour between the shining ebony stem with its hair-like divisions above and the delicate green of the pinnae adds not a little thereto; and the tree-like effects of the spreading horse-shoe of branchlets set with wedge-shaped pinnae, translucent, membranous, like an oak of some fairy forest, of such transcendent delicacy, this unites with the other qualities to give the fern a dainty elegance and grace unrivalled among its kind.

It belongs to a group whose sporangia are all secured by being clamped in under the recurved edge of the frond. The type and commonest representative of the group is the Bracken, which when fully fruiting shows its pinnules strongly contracted. There are two other genera in the group, the Cliff Brake (*Pellaea*) and the Rock Brake (*Cryptogramma*).

Along with the Maidenhair, but in deeper shade where no grass or herbage disputes its right to the peat and leaf-mould, especially under cedars and hemlocks, the Oak Fern is abundant. It also is a fern of peculiar charm and part of its pleasing appearance is due to a quality it shares with the Maidenhair; its growth is in two planes, the frond itself spreading more or less horizontally out from the top of the erect stem, which is tall and slender in proportion to the whole plant, dull-green above, brownish near the base. The frond is triangular and in appearance tripartite, the lowest pair of pinnae being far larger and more compound than those further up the rachis; the foliage of the frond has sometimes the appearance of a bluish-grey bloom on the under surface. It is not unlike a miniature bracken to look at.

The Beech Fern (2 species) is of the same genus and has similar characteristics; its growth also is in more than one plane, the very long upright stipe having a (proportionately) short frond at the top, this frond not entirely in the same line of growth as the stipe, and the lowest pair of pinnae (which are usually far the largest) carried forward and deflected like a pair of spurs at an angle to the rest of the frond. The Broad Beech Fern I have never found, but it is abundant near Owen Sound; the Narrow Beech Fern does not occur near Port Hope, but I have found it near Perth, at Lanark and in North Burgess; in the Algonquin Park it is exceedingly common, growing in great patches in the damp shaded woods and found even, in stunted form, far up the precipitous rock faces of railway cuttings and natural cliffs. The chief generic mark is that the sori or clusters of sporangia which are small and dark-brown are destitute of covering (indusium).

There is one other genus belonging to the same group, the Polypody or Rock Fern; I had to wait till I visited the Rideau before I saw this common fern, for it insists on rock; I have no doubt it is abundant as near us as Rice Lake. It has very large naked sori of a rich light gold colour.

The next two genera in the list of ferns have a distinct indusium protecting the sporangia clusters, the Spleenwort and the Shield Fern. Easily the most common of the former and with the widest range of habitat is the Lady Fern. It is about

the same size as the average Shield Fern (e.g., the Spinulose or the Marginal), but the texture of its frond is far more delicate; the sori are oblong, but being placed along the twisting veinlets of the pinnules they usually curve bow-wise into a horse-shoe shape. The indusium opens along one side as the spores ripen. The stipe of the Lady Fern is often reddish in colour.

A wood of maple, beech and hemlock some 5 miles out from Port Hope forms the west end of the rolling country I have before referred to; through the midst of it between springy and steep high banks flows a stream; the wood has many deep rich hollows of peat and leaf-mould; it is luxuriant with plant life, having an unusual range of violets and lilies and some uncommon orchids, such as Hooker's Rein-orchid and the Showy Orchid. For a small wood whose greatest diameter is perhaps half a mile, it is quite the richest in ferns that I know. And that not merely in number of species but in actual quantity; with hardly an exception, the ferns that occur there at all fairly run riot within its shelter. Observing the order in which the ferns are treated, besides the Oak Fern, the Maidenhair and the Bracken which in congenial surroundings abound in the wood, there are all three of the largest Spleenworts; the Lady Fern and the Silvery Spleenwort are abundant, some plants and patches of wonderful size; the oblong fruit-clusters of the latter with the indusium silvery-white until the spores ripen make it easily recognized; it fruits freely, the oblong clusters standing out obliquely from the midvein of the pinnule, suggestive of a small fish's backbone. The third species I have found there is the Narrow-leaved Spleenwort, which fruits even more freely and in the same peculiar way; the sori, however, are larger, cylindrical rather than flatly oblong; the frond is of a delicate texture, the pinnae are simple and entire, in the form of a long tapering acuminate pennant; in the fertile fronds the pinnae are much contracted and so closely do the sori stand together that the whole under surface forms an unbroken series of contiguous cylinders of spore cases. The fern is far from common and in all this wood there is only one small colony about a square yard in extent. In August, 1909, I was fortunate enough to find two other stations for the Narrow-leaved Spleenwort, one near Lanark and the other near Otty Lake between Perth and the Rideau. A peculiar feature of the Narrow-leaved Spleenwort is its frequent companionship with the Goldie's Shield Fern. In Niagara Glen below the Whirlpool Rapids, both plants are found together in the rich leaf-mould and peat where the ground is swampy, and here in this little wood near Port Hope within a few yards of the little patch of *Asplenium angustifolium* were plants of the Goldie's Fern. The

late Dr. Fletcher when he heard of my finding the Narrow-leaved Spleenwort asked whether the Goldie's occurred in its neighbourhood, his own experience and that of other botanists having been to find the two together. This is not, however, a universal rule, for the two colonies of this fern found by me south of Ottawa had no Goldie's Fern anywhere near them.

The Goldie's Shield Fern is certainly a magnificent plant, and when first unfolded at the end of May peculiar by its light yellow-green colour and noble proportions. The frond is remarkably wide and more solid in texture than any other Shield Fern that approaches it in size, unless perhaps the Marginal Shield Fern. The Goldie's Fern is often 5 feet or more in height and can hold its own for mere stature with the Osmundas and the Ostrich Fern. Its width is always noticeable; I have gathered in September fresh fronds put up evidently after the fruiting season; the frond itself (on a long stout stipe) would vary from 8 to 10 inches in length and the width across from tip to tip of the lowest pair of pinnae was often an inch or more in excess of the length. Large ferns, say 5 feet high, have an extreme length of pinna of 8 inches; this would make a rhachis nearly a foot and a half wide, if the pinnae stood at right angles to the main stem; occasionally they are so placed but as a rule they incline upwards at an angle; the shape of the pinna is peculiar, being slightly curved like a scythe—as in the Holly Fern; the curving is often more plainly seen in the pinnule which is a pinna in miniature; the pinnules have a crenate or sinuous margin and taper to a point. The sori which are not very large lie rather nearer the midrib than the outer edge of the pinnule.

Another fern common in this wood is the Christmas Fern (*Polystichum* or *Aspidium acrostichoides*), an evergreen like the Prickly and the Marginal Shield Ferns. It has a somewhat peculiar habit of fruiting; the sori form on the upper part of the frond only, usually down from the apex to less than half way; these fruiting pinnae are strongly contracted, so that the green frond seems to pass from leafy below to a bare-looking narrowed and rigid spike.

The only other species of *Polystichum* found in Ontario is the Holly Fern (*Polystichum Lonchitis*); it is fairly common in the limestone region about Owen Sound and the Bruce peninsula; smaller than the Christmas Fern it has no bare stipe, the pinnae starting from the very base; the pinnae and the frond as a whole are falcate (scythe-shaped) and there is no contraction in fruiting.

All about the sloping meadows that surround the wood, as well as in it, you find thickets of the Marsh Shield Fern (*Aspidium Thelypteris*), and, somewhat sparsely growing in the middle of

the wood, especially about a woodman's path, its next of kin, the New York Fern (*Aspidium noveboracense*); the only two species of *Aspidium* destitute of chaff about the stipe, with peculiarly delicate and glabrous texture of frond. The Marsh Fern has a very short rhachis and remarkably long stipe; the lowest pair of pinnae are as long as those immediately above them, and the pinnules become strongly contracted in fruit, the margins being revolute over the sori. The New York Fern tapers both ways, the longest pinnae being about the centre of the frond; the pinnules are not contracted in fruit, the colour of the fern is pale yellowish-green, whereas that of the Marsh Fern is often bluish-green, certainly darker than the New York Fern.

Other *Aspidiums* found in this wood besides those already mentioned are the Marginal, the Crested (with its variant the Clinton's) and the Prickly. *Aspidium marginale* is easily recognized by its thick leathery frond, having the sori placed at the extreme outer margin of the pinnules. It is not common, as its preference is for rocky banks and woods, but under a group of pines in an elevated corner of the wood a few plants subsist near some glacial boulders. *Aspidium cristatum*'s choice of home is within the swamps and bogs; there is quite a striking difference between the fruiting and the barren fronds; the latter are shorter, lax and more or less prostrate, often growing outwards on all sides of the rootstock, rosette-fashion; right in the centre of these you will see 3 or 4 tall rigid fronds, the pinnae standing out almost at right angles to the rhachis and twisted round on their bases from a vertical to a horizontal position so that the under side of the pinna, with its fruiting clusters, is facing the ground and hidden from the light, while the upper sides appear to be "taking the sun"; the outline of the frond is more or less oblong, the pinnae from the base almost to the apex being practically of one uniform length. *Aspidium spinulosum* is one of the most variable of ferns, yet always easily recognized by its finely-cut frond, the lobes ending in a prickle or acuminate tip. It is quite common and one of our handsomest ferns; I saw a plant of it to-day (June 15) in a wood I have been speaking of; a tree, fallen or felled years ago, had left a stump some 3 feet high; the top of this was rotted out to a depth of more than a foot; in the centre of this natural flowerpot was growing a magnificent plant of the Prickly Shield Fern; I counted 25 fronds, most of them well over 2 feet in height and fruiting profusely. Being evergreen it is often kept by florists over the winter, in some cool damp place, and used at Christmas for foliage with carnations and other cut flowers of the hothouse.

Altogether, out of 24 species of fern that I have found in the immediate neighbourhood of Port Hope, this little wood

and its surroundings harbour all but 2. These include 2 species of *Cystopteris* (Bladder Fern), 2 species of *Onoclea* (the Sensitive and the Ostrich), 2 species of *Osmunda* (the Royal and the Cinnamon), the Adder's Tongue, and 2 species of *Botrychium* (the Virginia Rattle-snake and the Ternate Grape Fern).

The Bladder Bulblet Fern (*Cystopteris bulbifera*) forms a tangled mass of intertwined fronds about the banks of the stream and the swampy hollows of the wood. The stipe is reddish, translucent and brittle; the frond takes one of two forms, either short, triangular, rather longer than wide, or a very prolonged narrow oblong; this latter form is usually procumbent and straggling, especially where the fern grows over the talus of loose limestone blocks at the foot of a shaded bank or cliff, it seems to take a new lease of life. Antæus-like, at every point of contact with mother earth, I have found the frond running along like a creeper in a slightly upward plane from stone to stone with a straggling growth of 4 feet or more. The species is unique among our northern ferns in forming green bublets about the rhachis and pinnae, whence a new fern-plant springs as soon as the bublet drops to the ground.

The other species (*Cystopteris fragilis*) is usually found growing in tufts from seams and clefts of damp rock, but like many plants it has another home, in which it grows to greater size and sturdiness; this second home is in crumbly soil on mounds and about the upraised mossy turf at the base of trees. I gathered 5 or 6 fronds to-day from such a place, they were fairly rigid and erect for so delicate a fern, about 12 inches in height, 4½ inches of stipe, dark-brown, nearly black at the base, lighter above, green on the rhachis from base to tip of frond. These erect ferns were fruiting freely and growing up out of a tangled mat of smaller more or less prostrate fronds hardly fruiting at all. The genus develops very early in the season, but early as *C. bulbifera* is, *C. fragilis* is more than a fortnight earlier; I saw this year a mound of earth in my wood covered with expanded fronds 2 or 3 inches long by the 7th of April, and last year at the beginning of May, when other ferns were in the young crosier stage, its fronds were full-grown and the fruit dots appearing.

Something must now be said about the 2 species of *Onoclea*—the Sensitive Fern (*O. sensibilis*) and the Ostrich Fern (*O. Struthiopteris*). To the uninitiate eye there is little or no resemblance between these ferns, but "by their fruit ye shall know them," dissimilar as are the barren fronds of the two *inter se*, they are yet more alike than the fertile fronds in either species are like the sterile of their own plant: on the other hand the fertile fronds in both species differ from the sterile in the same way and for

the same cause and are consequently very much alike. In both species the fruiting spike is an ordinary frond modified to protect the sporangia. In the Sensitive Fern the pinna of the fertile spike appears as a midrib supporting on each side a row of sessile or berry bead-like capsules, each lobe of the original pinna having apparently rolled in on itself independently; in the Ostrich Fern the pinna shows as a long narrow pod, or more exactly a mid-rib flanked on each side from base to apex by a narrow more or less cylindrical roll or coil; in this case the pinnules have not rolled in on themselves separately, but their presence as distinct pinnules or lobes of the pinna is shown by the coil being cut into segments at short intervals corresponding to the pinnatifid notches of the unmodified pinna. The fruiting fronds of both species develop in July and August; the genus, as we have it, is decidedly moisture-loving, the plants being everywhere familiar objects about wet meadows, swamps and thickets. I say everywhere, but in the Algonquin Park within say 12 miles of headquarters, the Ostrich Fern does not grow; the last time I returned from the Park to Ottawa I spied none of it from the train west of Golden Lake. The Sensitive Fern is reputed a frequent victim of late spring frosts, but I have not found it so "sensitive" in this respect as the Oak Fern, the Marsh Shield Fern or the Cinnamon Fern.

The Ostrich Fern is surely a fern pre-eminently handsome and of tropical splendour; no doubt the *Osmunda regalis* attains a greater height and is more massive, indeed it is often mistaken for a shrub of some kind; but the Ostrich Fern can never be taken for anything other than a fern, its pale green fronds are unmistakable; so, indeed, are the fronds of the Cinnamon and the Interrupted Ferns, which nearly surpass it in size, but what all the *Osmundas* lack in the entire plant, the Ostrich Fern has in matchless sort—symmetry. The plant grows in a hollow crown, a circlet of symmetrical fronds, equidistant, uniform; the fronds grow upwards and outwards for 3 or 4 feet and then curl gracefully away from the centre, their tips curving back in a beautiful arch, they look like giant shuttlecocks or green vases of graceful outline and exquisite workmanship. From the centre of this vase springs later a cluster of short stiff fruiting fronds. I kept a plant of the Ostrich Fern in a large pot one spring; for a week or more, at the time of their greatest activity, the fronds grew nearly 2 inches every 24 hours; by the end of June the fronds were between 5 and 6 feet long. Not only is the whole plant symmetrical, but each frond is a study in proportion. It tapers very gradually to the base from near the top, where it suddenly contracts into a narrow apex of little pinnae or pinnules.

Where the frond is widest, some way above the middle, in fact where it arches over to form the wide lip of the "vase" it so closely resembles, the pinnae are extremely long and narrow, tapering gradually to a pointed extremity; they look like long streamers or pennants; these pinnae are pinnatifid into narrow oblong pinnules, something like the ultimate divisions of the Cinnamon Fern but narrower. The plant spreads freely by slender underground stolons; as you walk along some shady path through the woods, you will often see a great patch of wet ground filled as with a shrubbery by these immense tufts of ostrich plumes—a wealth of green in riotous profusion. Looked at through the undergrowth and brushwood of maples and other light-foliaged trees, the scene is one of tropical luxuriance, you think of a New Zealand forest of tree-ferns, or a jungle of dwarf palms in Brazil.

About the Osmundas I have already spoken; and I shall defer mention of the Adder's Tongue family with its two genera of *Ophioglossum* and *Botrychium* to a sequel, in it I hope to extend the list of species already mentioned from about 20 to 36. The paper will deal with two seasons of fern-hunting, chiefly from headquarters on the Rideau, though once or twice involving a day's journey by rail to points as far distant as Niagara, Muskoka and the Algonquin Park.

TWO KINDS OF WAR—ONE IS CONSIDERED NECESSARY AND THE OTHER IS NOT.

BY HENRY SKINNER, M.D., PHILADELPHIA, PA.

War is said to be hell and it may be interesting to find at least a partial reason why this is so. One of the factors in making this lurid fire and brimstone condition, where death lurks, is what may be called armament, consisting of various kinds of death-dealing devices. This, however, is not the most important factor as man's devices do not succeed nearly so well as those created by nature. The great death-dealing combination in war times is made up of three animals and a plant. The plant is exceedingly small and it takes the highest powers of the microscope to elucidate it properly. It goes by the name of *Bacillus typhosus* and causes typhoid fever. The smallest of the three animals is a protozoan, and it is also very small, as it destroys the red corpuscles of the blood, and they are less than one three-thousandeth of an inch in diameter. This animal is known as the *Plasmodium malariae*. The other two factors are insects and they are very common ones, the mosquito and the

ubiquitous house-fly. The mosquito would have a good case in court if it were tried by an impartial jury as it could put in a plea of accidental or unintentional homicide. In its search for food it uses its beak hypodermatically and introduces into its biped victim the *Plasmodium malariae* and that disease that has such a misnomer is set up. The house-fly is hardly responsible for its hairy feet and nature did not restrict it as to the places where it should walk, as it does equally well on the glass of the baby's bottle or on the soldier's biscuit. It could also set up a plea of innocence and show that all its crimes are due to ignorance. Man must, however, look at the matter from the standpoint of self-preservation and put up a "no trespass" sign and if the warning is not heeded the careless dung-bred dipteran must suffer the consequences. When a young man goes to war he is full of the martial spirit and he is willing to be a victim of the bullets of the enemy for the glory and righteousness of his country; but he is much more likely to be put under the sod by the *Plasmodium malariae* or the *Bacillus typhosus*, and there is no doubt but that a knowledge of bacteriology and entomology are of more importance in war times than the question of armament. During the British-Boer war there were said to be at least a hundred thousand men invalidated and a Canadian surgeon testified that in many camps the meat hung up could not be seen for house-flies. Think of this many men, all a loss as fighting units, and the great expense to the government for medical attendants, nurses, food and medicines. The United States thought it had a war with Spain and that the States won the victory, but it would be more accurate to state that the United States had a war with the house-fly and suffered awful defeat at the hands (feet) of its little enemy, as the Spaniards only killed about two hundred Americans and the house-fly by its utter carelessness in walking in the latrines and then flying into the mess tents and stealing its meals from the soldiers, made it possible for the *Bacillus typhosus* to make many very ill and kill over four thousand of them. Thus the fly was victorious over a great nation. Fifty thousand men are buried in the neighborhood of the Panama Canal and the little mosquito beat the French to a finish in their efforts to build a great transcontinental water-way. There are about fifty thousand men there now in an effort to accomplish the same object and they will probably be successful as they know the enemy and her power and also know how to prevent her careless ways of getting a meal of blood. Some heedless people may not know the importance of this subject and they are slow to learn, and it may be necessary to remind them that war is hell and that in the Crimean War

17,580 died from disease; during the Civil War 186,236 died from disease and in the French expedition to Madagascar in 1894, only 29 were killed and 7,000 died from disease. Most of these deaths were probably due to the irresponsibility and carelessness of insects, and man has therefore suffered. How long will be continue to be the victim?

EXCURSIONS.

BLUEBERRY POINT.—The excursion to Blueberry Point on May 7th was attended by about forty members of the Club, students of the Normal School and others. The weather being of the very best, and the locality one with many distinctive features, much good work was accomplished by the various groups. The interest in the locality, especially for those who have been visiting it through a long series of years, was somewhat heightened by the realization that its day as a wild natural retreat, is doomed by the encroachments of the real estate agent and the summer cottager. Already the picturesque name of the past, derived from the profusion of Blueberries growing there, has been supplanted by the more fantastic, though less significant name of Wychwood, while "streets" already blazed and labelled, extend with offending boldness into the very heart of the grove.

The passing of Blueberry Point will be regretted by all who have known it. It is one of the few accessible localities around Ottawa for the pretty Trailing Arbutus; as also for some trees, to be referred to below. The Arbutus was found to be still abundant, although at that date almost past blooming. The Aromatic Wintergreen with its shining leaves, and bright scarlet fruit, both persisting from last year, was also much in evidence.

The principal observations of the afternoon were presented by the Leaders, when all had gathered together again at five o'clock. The President, Mr. Halkett, called for these reports, and himself dealt with the zoological "finds" of the day. Specimens of two species of Salamanders were taken: *Spelerpes ruber* (a beautiful form), and *Plethodon glutinosus*. Much interest was manifested in examining the forms of life in the pools, several specimens of crustaceans, including *Daphnia*, being found, and one of the isopods, *Asellus aquaticus*. Judging from the character of the tubes of the larvæ of a certain Caddis-fly, probably this was a third species observed during the excursions of this season. These tubes were mostly made of bits of small coniferous leaves which pointed outwards like the spines on the shell of a sea-urchin.

Speaking of the geological features of the district, Mr. Wilson said that only a few outcrops of rock were to be seen. These exposures were Chazy shale, and this formation is known to underlie the banks of the Ottawa on both sides of the river for a considerable distance. No fossils were found. He pointed out the relation of the Chazy beds to the Trenton and Utica formations as seen on the former excursions to Rockcliffe and Billing's Bridge.

Mr. J. W. Gibson, with specimens in hand, called attention to the fact that three species of pine were growing together naturally in the vicinity, as nowhere else around Ottawa. These were the White, Red, and Jack or Banksian pines, the differences between which he pointed out. The latter occurs only here, and the second in but one or two other places near Ottawa.

The writer showed specimens of three *Amelanchiers* or Juneberries, all in blossom. The species *canadensis*, and its variety *Botryapium*, which differs in being pubescent, were advanced in bloom, while the other species, *spicata*, was more recently open. He also spoke of a fine example of "witches' broom" which had been found on a balsam nearby, and explained that it was due to a fungus of the *Exoascus* group, which lives from year to year within the wood.

Some specimens of *Antennaria canadensis*, which had been deformed into rosettes of leaves lying close upon the ground, by the attacks of a Cecidomyid insect, were discovered by Miss Matthews; and the larvæ causing the injury, have since been identified by Dr. Felt, of Albany, N.Y., as probably those of *Rhopalomyia antennariæ*.

Others called upon were Mr. Brown, who briefly referred to some of the plants collected, and Mr. Kingston, who gave a list of the birds met with, and made some interesting observations on the habits of some of the species. Owing to a rather strong wind, not so many birds were seen as otherwise might have been, but the following were observed: Phœbe, Bronze Grackle, Red-winged Blackbird, Meadow Lark, White-throated Sparrow, Song Sparrow, Chipping Sparrow, Purple Finch, Ruby-crowned Kinglet (in full song), and Catbird.

H. G.

McKAY'S LAKE.—The excursion to McKay's Lake was held on Saturday, May 28th. The weather was delightful, and in spite of the fact that very few were able to be present, the afternoon proved to be an exceptionally profitable one. In the absence of the President, Mr. Kingston was in charge of the party, which assembled at the Bridge at 3 p.m. Two delightful

hours were spent in the woods and on the shores of the lake, and at 5 o'clock all assembled at the appointed place, to compare notes, and to hear the short addresses which were given by the Leaders of the various branches.

Mr. Groh, as one of the botanical Leaders, showed several species of sedges, and pointed out particularly that species known as *Carex plantaginea*, drawing attention to its very broad leaves. He also referred to the great number of species to be found near Ottawa, and to the very large number known in the world. Several kinds of violets were also shown, particular reference being made to the great abundance and luxuriant size of *Viola canadensis*, which in some cases had grown to a height of over 12 inches. *Viola pubescens* was also shown as an example of a tall leafy-stemmed violet, differing from the last in having the flowers yellow, instead of white. Several interesting points were mentioned in reference to the Indian Cucumber Root, a plant which gets its popular name very appropriately from its crisp, juicy, cucumber-flavoured rhizome. The curious long-branched stigma of this plant was pointed out, also the fact that the liliaceous rule of three is followed in the grouping of its whorls. The Indian Turnip was also shown, and its rootstock or corm contrasted with the Indian Cucumber as to flavour.

In the stagnant water of McKay's Lake the botanists found specimens of *Myriophyllum* (Water Milfoil) and several points of interest in connection with this plant were touched upon. Other plants were shown and handed around for inspection.

Mr. Wilson was then called upon to give an account of his afternoon's studies in geology. Those particularly interested examined the marl deposits on the shores of the lake, finding there many things of engrossing interest. These deposits are of considerable thickness, varying from one to ten feet, as seen in recent exposures. They are fifteen feet or more, above the present water-level in the lake, and show that it formerly stood at a higher level, and occupied a larger area than it now covers. The marl is composed of fresh water shells, many of which are in a perfect state of preservation. Eight species, belonging to six genera were collected and identified, viz.:—*Planorbis campanulatus*, *P. bicarinatus*, *P. parvus*, *Physa heterostropha*, *Limnæa galbana*, *Valveta tricarinata*, *Amnicola porata*, and *Pisidium abditum*. These shells are all abundant except the last named. Besides the species here enumerated there are a few rare ones which have been collected at this place, but were not found on Saturday. Below the marl beds there is in most places, a bed of coarse gravel, and under this several feet of pure sand bedded

in layers of varying thickness. Some of these layers illustrate "false bedding;" the layers being composed of a number of laminae lying at a steep angle, while the main beds are horizontal. It was pointed out that the tilted layers were probably laid down on a sloping bank by a swift current, and that this was followed by a period of still water, when the horizontal bed was deposited on top. It is interesting to note that this sand contains marine shells, indicating that an arm of the sea invaded this area when it was deposited. Attention was directed to the cut terraces surrounding the lake, and also to the gully cut by the present outlet, which has reduced the water to its present level.

After Mr. Wilson's interesting and instructive talk, Mr. Kingston gave a short account of his afternoon's observations in ornithology. The following is a list of the birds that had been noted:—

Nighthawk, Chimney Swift, Kingbird, Wood Pewee, Crested Flycatcher, Least Flycatcher, Red-winged Blackbird, Cowbird (female), Meadow Lark, Baltimore Oriole, Goldfinch, Song Sparrow, Swamp Sparrow, White-throated Sparrow, Vesper Sparrow, Rose-breasted Grosbeak, Bank Swallow (nesting), Yellow Warbler, Black-throated Blue Warbler, American Redstart, Maryland Yellow-throat, Oven Bird, Wilson Thrush.

Several interesting points were brought out concerning the different birds, particular mention being made of the Cowbird, and her lazy habit of depositing her eggs in the nests of smaller birds. A last year's nest of a Red-winged Blackbird was found by one of the party and handed around for inspection. Notices having been given out about the excursion to Macdonald College, etc., the party started for home, everyone feeling, I am sure, that the afternoon had been spent to some purpose, and that a great deal of knowledge had been acquired in a very delightful way.

F. M. F.

NOTE.

HOW TO DEAL WITH THE FLY NUISANCE.

A circular giving concise directions as to the method of ridding houses, public places, etc., of the dangerous house-fly has recently been issued by the Division of Entomology, Central Experimental Farm, Ottawa. This is most timely, and all who read this note should apply to the Division for a copy.

BOOK NOTICE.

TEXT BOOK OF ELEMENTARY ZOOLOGY for Secondary Educational Institutions, by Thomas Walton Galloway, Ph.D., Professor of Biology in the James Millikin University, Decatur, Illinois, with 160 illustrations: Philadelphia, P. Blakiston's Son & Co., price \$1.25 net.

This new text book of xi + 418 pages should have a wide sale not only among teachers, for whom it will be of special value, but other persons interested in elementary zoology. It is of a very convenient size, 5½ x 8 inches, the matter has been well prepared, the illustrations and printing are excellent, and the price brings it within the reach of all. The writer states that the "book is an effort to combine the older and the newer phases of thought among us, and is offered as a partial, and yet a distinct, step toward what the author believes to be a sound pedagogical and humanistic movement. He believes that the secondary school biology of the future will be primarily concerned about our life interests; but he believes that the great evolutionary conception, which can only be had by some study of the ecology, morphology and physiology of the animal phyla, is quite as really and profoundly a 'human interest' as is stock-breeding, agriculture or malaria. This conception has changed the whole aspect of human thinking in the last half-century. No course in zoology, which is more than commercial, can afford to neglect it."

Two sizes of type are used. The matter in larger type can be completed by a good class in a year. That in fine print is intended as a background for reference and for extra work. The book is divided into thirty chapters, each one of which is full of information and suggestions for the teacher. "Zoology and its Purpose" is the title of Chapter 1. This is followed by chapters on "Field Work," "Classification of Animals—General Survey," "Laboratory Work—Forms of Matter," "Living and Non-living Objects," "Plants and Animals," etc., etc. In the thirty chapters are 407 separate headings and topics. The last chapter "Economic Zoology" gives briefly interesting facts regarding "Animals as a Food Supply," "Animals in Science and Medicine," "Animals Directly Injurious to Man," "Animals Hurtful to Plants and Plant Products," etc.

The brief keys throughout the book will be found of much value to the pupil. The work on the whole is concise and the subjects are well chosen, and as the writer is a well known biologist, and one who knows the requirements of the teacher and pupil, this, his latest contribution, will undoubtedly be well received. Dr. Galloway's other book "Text Book of Zoology," xii + 481 pages, is now in its second edition.

A. G.



THE JAMES FLETCHER MEMORIAL FOUNTAIN



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UNVEILING OF THE JAMES FLETCHER MEMORIAL FOUNTAIN.

The unveiling of the James Fletcher Memorial Fountain took place at the Central Experimental Farm, Ottawa, on Tuesday afternoon, the 19th July, 1910, at the hour of 4.30 p.m. The ceremony was a complete success in every way. Several hundreds of people came out from the City, and some distinguished visitors from a distance were also present. The Ottawa Field-Naturalists' Club, under whose auspices the Fountain was erected, was largely represented from its local membership. Official representatives from the Royal Society of Canada and the Entomological Society of Ontario were also present, and took a prominent part in the proceedings.

Before introducing the speakers, Mr. E. R. Cameron, K.C., the Chairman of the Fletcher Memorial Committee, outlined briefly the steps that led to the erection of the Fountain, instancing facts in regard to the work of the Committee, the soliciting of subscriptions and the decision, after the most careful enquiry and consideration, to place the work of the memorial in the hands of Dr. R. Tait McKenzie, of the University of Pennsylvania, Philadelphia, U.S., an artist of wide repute who has won a high place in the salons of London and Paris for his work in bronzes.

The Honourable Sydney A. Fisher, Minister of Agriculture, who unveiled the Memorial Fountain, spoke in the very highest of terms of the late Dr. Fletcher and his work for Canada. He referred to his early associations with him, and in a charming manner described how the personal friendship which began many years ago continued up to the time of his death. He said that Dr. Fletcher was one of the first, if not the very first, person to welcome him to Ottawa on his election as a Member of Parliament. He then went on to speak of his relations with him as Minister of Agriculture. Dr. Fletcher, he said, represented the ideal type of a public servant. The work which he did throughout the whole of Canada was of the greatest benefit to the country at large. Entirely forgetting himself in every way he gave up his whole time to the work in which he was placed in

charge, as Entomologist and Botanist of the Dominion Experimental Farms. He was a very hard worker and one who never spared himself. There was no doubt in his mind that if he (Fletcher) had taken a much needed rest, some few years ago, that he might have been with us and doing his work to-day. His investigations and lecture courses took him to every part of the Dominion and the experience he thus gained respecting agricultural conditions, was of extreme value to him in his work. His whole thought was to benefit Canadian agriculture, and the wide reputation he made, not only in his own country, but throughout practically the whole world where economic problems in agriculture are studied, will last as long as time itself. Of a genial and enthusiastic temperament he made friends wherever he went and his name to-day is known in every part of Canada where agriculture is practised. His delightful personality brought him in close touch with farmers, horticulturists and others, and his talks and lectures on insects and plants were always eagerly listened to.

Dr. Bethune, Professor of Entomology at the Ontario Agricultural College, Guelph, expressed his gratification at seeing so many young people present to do honour to the memory of the late Dr. Fletcher, who was so deeply interested in children of all ages and so ready at all times to help and instruct them. He said that he came as a representative of the Ontario Agricultural College where Dr. Fletcher was always a most welcome visitor. Whenever it was announced that he was to give an address at the College, the hall was sure to be thronged with both young men and women who were eager to hear him. He also represented the Entomological Society of Ontario, of which Dr. Fletcher had been a very active member for a great number of years. On the appointment of Dr. Saunders to be Director of the Experimental Farms he was obliged to give up his active co-operation in the work of the Society, and happily his place was very satisfactorily filled by our lamented friend. For nearly thirty years he was a member of the Council of the Society and did a very great deal to advance its interests in various directions.

The speaker then went on to describe his own intimate friendship with Dr. Fletcher and his admiration for his ability as an entomologist and in other respects as well. While we could not regard him as a man prominent for discoveries in science, while we did not exalt him to the same position as a Darwin, a Huxley or an Agassiz, still he had a very scientific capacity for discerning minute distinctions in the objects of his study, and with his wonderfully retentive memory was able to do a great deal of most valuable work. We do not, therefore, erect this memorial as a tribute to his scientific attainments, but

rather as a token of our love for the man himself and the devoted affection in which we all held him. While he was widely known and respected all over the country, and was regretted as a true friend of a great variety of people, there was another side to his character which was not so generally known: he had a very deep sense of religion and was a man of unobtrusive piety which only revealed itself to those who were on the most intimate terms with him.

Dr. Bethune then read a letter from Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington, and therefore considered to be at the head of the entomologists of North America. He wrote as follows: "I regret more than I can tell that I am unable to come to Ottawa for the unveiling of the memorial. Dr. Fletcher was one of my dearest friends and I had the greatest admiration for him. His services to Canada were very great. He had a wonderful capacity in a very broad field in entomology and was one of the best informed men of his time on the intricate and manifold aspects of economic entomology. His reports were sound and practical, and as a public speaker before assemblages of farmers and gardeners he was unexcelled. He was known and admired, and loved also, throughout the United States. In fact I have never known a man who had so many absolutely devoted friends as Dr. Fletcher. His energy, his enthusiasm, his absorbing interest in everything that lives and grows, his warm heart, his perfect lack of even a suspicion of egotism attracted everyone who knew him and bound them to him in friendship, and even love, forever."

Dr. Wm. Saunders, C.M.G., Director of the Dominion Experimental Farms, spoke very feelingly of his long association with Dr. Fletcher, which commenced before his appointment on the staff of the Experimental Farms. The value of his work as Entomologist and Botanist to the farmers of the Dominion was very great and he has been much missed. At meetings of farmers and fruitgrowers his clear statements regarding subjects under discussion made his presence a great benefit. He was blessed with a child-like optimism and cheerfulness of spirit which made his society always welcome, and instances of his wide and kind sympathy can be recalled by all who had the privilege of his acquaintance. Dr. Saunders said he had hoped to enjoy his co-operation in the work of the Experimental Farms as long as he held the office of Director. An all-wise Providence decreed otherwise, however; but although deprived of his society and help, he would always look back to the pleasant intercourse of the years they spent together. Such a life as his was will be a lasting influence for good. Having by this memorial striven to show our appreciation of our late friend's character and work,

we may honour him still further by endeavouring to maintain and advance those sciences to the promotion of which so much of his life was so enthusiastically devoted.

Dr. W. D. LeSueur, Hon. Secretary of the Royal Society, in paying his tribute to the late Dr. Fletcher said that the ceremony in which we are engaging to-day, the duty we are fulfilling towards the memory of our departed and deeply-lamented friend, is one in which the Royal Society of Canada may very fittingly take a part. It was early in the history of the Society—at its third annual meeting in the year 1885—that the name of James Fletcher was enrolled in its list of members. His zeal and his attainments as a practical botanist and entomologist had already attracted the attention of the leading men of Section IV, the Section devoted to the biological sciences; and they gave him a warm welcome to their ranks. It is almost needless to add that he did not regard his election in the light of an idle decoration; he saw in it rather a call to work and duty, and he took at once an active part in the labours of his Section, of which nine years later he was elected President. The address which he delivered in that capacity dealt with the subject of practical entomology. The turn of his mind was at all times practical. He was one of those men who see things to do, and who do them. He was not a man to undervalue or depreciate scientific theory, but his talent lay rather in the region of the visible and tangible. The living, breathing world was his domain. He had the quick eye, the retentive memory, and, above all, the responsive, sympathetic heart.

In the year 1901 we find him reading a paper before the Society on "The Value of Nature-Study in Education." This was a subject after his own heart. He could not understand education apart from nature-study.

His executive abilities were quickly recognized, and for many years he filled most efficiently the office of Honorary Treasurer. In the year 1906, he succeeded Dr. S. E. Dawson, then elected vice-president, in the more difficult and laborious office of Honorary Secretary. Here his talents of industry, tact and management found abundant exercise. The office had previously been held but by two individuals, Sir John Bourinot for the first twenty years of the Society's existence (1882-1902), and Dr. Dawson for the four succeeding years. These were the distinguished predecessors in whose steps he had to walk; and it was agreed by all that, in his hands, the best traditions of the office were fully maintained. He worked while it was day faithfully and well. Feeling testimony is borne to his services and character in the Proceedings of the Royal Society of Canada of last year; and in the galaxy of noble men whom that Society

has lost, the name of James Fletcher shines, and will shine, with a radiance all its own.

Mr. R. B. Whyte spoke on behalf of the Ottawa Field-Naturalists' Club. He told of the early days in the history of the society and of the keen interest which Dr. Fletcher, who had been worthily styled its "father," always had in its welfare. When the Club was organized in 1879, about 40 gentlemen joined its ranks, largely through Dr. Fletcher's influence. No one at that time ever expected the Club to develop in the remarkable way it has done and to do the great amount of work it has since accomplished. From that year until his death, during which period the membership has increased to over 300, he was at all times the chief mainstay, so to speak, of its varied branches of work. As a field-naturalist, there was probably no one in America who was his equal. He had a deep love for boys and girls, and many well-known naturalists in Canada to-day owe their early interest in plants and animals to him. At the excursions of the Club he was always the leading centre of attraction. Everyone wanted to go with Dr. Fletcher through the woods and into the meadows and get from him some of his enthusiasm and knowledge about the forms of life which occurred everywhere.

Mr. Frank T. Shutt, Chief Chemist of the Dominion Experimental Farms, said that to those who knew James Fletcher personally no monument in stone or bronze is needed to keep his memory green. The charm of the true, kindly, cultured gentleman, which we all felt when in his company, will not readily be forgotten. But we have done well in the erection of this Fountain, a tribute to his memory—a tribute, as has been happily expressed upon the stone, of affection from his friends, that may speak to those who come after of the love and the admiration we had for him; to tell them that James Fletcher was a man who did much good in his day and generation. His work was of incalculable benefit to the farmer and fruit-grower of this country in combatting weed, fungus and injurious insect. Probably of even more value, however, was his inspiring enthusiasm, that power to awaken in others an interest in the study of animate nature. And in this connection we of Ottawa were particularly fortunate. Whether on the excursions of the Field-Naturalists' Club or on the lecture platform of the winter series of lectures, he was the teacher that all listened to with pleasure. We do honour to-day to the memory of a busy man called away in the prime of his life, in the midst of his work. So far as we know he had made no startling or brilliant discovery in the realm of pure science, but that fact—if fact it be—does not in the least detract from the honour that is rightly his. We are rather apt now-a-days to

save our applause for those who legitimately or illegitimately can startle us. But Dr. Fletcher was none such. He was a hard worker—but one who looked upon his work as his pleasure—and he was a phenomenal success in that special work to which he devoted his life. He left us a splendid example; may we all try in some measure to follow in his footsteps.

We may all take great satisfaction in knowing that this Fountain, now entrusted to the care of the Experimental Farm and the public, has been erected as a free-will offering by his admirers. In not a single instance was personal canvassing resorted to. We shall rejoice to reflect in the days that are to come that this memorial was the spontaneous tribute of those who knew and loved James Fletcher.

The following letter from Dr. T. J. W. Burgess, Medical Superintendent of the Protestant Hospital for the Insane, Montreal, was read by Mr. Shutt:

"I cannot tell you how sorry I am to be obliged to say that I shall not be able to be present to do honour to dear old James Fletcher. No more lovable man ever breathed. It is one of my proudest boasts that, for over thirty years, I was counted by him on his list of friends. Never had science a more ardent votary than the late Dr. Fletcher. His whole thought was given to it and not only his personal intimates, but Canada as a whole should cherish the memory of one who offered up his entire time and energy to her service, making for himself thereby a fame that it will be difficult for anyone to eclipse. As Longfellow says:

'His heart was in his work and the heart
Giveth grace unto every Art.'

Peace to his ashes!

'He rests from his labours, and his works do follow him.'"

FERN HUNTING IN ONTARIO.

BY F. J. A. MORRIS, PORT HOPE, ONT.

II.—ABOUT THE RIDEAU AND OTHER ROCK DISTRICTS.

When I went from Port Hope to the Rideau Ferry in my first season's fern-hunting, I was curious to see what new species, if any, awaited me in a rocky district. I told myself not to expect more than 2 or 3 additions to my list of 20, and I kept assuring myself (and others, too, when I could find a willing ear) that I should be satisfied with 24 species in all. I was noth-

ing short of jubilant when I ended the season with 30 species; this number rose in 1907 to 34 and in 1909 to 37.

Ferns have a great liking for limestone, and almost my first expedition was to a creek flowing from Bass Lake to the Lower Rideau. Its course is little more than a mile long, first through beaver-meadows and then through pastures, where the stream is shaded with trees and flanked on one side by limestone cliffs ranging from 2 or 3 to 20 feet in height. Refreshing myself at a natural well in the rock on the near bank of the stream, I stepped across, scrambled up the loose talus and examined the shaded wall of limestone above. If you are not a fern lover you cannot share my feelings when I tell you I was standing within arm's length of 3 new species.

On the upper side of the topmost ledge stood a dense mass of Polypody, forming a natural coping-stone, as it were, to the rock wall. Beneath some lower ledges and in the horizontal seams were tufts of Black Spleenwort (*Asplenium Trichomanes*); while further in the shade, beneath some cedars that grew above the rock and behind two maples that grew up from below was a mass of tangled leaves—what could they be? some sort of dock? no! there were lines of spore-cases on the under side; it was the Walking Leaf (*Camptosorus rhizophyllus*), and, as though to put itself beyond suspicion or a doubt, it was actually walking; I got a plant three of whose fronds had regained the moss on the face of the cliff, rooted and given rise to plants of their own.

The Walking Leaf must have shade. It is fond of limestone, but in deeply-shaded damp woods I have found it growing on sandstone, and if you slash the woods and mutilate its sylvan bowers, letting in the sunlight, it will soon disappear even from its favorite limestone shelves. Its foliage has not the glossy finish of its congener, the Hart's Tongue, but its quaint growth and a certain local rarity about it will always attract attention.

The tendency of the long tapering frond with its sensitive tip to regain the mossy bed from which it sprang, seems like an instinct closely analogous to the blind groping movements of certain lower forms of marine life; true the tentacle thrust forth by the plant to search for the wall of its sea-cave swims in a more impalpable element, the ocean of air, but it serves the same purpose. The act is doubtless not a conscious one in either case, but in both alike sensation is involved. Not seldom when the frond has reached outwards to a distance from the rock and takes a long time to return, the auricles at the base of the frond are found stretching out blind hands in the shape of similar sensitive tentacles. The great blocks of limestone that fill the Niagara gorge are often densely carpeted with the Walking Leaf, the

plants growing in interwoven masses, a tangle there is no unravelling.

The little Black Spleenwort I had never seen growing in its native wild before. But I recognized in it at first glance the plant that I had seen as a boy of 10 years old in the pedlar's pack of a veteran fern-hunter in Perthshire; he had lifted it out with pride to show me as part of the spoils at the end of his long day's tramp to Glen Almond. He called it the Scotch Maidenhair and told me it was getting scarce in our neighbourhood of Crieff. It has a close kinsman in the Green Spleenwort, which is found in Ontario about the Bruce Peninsula. In size and shape of frond the ferns are indistinguishable, but the stipe of the Black Spleenwort is a shining ebony at the base and dark brown above to the apex of the rhachis; in the Green Spleenwort the stalk is brownish at the base and green above. I have found both species fairly abundant about mountain torrents and shaded glens in Argyllshire and high up on the hills of North Wales.

Altogether, along about half a mile of this little stream I have found 24 species of fern. The Christmas Fern is not nearly as common about the Rideau as at Port Hope, and I have not found the Narrow-leaved Spleenwort or the Goldie's Shield Fern at all, but on the other hand the Polypody is abundant; its favorite home is on top of a shaded rock wall.

Later in July I was on a picnic excursion, to the Big Rideau, that landed on the north shore nearly opposite Sand Island. This shore at one place rises to a high cliff of exposed rock; here I found an abundant growth of the Rusty Woodsie (*Woodsia ilicensis*): it seems to enjoy exposed situations and will fill up the rock seams in tufts as dense as those of the British Parsley Fern in the slate ledges of the Lake District. A peculiar feature about it and two or three other species of *Woodsia* is that the stipe is jointed; an inch or so above the base you will see an obscure thickening of the stalk; when the frond dies it breaks off at this joint.

Just behind the shore, a good deal higher than the level of the lake, the country consists of rocky open woods, chiefly poplar and oak. In these woods I found much to interest the naturalist: the Fragrant or Canada Sumach, and on it, feeding on its leaves and breeding there, large numbers of a Chrysomelian beetle, *Blepharida rhois*; the Steeple Bush or red spiraea (*S. tomentosa*); the Red Cedar (*Juniperus virginiana*); also, on the sun-baked surface of great weather-worn rocks, the *Selaginella rupestris*; in the shaded recesses of the rocks, the Black Spleenwort and near it the beautiful Ebony Spleenwort (*Asplenium platyneuron*); this last usually not in the rock ledges, but in stony ground a little way out from the Black Spleenwort's favorite haunt. It has much the appearance of the Christmas Fern, but the frond

is somewhat more slender; the pinnae, however, are strikingly like those of *Aspidium acrostichoides* and often auricled at the base; the dark brown or ebony stalk and the nature of the fruiting make it easily identified; the barren fronds, as in many ferns, are smaller and less rigid, with wider pinnae. It is not a common fern in my experience, and this is the only station so far known to me. A curious coincidence about finding it there was that one of the fern authorities (I think Mrs. Dana) says she has found it among red cedars; I had rarely, if ever, seen the red cedar growing, but it was noticeably abundant in the rocky open wood where I was exploring that day.

Towards the end of July I had planned to stay for a few days in Lanark, north of Perth, and just before going there I paid a visit to a tamarack swamp near Smith's Falls. On my way there I skirted a somewhat rocky pasture with straggling groves of maple and hemlock; in one of the wooded alleys near the roadway I saw some large masses of a light green fern which struck me as peculiar in its habit of growth; the fronds appeared to be very long and to droop outwards, the clumps as a whole looking like gushing fountains or spreading geysers of green; the pinnae, I noticed on drawing near, were very finely cut like filigree work; it proved to be the Hay-scented Fern (*Dicksonia punctilobula*); it is far from common about the Rideau, but its beautiful spreading sheaves are a noteworthy feature of North Muskoka, near Port Sydney. I found some more of it near Lanark in a rich maple wood, which provided me also with a second station for the Narrow-leaved Spleenwort. The *Dicksonia* does not like to be heavily shaded; it was in an open glade that I had first found it; it was growing in a clearing of the Lanark wood; in Port Sydney it is abundant at the sides of the roads, and in the Algonquin Park it usually occurs in disused lumber roads and on the trails.

Just north of the Village of Lanark I found under some cedars by the roadside my first colony of the Narrow Beech Fern (*Phegopteris polypodioides*); some of the specimens I got were at least as wide as long, but they were not the Broad Beech Fern which I have never found; for some time, however, I thought my find was *Phegopteris hexagonoptera*, but my first visit to the Algonquin Park settled any doubts I had.

During my few days at Lanark I drove to the head of Lake Dalhousie, where the Mississippi rushes into the Lake from the High Falls a little further up. The rock cliffs at the foot of the gorge are some 200 feet high and pretty sheer. I scrambled up the steep bank of talus to the foot of the cliff and made my way along the side, facing up stream; after an hour's slow survey of niches and crannies, and rummaging about among caves and

alcoves, I made a find that greatly pleased me; in some wet rock fissures I found growing the Slender Cliff Brake (*Pellaea gracilis* or *Cryptogramma Stelleri*). The books say it is rarely, if ever, found away from limestone; these cliffs, however, are granite or sandstone. There were two stations for the fern along the cliff, about half a mile distant from one another; one station contained 2 or 3 colonies some yards apart, the other only a single colony. The Slender Cliff Brake is the most delicate and frail fern I know. The stalks are almost threadlike in their thinness and very brittle; there is quite a marked difference between the sterile and the fertile fronds; the frond in fruit has its divisions narrow and pointed, the margins being recurved over the sporangia; in the sterile frond the pinnae have not recurved margins, and the 5 or 6 lobes into which they are divided instead of being a narrow lanceolate are wide spreading, ovate to orbicular, with a crenate margin. The fern grows in tufts out of rock seams with a habit like that of the Brittle Bladder Fern; the fronds when pressed are of so filmy a texture that the mere act of breathing over them will waft them off the sheet on which they lie.

In order to make myself familiar with the genus, I paid a special visit that autumn to Niagara Glen, where, on the sheer limestone cliffs above the gorge, the Purple Cliff Brake is abundant. It presents as remarkable a contrast to the Slender Cliff Brake as can well be imagined. The stipe is stout and woody, the foliage thick and leathery, bluish green in colour. Of course the kinship of the two is close and obvious, the sporangia being clamped beneath the reflexed margins of the pinnules; but in the true *Pellaea* the difference between fertile and sterile fronds is slight, in the *Cryptogrammes*, such as Steller's Cliff Brake and the Parsley Fern it is quite marked.

My next trip of any consequence was a visit to the Algonquin Park by way of Ottawa. Like all visitors to the Park, we first called on Mr. Bartlett, the Superintendent. In addition to his intimate knowledge of this fine tract of forest and lake, Mr. Bartlett has a great love of natural history, and the *flora* and *fauna* of the Park interest him quite independently of his official position. Hearing that I was specially fond of ferns he handed me over a small plant growing in a box and asked me what it was. I looked carefully at it and decided it was a Shield Fern, but the species was beyond me. I was then told to smell it; there could be no mistaking that sweet spicy fragrance; when I found that the Fragrant Shield Fern grew in the Park and was obtainable not far from Headquarters, I could scarcely wait till next day. The scent from the resinous glands on the under side of the frond is indescribably delicious.

The fern was not abundant in the neighbourhood, but was

found at 3 or 4 stations on the dry brittle rock; generally shaded, but not densely; its usual companions, the Polypody, the Beech Fern and the Rusty Woodsia. It grows in large compact tufts, a dozen or more green fronds projecting from a mass of brown shrivelled fronds of the previous season. The frond is in outline oblong lanceolate, its pinnæ a narrow oblong, consisting of narrow oblong pinnules, mostly opposite, and serrate at the tip and along the margin more remote from the rhachis; the base of the tuft is densely chaffy with large flakes of light-brown scales, which extend up the stipe to about half-way up the rhachis. The upper side of the frond is dark green, the under side is almost covered with the large circular indusiums, silvery-grey in appearance; the stipe and the frond, when the plant is fresh, are sticky and clammy moist with the resinous glands. The fern is so rich on the under side with this fragrant resin that it adheres tightly to the sheet of blotting paper in the press. The largest fronds on a well-grown plant are about 11 inches from base to tip, 3 inches of this being stipe; the extreme width is about 2 inches.

From the Algonquin Park I made a trip by rail to Port Sydney on the north branch of the Muskoka River. The chief object of this trip was to see the Virginia Chain Fern which had been found growing in abundance along one margin of a mud lake. Its companion was a fringed orchid I had never seen before, *Habenaria blephariglottis*.

We had only two days' stay in Port Sydney before my companion had to go east on his return journey to Liverpool, and the nicely calculated less or more of time for the trip proved almost our undoing. We left the Park Station at 6 a.m. and were met, as pre-arranged, shortly before noon by a wagon; this conveyed us to a bush from which we were to proceed on foot with our host and guide to where the Virginia Chain Fern grew. On the next day we were to go in a different direction to a wood where the Lance-leaved Grape-fern was to be seen.

Unfortunately our host and guide, a local naturalist with a reputation for never having lost his way in the bush, lost his way and his reputation both that first afternoon. The wagon-track ended suddenly at the edge of a marsh shortly above a beaver dam. Its sudden disappearance was due to the activity of some beavers. The marsh was drained down its centre by a small creek; round the edges of the marsh grew many poplars; coveting these for food the beavers had dammed the creek at its exit from the marsh, converting about half a mile of beaver-meadow into a standing lake. At first we thought of crossing this obstacle by the dam, but our guide's son found this narrow pass jealously guarded by a colony of "Yellow-Jackets" and we decided to keep to the wagon-track above; this led across the swamp by

a now submerged corduroy road and we had to feel our way along the track in water that in places reached the waist. The track then led up into a wood and from it diverged on the right a doubtful and tortuous trail in the direction of Twin Lake where the Chain Fern grew.

In an evil moment our guide tried a short cut to avoid an awkward slash in the woods. He lost his way, and we floundered along for more than an hour; during this time we crossed three slashes (apparently) far worse than the one we had avoided; they were really one slash and the same; as usually happens in the bush to those who use no compass and disregard the sun, we were walking in a series of eccentric circles. We drew up at last on the edge of a creek which our guide failed to recognize as the one we had first waded across; to make confusion worse confounded, we seemed to have got somehow onto the wrong side of this creek, but how or where we had crossed it we could not make out. Following down the creek a little way we came out on a lake. Our host had then to make the humiliating confession of having gone in a circle; instead of reaching Twin Lake, two miles above the Leaver dam, we were nearly a mile below the dam. It was then so late in the afternoon that we had to postpone our expedition to next day.

This time we chose a longer but more certain route and reached the colony of *Woodwardia virginica* without mishap. The first sight of this fern was quite impressive: the fronds stood rigid and erect, in long lines, all facing one way; the upper surface of the frond faced the water, the backs were away from the lake and most of them heavily fruiting; I do not mean to imply that the water caused their direction of growth; it was probably sunlight, as it was more open towards the water and shaded behind by the edge of the woods.

The fern is about as large as a medium-sized Cinnamon Fern and its pinnules are very similar in shape; the veins, however, are not free but areolate, forming a network; in the barren fronds the pinnules are seen to be minutely serrulate, but in the fruiting fronds the edge is apparently smooth and entire; this is due to the serrulate edge being reflexed; if you look at the under side of a fruiting pinnule, you will find the edge distinctly rimmed. The only other noticeable difference in shape between the frond of the Chain Fern and that of the Cinnamon Fern is that in the former the frond is narrowed considerably towards the base and above is lanceolate up to an acute tip; this character is repeated and even emphasized (as so often) in the pinna, which is strongly contracted in one or two pairs of pinnules at the more or less sessile base. The peculiar fruiting is, of course, unmistakable: the oblong sori running in parallel lines like the links of a chain

along each side of the pinna's midrib and similarly up each pinule. The fronds are thrown up at intervals from long underground rootstocks which occasionally attain a length of 9 or 10 feet. These long loose lines of ferns, like regimens in extended order, looking all in one direction, focussed on some unseen point of control, were standing thus to attention deep in the sphagnum moss of their subterranean root-stocks, running horizontally and branching down below, still lay in the same everlasting bed of sphagnum.

When I had first seen them, about the 5th of July, they were just beginning to rear their forms to stately height, the tips of the frond and the pinnae still partly furled, the whole foliage of a lush-coppery softness. Now, in the middle of August, they were mature, standing stiffly on stout woody reddish-brown stipes, the fronds thick and coriaceous. I said they were as large as an average Cinnamon Fern. With a view to the size of my press and the usual botanical mount, I chose the smaller specimens; they are from 20 to 30 inches long; but our guide insisted on my taking one frond, the largest he could see: it measures 52 inches, 21 of stipe and 31 of rhachis; the length of the longest pinnae is $6\frac{1}{2}$ inches, but as they point upward at an angle following the line of growth of the stem, the greatest width of the stem is 11 inches or thereabouts.

I have now brought my account of Ontario Ferns so far as they have come within my limited experience, down to the last family, that of the *Ophioglossaceae*, with its two genera of the Grape Fern (*Botrychium*) and the Adder's Tongue (*Ophioglossum*).

EXCURSIONS.

BEAVER MEADOW, Hull, May 14, 1910. About thirty members of the Club, including a representative number of students from the Normal School, were in attendance, and fairly good collections were made in the various branches.

The party met about 5 o'clock, and under the direction of the President, Messrs. McNeill, Brown, Wilson, Kingston and Groh spoke briefly on what they had observed.

The geological branch visited the quarries on both sides of Beaver Meadow—on the east several fossils were noted principally corals and brachiopods, and on the west several crinoid stems, one over a foot long. Both these quarries are in the Trenton limestone. The one on the west side is not far from the fault which is the boundary of the adjacent wedge-shaped area of Black River limestone. Numerous pot holes and other evidences of the action of running water were seen. The relative position

of the Trenton rocks to the Chazy and Utica formations, as observed at Blueberry Point and Billing's Bridge, was pointed out by Mr. Wilson.

Mr. Groh, after calling attention to the abundance of Rosaceous plants in the locality, illustrated the fact by means of specimens collected, as follows: The two wild strawberries (*Fragaria virginiana* and *F. vesca*), Barren Strawberry, Dwarf Raspberry, Wild Red Raspberry, Purple Flowering Raspberry, Bird Cherry, Choke-cherry, Wild Plum, Juneberries, two species (*Amelanchier canadensis* and *A. spicata*), and Wild Rose (*Rosa blanda*.) The Wild Plum and Dwarf Raspberry were particularly noticeable.—T.A.B.

Hog's Back.—The excursion to Hog's Back on the afternoon of June 18th was favored with excellent weather, but was rather poorly attended, owing to heavy rains which had fallen earlier in the day and threatened to spoil the afternoon. The party assembled at the Experimental Farm and proceeded across the Arboretum and along the Rideau Canal to the interesting locality named, the leaders being Messrs. Kingston, Wilson and Groh. Messrs. J. W. and A. Eastham, of the Wellington Field-Naturalists' Club, of Guelph, were welcome visitors with us.

The geological features of the place are very striking, and particular notice was taken of the nature of the rock formations, which are limestone and Chazy shale, and of the unusual amount of dipping and folding of the rock strata. Mr. Wilson stated that the anticlinal fold, or "hog's back," which gives the locality its name, and which occupies a prominent position in the middle of the rapids, is one of the finest examples of its kind to be found anywhere.

The botanists of the party found no lack of interesting material for their attention. All along the canal and at the Hog's Back the hawthorn flora is comparatively rich, both in numbers of individuals and in species, and the afternoon's collecting in this genus resulted in the securing of six species as follows: *Crataegus submollis*, *C. Jackii*, *C. Grayana*, *C. flabellata*, *C. macracantha* and *C. pedicellata*. Some curious fungous and insect injuries of plants also attracted attention.

H. G.

NOTES.

THE IMPERIAL MOTH, *BASILONA IMPERIALIS* DRURY.—Captures of this large handsome insect in Canada are always interesting. During June and July of the present year no less than

eight specimens were collected in the Ottawa District and the upper wing of another seen on the ground beneath an electric light. The first of these specimens was shown to the writer, and was collected around an electric light on the Experimental Farm, on 24th June, by Mr. D. Gibson, an employee of the Farm. On the following day the undersigned saw the wing above referred to.

The six Ottawa specimens were all taken around electric lights, five at the Experimental Farm, and one at Britannia, (H. Groh, 19th July); the other two specimens collected in the district were captured in Hull, Que., by Mr. W. H. G. Garrioch, also at electric light, one on 22nd June, the other on 26th June, and reported to the writer by the Rev. Dr. Thos. W. Fyles.

The Imperial Moth is rare in Canada. The only published Canadian records, which I know of, are the following:

Belleville, Ont., 1880, June, (J. T. Bell).

Orillia, Ont., 1900, and June 24, 1901, (C. E. Grant).

Ross Mount, Ont., 1906, (T. W. Ramm).

Kingston, Ont., Aug. 12, 1907, (A. B. Klugh).

Simcoe County, Ont. Larva found feeding on red and white pine, Sept. 15, 1907, (E. J. Zavitz).

Go-Home-Bay, Ont., July, 12, 1909, (J. B. Williams).

Trenton, Ont., June 27, 1909, (J. D. Evans).

Besides the above a specimen was collected at Port Hope, Ont., on July 25, 1900, by Mr. W. Metcalfe. At the same place the Rev. Dr. Bethune found the larva on pine.

In Packard's Monograph of the Bombycine Moths of North America, Part II, (1905), the geographical distribution of *Basilona imperialis* is given as follows: "New Hampshire; Claremont, N.H., (F. H. Foster); Cambridge, Mass., (Harris); Providence, R.I., (H. L. Clark, J. Bridgham, Deardon); Plattsburg, N.Y., (Hudson); Ithaca, N.Y., (Slingerland); New York City, (Joutel); Pennsylvania, (Strecker); New Jersey, 'usually common throughout the State'; Newark, in July, (Smith); Columbus, Ohio, (Tallant); Springfield, Alton, Ill., (Riley); St. Louis, Mo., (Riley); Cordova, Mexico, (Packard); Jalapa, (Druce); Race *nobilis*, Texas, (Neumoegen)."

If any other collectors in Canada know of captures of the Imperial Moth during the present season, I should be glad to get notes on the same.

ARTHUR GIBSON.

AN INTERESTING MILLEPEDE.—The large millepede *Arctobolus onondaga* Cook, is not uncommon in the Ottawa district. Specimens have been exhibited at several of the Spring excursions of the Club under the name of the Canadian *Julus*, *Julus*

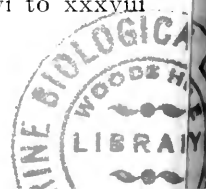
canadensis Newp. The largest specimen I have seen was collected by me at Chelsea, Que., on May 30th, a few years ago at a general excursion of the Club. It was crawling up the trunk of a large hardwood tree and when measured it was found to be $5\frac{1}{2}$ inches long when extended, and almost three-eighths of an inch in width. The species is described by Cook in Vol. VIII., p. 64, of the Harriman Alaska Expedition, the type having been collected at Kirkville, Onondaga County, New York, in June, 1895. In the description it is stated that the "species is abundant in favorable locations in central New York. It differs from the more southern *Arctobolus marginatus* Say, in the smaller size, more slender body, more uniform and darker colour and in the more distinct punctations of the surface of the segments. The basal joint of the gonapod is sinuate or emarginate laterad, instead of evenly convex as in *A. marginatus*." "*Julus canadensis* is a much smaller species, being only about 20 to 25 millimeters long. The specimens of *A. onondaga* above mentioned were found in dampish locations in the rather thick wood north of the grove at Chelsea.

ARTHUR GIBSON.

BOOK NOTICE.

A TEXT BOOK OF FIELD ZOOLOGY—INSECTS AND THEIR NEAR RELATIVES AND BIRDS, by Lottie E. Crary, assistant Professor of Biology and Geology, Kansas State Normal College, Emporia, with 117 illustrations: Philadelphia, P. Blakiston's Son & Co., price \$1.25.

This text book of xii + 364 pages makes a splendid companion book to Dr. Galloway's new book, a notice of which appeared in the July number. It is much the same in general make-up; the paper used is good and the type and printing all that could be desired. The book is intended primarily for students who have had little previous knowledge of insects, or animals of any kind. Common animals have been chosen for discussion. The illustrations used, with one or two exceptions, are excellent. The book is divided into three parts: Part I, Insects; Part II, Arthropoda, exclusive of Insects and Crustaceans; Part III, Birds. Altogether there are thirty-eight chapters. In Part I, the different orders of insects are characterized and suggestions given for field work. Part II discusses the near relatives of insects—myriopoda, acarina, spiders, etc. Chapter xix is a key to the families of spiders. Part III on Birds gives directions for field work, and much information on their physical features, habits, food, etc. Chapters xxvi to xxxviii treat briefly of the different orders of birds.—A. G.





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FERN HUNTING IN ONTARIO.

BY F. J. A. MORRIS, PORT HOPE, ONT.

III.—THE ADDER'S TONGUE FAMILY.

The Virginia Rattlesnake, our commonest Grape Fern, is so familiar a sight in our woods that I suppose no fern-hunter can well help being acquainted with it. It looks much like a Bracken, the sterile frond being more or less tripartite with the divisions compoundly pinnate and much dissected; but the base of the stipe is usually reddish and up from the centre of the sterile frond projects the fruiting spike; this ripens in June or July and soon after begins to wither away. There is another species, stouter and much more fleshy, which fruits in September or October, the Ternate Grape Fern (*Botrychium obliquum*). It was early in August that I first found this plant. Its dark-green fleshy sterile frond is not so finely dissected as that of *B. virginianum* and is more or less prostrate or decumbent on the ground; it grows on a long stalk from near the base of the main stipe; the fruiting spike is also thicker and heavier than that of the Virginia Rattlesnake. Its favorite habitat is at the edge of a wood in short dry turf with a sandy or crumbly soil; often in or about cedar alleys, but not deeply shaded in the woods themselves as the Virginia Rattlesnake usually is. Probably many of my readers have never been lucky enough to find more species of *Botrychium* than these two; but I have had the good fortune to find (I believe) all the species known to boreal America, except the famous Moonwort (*B. Lunaria*).

At the end of June in my first season's fern-hunting (1906), I took two of the schoolboys out to a tamarack swamp near Newtonville, 10 miles west of Port Hope. Our intention was to combine botany with entomology, my pupils being, like myself, interested in coleoptera. In a corner of this swamp is a dense damp cedar wood, forming part of the belt of woodlands enclosing the swamp. Along its inner side, among sphagnum, cranberries and pitcher-plants, grow the *Arethusa*, the *Pogonia*, the *Calopogon* and the *Cypripedium spectabile*; and right in the cedar wood (which contains also a few spruces) I knew were some

plants of the Yellow Lady's Slipper; I was groping about in this wood and had knelt down to examine some vines of the beautiful little Twin-flower (*Linnaea borealis*) when I spied some small spikes of a strange fern; they were not more than 3 or 4 inches high and were evidently a *Botrychium*. I sent some specimens to the late Dr. Fletcher, of Ottawa, who thought they were *B. matricariæ*, but he said he had never found the Matricary Grape Fern (now called *B. ramosum*), and my plant might prove a variety of *B. simplex*. This was my own feeling at the time and I was confirmed in it the following season when I found *B. matricariæ* (*ramosum*) growing plentifully in the Algonquin Park.

I have visited the colony every season since and have observed the plants closely. They show above the ground early in June; probably soon after the floor of the wood ceases to be inundated and the saturation of the vegetable mould is relieved by evaporation. Well-grown plants attain a height of from 7 to 9 inches (partly under ground) by the middle of July, at which time the spores are shed; by the end of July, or early in August, the plant becomes flaccid and wilts to the ground. Specimens gathered in the middle of June are about 4 inches long, the sterile frond longer than the fruiting, but in the mature plant these relations are reversed, the fertile frond considerably exceeding the barren; the appearance and shape of this latter are remarkably constant—it develops from about the middle of the main stem, occasionally lower, sometimes a good deal higher; it is always long-stalked and ends in a leaf blade of from 2 to 4 pairs of obovate or cuneate, sometimes nearly lunate, sessile lobes; these lobes are nearly opposite, and beyond them a single lobe, boldly notched, forms the apex of the frond. The plant is very fleshy and pale-green, more fleshy and pale than *B. ramosum*, which in turn is not so foliaceous or dark-green as *B. lanceolatum*.

In pressed specimens the bud at the base is rarely, if ever, visible, owing to the stem above the root being wrapped in the dry brown sheaths of previous years; in *B. ramosum* the next year's bud is almost always conspicuous as a dark-green projection in the pressed specimen. In the lobes of the leaf there occurs no mid-vein, just a fan-like spreading of the free, forking veins from their wide indeterminate base in the rhachis; in *B. ramosum* there does seem to be a mid-vein (doubtless lost in ramifying) which governs the growth of the secondary veins through the lobes and subdivisions of the leaf; these in *B. ramosum* consequently tend to terminate in a point, blunter indeed than those of *B. lanceolatum*, but distinct from *B. simplex*, which would seem to be a miniature and close kinsman of the famous Moonwort

(*B. Lunaria*). As exact figures are never out of place, I shall describe a mature specimen as it lies before me at this moment. Height 9 inches; common stem $4\frac{1}{2}$ inches, covered for 1 inch with brown sheaths of previous year's growth; fertile frond $4\frac{1}{2}$ inches consisting of a stem ($2\frac{1}{4}$ inches) and a bipinnate fruiting spike ($2\frac{1}{4}$ inches); sterile frond $3\frac{1}{3}$ inches long, consisting of a stem ($1\frac{1}{3}$ inches) and a leaf (2 inches) narrow-oblong in outline with 9 cuneate, simple, entire lobes; the first pair alternate at a little distance from one another; nearly half an inch higher the second pair contiguous-alternate, the third pair a quarter of an inch higher overlapping-alternate, the fourth pair opposite, and at the apex of the frond a single lobe strongly notched.

The normal form of *B. simplex* is said to grow on dry hill sides and to be very rare. Is it not possible that botanists have been begging the question in deciding that the form found in dry exposed stations was the normal form and that the fern was therefore very rare? In that little cedar wood of some 30 or 40 yards square there is hardly any vegetation apart from *Botrychium simplex*; I have counted half a hundred plants in the shade of a single cedar; it would be a modest estimate to say there were 1,000 plants in the colony. It is surely possible that rich vegetable mould in cedar swamps is the natural habitat of *B. simplex* and that the dwarfed rigid form on dry hill sides is only a variety. Of course, *B. simplex* is closely akin to *B. Lunaria*, which also is rare and has its home in exposed situations, so that the form I have may be a variety; it is of exactly the appearance and habit you would expect in a plant subjected to somewhat abnormal conditions: it is lank, flaccid and pale, like a plant grown in a cellar; but on the other hand its abundant fruiting proves it healthy.

For four years this damp cedar wood remained my only station for *B. simplex* (if I have rightly determined the species); but in September last at the close of my season's botany I got a great surprise while staying in North Burgess at a mica mine near Otty Lake (between Perth and the Rideau). The owner of the mine, an old pupil, was taking me to see a "mud lake" on his property; on our way through cedar alleys growing on an elevated rocky plateau a few feet above marsh level we found a colony of *B. ramosum*; they had shed their spores, but were still rect. living and green; all about the more open turfy parts of this plateau were plants of *B. obliquum*, some of them enormous, others very small and delicate, but all fruiting freely; the Virginia Rattlesnake was also, as usual, abundant.

From there we dropped to swamp level and came out at the upper end of the mud lake; it was unusually treacherous,

and after going almost to the waist more than once in a hole among the bushes of bog-myrtle, Labrador Tea and other shrubs we drew back a little from the lake and entered a narrow fringe of cedars at whose outer edge cropped out the rock that forms the foundation of the raised plateau mentioned before. I was just in the act of exclaiming about the similarity of this belt of cedars to the Newtonville cedar wood, when my pupil shouted to me to come and look at a strange plant he had found. Drooping, faded and yellow, it was the same *B. simplex* as I had found at Newtonville! We agreed to go different ways in search of more specimens along this fringe of cedars only a few yards wide; both of us were successful in finding more plants over a distance of 200 yards or more. More than 100 miles east of the first station, in conditions otherwise almost identical, the appearance of the plants differed not at all; the sterile part having a long-stalk, 3 or 4 pair of sessile, simple and entire cuncate lobes, and ending in a single similar but notched lobe.

Of course, these smaller Grape Ferns are a very variable genus, and for a long time confusion existed between *simplex*, *ramosum* and *lanceolatum*. Some botanists have yielded to the temptation of multiplying species by the separation of varieties, while others have nullified sound distinctions by confusing young immature plants of *ramosum* (for instance) with full-grown plants of *simplex*. From their habit I have come to the conclusion that these plants of mine are the same as those described by A. A. Eaton as *B. tenebrosum*, and I was therefore greatly interested to find, on looking at the new edition of Gray *tenebrosum* treated as a variant form of *simplex* and not *ramosum*. Many qualities relied on for final identification, such as the veneration or manner of folding in the bud, the venation or form in which the veins spread, are doubtless of secondary importance but the long stalk of the sterile leaf and the shape of its lobes are possibly more essential characters, and there is another point on which I have assured myself; the point relied on by the late D. C. Eaton, author of Ferns of North America; I mean the size of the spores.

I got by exchange a few plants of the normal *B. simplex* (2 - 4 inches high), and I have looked microscopically at the spores of *B. simplex*, *B. ramosum* and my strange plant; through a lens of 1 inch objective, the spores of my plant and the spores of *B. simplex* are both larger than the spores of *B. ramosum*; through a lens of $\frac{1}{4}$ inch objective there is no difference to be detected in the size of spores of the two former plants, but the spores of both are (apparently) as large again as those of *B. ramosum*.

My acquaintance with this latter plant, the Matricary Grape Fern, dates from 1907, when I first went from Ottawa to the Algonquin Park. I was out in a hardwood bush near Headquarters with the Park Superintendent, Mr. Wood, of the "Globe" staff, and the late Dr. Brodie. My companions were busy watching the movements of a pair of the Pileated Woodpecker (cock o' the woods); I walked down a slope of the forest floor towards a hollow filled with New York Fern when I almost set my foot on some plants of this (then) new species of *Botrychium*. It was early in August and the spores had been recently shed or in some cases were just being discharged. The fern varies greatly in size and in shape of frond, but it certainly deserves its title of "ramose," for it tends strongly to continued subdivision. The sterile frond is nearly sessile, never long-stalked; I have found it always in the rich leaf mould of hardwoods, usually near the foot of long gradual slopes, or in the shallow troughs and depressions just above actual swamp level. I have taken the fern as late as the first week of September; the plant was then sturdy and almost erect, having fruited (say) a fortnight or three weeks earlier.

It is the largest of the three species, *simplex*, *ramosum* and *lanceolatum*; I have a few specimens 9 inches high (one of 10 inches), but the average height of the plant is from 6 to 7 inches. I shall describe two plants (A and B) in some detail. A has a common stalk $4\frac{1}{4}$ inches high; a fruiting spike of $3\frac{1}{4}$ inches set on a stem of $1\frac{1}{2}$ inches; this fertile spike consists of 8 pair of pinnae, the lowest each an inch long, gradually reduced till at the apex of the fruiting division are 2 or 3 pairs of sessile clusters of sporangia; the barren frond is 2 inches long on a stalk about $\frac{1}{8}$ of an inch; it consists of 7 pairs of nearly opposite pinnae, the basal pair each $\frac{3}{4}$ of an inch long and divided into 5 pairs of ovate to narrow oblong lobes; the pinnae get gradually smaller till they end at the apex of the rhachis in 2 or 3 small sessile lobes. B has a common stalk of $5\frac{1}{4}$ inches; a fruiting spike of $2\frac{1}{4}$ inches on a stalk of $1\frac{1}{2}$ inches; this spike contains 5 pair of pinnae, the lowest pair each an inch or more in length, and ends at the apex in several sessile clusters of sporangia; the barren frond is $2\frac{1}{4}$ inches long and consists of 3 pair of ovate pinnae, the basal ones irregularly cut into about 5 lobes, the upper pair into 3 lobes, and at the apex a single 3 or 4 lobed pinna; this barren frond has a stalk of $\frac{1}{2}$ inch in length.

B. lanceolatum is a smaller plant than *B. ramosum* and usually ranges from 2 to 6 inches in height. The barren frond is not at all fleshy, but foliaceous and dark-green, sessile at the very apex of the common stem, or (if you prefer) at the base of the

sessile or short-stalked fruiting spike. In general outline, the fertile part and the sterile both tend to spread into an ovate form, not oblong as is usual in the other two species with the sides nearly parallel. The barren part consists of from 2 to 4 pairs of narrow lanceolate pinnae, subdivided into narrow lanceolate lobes or notched into sharp-pointed teeth; the fruiting part is often not so much a spike as a fascicle of 3 or 4 slender spikes, the central one often very little longer than 2 or 3 of the others; these spread out, often not in the same plane, into an ovate outline, and flanked with their clusters of sessile sporangia suggest the lashes of a knout or cat-o'-nine-tails.

The Lance-leaved Grape Fern is not at all common, as far as I know, in Ontario. I had found *B. ramosum* fairly abundant in the Algonquin Park in 1907 when I first visited that district; *B. lanceolatum* I saw no traces of, and learned only in the autumn from Mr. Ivey, of Toronto, that it occurred in our province; he had found it near Port Sydney in a rich hardwood, occurring with *B. ramosum*, but sparsely, occasional rather than abundant. In 1909, as I was taking an English botanist to the Park and was very anxious to see *B. lanceolatum* growing, Mr. Ivey very generously sent me a pencil sketch of the wood in which the fern had been found.

Owing to the failure of our first attempt to reach the Chain Fern I had only what time I could find before 11 a.m. in which to identify the wood and reach the small space within it occupied by the Lance-leaved Grape Fern. Not wishing to give my friend a second wild goose chase after the previous day's adventures, I got up alone between 3 and 4 a.m., and with my boots in my hand, crept stealthily down the boarding-house stairs in stocking feet. Fortunately it was not Sunday; my movements were not betrayed by my dropping a hob-nailed boot. The day before had been thundery and the sky was dark with clouds, the air heavy and close. It was daylight by my watch when I started out, but even in the open road it was barely dawn, a kind of tricky twilight, and to step into the woods was to shut and bolt the door on day and enter a labyrinth of crepuscular gloom. For nearly an hour I could not distinguish small objects on the ground except by painful straining of the eyes.

After two or three false starts, I satisfied myself that at least I had found the right wood, and a rich hardwood it proved to be. My experience in finding the Matricary Grape Fern led me by a half-conscious process of selection and rejection to a shaded slope and hollow of dead leaves just below some rock ledges; sure enough there was *B. ramosum*, several plants, and fine large ones, and as I knelt to examine them I spied

two plants of *B. lanceolatum* within arm's length. I marked the place, got back in time for breakfast and immediately after guided my friend to the spot.

The relation of *B. lanceolatum* to *B. ramosum* is certainly peculiar; the former being generally found sparingly in colonies of the latter; but it only makes its appearance and ripens after the other has shed its spores; in North Muskoka and the Algonquin Park it matures about the middle of August. I have more than once found a plant of *lanccolatum* with its stem actually contiguous with a plant of *ramosum* and its roots intertwined.

Mr. Raynel Dodge, the author of "Ferns and Fern Allies of New England," in a paper published in the Fern Bulletin of April, 1910, suggests that *ramosum* is a polymorphic plant, producing all the forms known as *ramosum*, *tenebrosum* and (perhaps?) *lanccolatum*. It certainly looks as though, by some mysterious hybridism or through some quality of dimorphism, spores of *B. ramosum* could give rise to *B. lanccolatum*.

On my return to the Park after seeing my friend off for England I spent a week in assiduous search for *B. lanccolatum*; my labours were rewarded by the finding of 10 plants in 3 separate places, both east and west of the Park Station. It seems to like even more shade and richer mould than the Matricary Fern, and often grows under small seedlings of hazel (for instance) in damp leafy troughs where no other vegetation, or very little, is to be found.

The Adder's Tongue is the last fern I have to speak about. Probably not many readers of THE OTTAWA NATURALIST have ever seen this quaint little plant growing; they think it very rare; I thought so, too, till less than a year ago, but since then I have been forced to the conclusion that it is fairly abundant wherever suitable conditions obtain, but so inconspicuous as to be entirely overlooked.

On the 1st of July last I shook the dust of town celebrations from my feet and spent the day in the country ten miles north of Port Hope near Garden Hill. I was lunching in the corner of an old meadow, or rather, upland pasture of sandy soil, when I saw 3 or 4 plants of *Liparis Loeselii* in the grass just where the pasture sloped off into a beaver meadow skirting a cold little trout stream. I had hitherto found this orchid in marshes only, often in the wet grassy padway of winter roads, and I got up on the mound of a half buried old log to survey my surroundings; suddenly among the thin sparse seedstalks of grass I spied some 20 spikes of (surely it couldn't be?) *Ophioglossum vulgatum*. I searched carefully—exhaustively, as I thought—, but only found 3 more spikes nearer the edge of the beaver meadow

I was expecting a brother botanist from England to spend the summer with me, and you may imagine my elation at being able to show him the Adder's Tongue Fern in its native haunt.

The colony was so small that I kept close watch over it and when hay-fields began to be cut I strode sternly out to defend my proprietary rights. Fortunately my corner was arid and sandy, the grass so short and thin that no mowers had been to molest the Adder's Tongue; no mowers, but the devil disguised as a horse had come and cropped the few spikes I had added to the first find. Domestication seems to distort good wholesome animal instincts into unnatural appetites; the horse is bad enough, but for depraved tastes commend me of all things to that clumsy ruminant, the common cow; a creature so prosaic, too, that aesthetic considerations seem lost to it; among its favorite food plants I may mention the Plantain-leaved Ladies' Tresses, the Narrow-leaved Spleenwort (especially when rare in the neighbourhood), and the Adder's Tongue Fern.

About the middle of July the two of us went out to see the colony and inspected the bank of the stream a little further down; we found hundreds of plants, usually near the foot of steep slopes; we then tried the far bank, my friend unsuccessfully, but I detected several colonies, and at one spot some plants newly trodden down; the footprint was my friend's. I called him to me and made merry at his expense, showing where he had walked and trampled under foot fronds 7 or 8 inches long of the fern he was looking for; he rather took the wind out of my sails by pointing out some still larger plants on which I was kneeling. It is a most inconspicuous fern, but far from rare. However, we still clung desperately to the cherished belief that it was rare; true, it was plentiful along this stream, but that was only one station and probably (we concluded) a lucky find.

A week later we had flitted with our botany cans 100 miles or more east to the village of Lanark, north of Perth. We were returning across country to the village from a bluff on the upper part of the Clyde River where the Rusty Woodsia (*Woodsia ilvensis*) grew; our way led across undulating pastures and grain fields, an elevated and rocky stretch; here and there a small wood now lying in a hollow, now hanging on a hill-side or perched on a knoll. In some of these upland pastures near the edges of marshy ground we found great patches of *Selaginella apus*, that pretty little cousin of the club-mosses, with its bright yellow-green prostrate branches forming thick mats in the spongy turf.

We went along a sloping pasture towards a wooded ridge in the distance; and as we surmounted a fence that ran from a little wood tilted half way up the slope to a willow swamp below

we spied a fine sheaf of one of the *Osmundas*; so fine that we swerved from the path to view it at nearer quarters: *Osmunda claytoniana*, truly a royal group, and hedged about with a body-guard of Sensitive Fern. As I stooped over to enjoy the sight I discovered some spikes thrusting up among the barren fronds of *Onoclea sensibilis*; the body-guard was fairly bristling with spears: it was the Adder's Tongue Fern. Walking carefully about we discovered an extensive colony, reaching back to the fence we had climbed, down the slope to the swamp's edge, and forward a little way round the margin of the swamp.

Three days later we were at the Rideau Ferry, and as we were examining some plants of *Botrychium obliquum* near the Bass Lake Creek, my friend spied the Adder's Tongue near some pines at a fence-corner. We were delighted to find it in a neighbourhood I knew so well and showed the colony to our host, my old pupil. After asking incredulously whether it was really a fern, he said he was sure he had seen it growing at the mine! Of course, if a friend asked me in strict confidence where he was likely to find *Ophioglossum vulgatum*, I should not recommend him to go to a mica-mine. But I knew my pupil was observant and we had meant to go to the mine anyway, so off we went.

In the first swamp edge—just above and outside a narrow swamp filled with sedge-grasses and the Marsh Fern—we found the Adder's Tongue; we found it *in* the swamp too, but only on and about peaty hummocks covered with crumbly turf, old ant-hills or something of the sort. We tried a second swamp that looked likely and found it once more. The illusion of its rarity was vanishing; what we had three times stumbled on accidentally, we were now deliberately hunting for in likely places (guided by experience).

A day or two later we went to the Algonquin Park where there are no clearings, and for a month we dismissed all thought of the Adder's Tongue. But at the beginning of September I returned to the Rideau and went to see the Bass Lake colony of *Ophioglossum*. I found that while nearly all other foliage was green, this fern had faded yellow and was easily detected. The leaves fairly dotted the marsh margins and drier parts of beaver meadows up and down both banks of the creek. I went to the mica-mine and discovered several new stations for the fern there; even a colony in a most unusual habitat, a deeply shaded cedar alley.

In the middle of September I returned to Port Hope and began investigations there. In four weeks I had found more than 20 stations for the Adder's Tongue, many of these stations comprising a large number of colonies and hundreds (if not

thousands) of plants. In many places the ferns were young and still developing their sporangia, but about the middle of October a light touch of frost checked further activity.

This spring I found plants sprouting early in May; by the 20th of June I had found plenty of Adder's Tongue in every station discovered last autumn and had added several new colonies and stations to the list. The plant is, I believe, quite common and almost ubiquitous in country clear of forest where old pastures abound. A fortnight ago I was driven some 10 miles to a trout stream rather beyond the pedestrian's range. As I sauntered up stream I noticed an open hill-side through a clearing in the woods; it looked a likely place and was only a few rods distant; in 10 minutes I had found 30 or 40 plants, about turfmounds on its slopes.

I almost think myself competent now to find the Adder's Tongue, for anybody who wishes, in any locality whatever, provided it has the right conditions, with as much certainty at least as your water-finder will discover hidden springs with his forked hazel wand; perhaps with the same overweening self-confidence, and (it may be) the same inability to communicate my gift.

NOTES ON *EUXOA DETERSA* WLK. AND *E. PERSONATA* MORR.

BY JOHN B. SMITH, Sc.D.

In 1856, Walker described as *detersa* an American species which he referred with a query to *Charcas*. It came from Nova Scotia and was not identified in our collections until, after an examination of the type, I referred it, in my catalogue of 1893, to the *Agrotis pitychrous* Grote, described in 1873, in the Bull. Buff. Soc. Nat. Sci. 1, 82. This reference has been questioned by Mr. Schaus, I believe; but not very definitely, and it has been followed since then by Hampson in his monographic work. My note was that Walker's type was like an average *pitychrous*, such as was also represented in the Grote collection under the latter name; but Hampson's figure does not represent such a specimen; it is really more like a *personata*.

In 1876, Mr. Morrison described *Agrotis personata* from a single example, in the Proc. Bost. Soc. N. H. XVIII, 238, recognizing its resemblance to *pitychrous* and really differentiating it rather by locality than by any very decided characters. In

1880, Mr. Grote, Can. Ent. XII, 187, definitely referred the name as identical with *pitychrous*, and so it has stood without definite question since.

In 1890, in my Revision of the Agrotids, I pointed out the difference between the *pitychrous* and *personata* forms without questioning their distinctness, and in my catalogue of 1893, I specified the collections where the types were to be found. In the Lintner Collection was that of *pitychrous*, and in the Tepper collection that of *personata*.

Recently, Mr. Arthur Gibson, of the Experimental Farm, Ottawa, Ontario, wrote me concerning *detersa*, now referred to *Euxoa*, questioning whether there were not actually two very distinct species involved. At my request he sent me his material for study and with my own this gives me 49 examples, readily enough divisible into two series, representing two good species.

EUXOA DETERSA WLK. Of this species I have 17 males and 16 females, in good condition. It is a common species along the shore in New York and New Jersey, found throughout September on the flowers of golden rod, in open sunlight. I have taken dozens of specimens in a single afternoon and scarcely two of them alike. The ground color of primaries is a very pale luteous, almost whitish in some specimens, and the variation is to a reddish gray, more or less suffused with smoky, until the entire wing becomes smoky. The females are darker throughout than the males, and tend to become spotted or mottled.

Taking a good series as a whole, the general resemblance of the *quadri-dentata* type of maculation is obvious. There is a pale longitudinal shade in the sub-median interspace beyond the claviform; the median vein is pale or white-marked; the s.t. space is paler and outwardly indented on veins 3 and 4, and these veins are usually a little emphasized by pale shadings or rayed. The median lines tend to obsolescence, the t.p. usually rigid, and there is rarely even a trace of a median shade. The ordinary spots are paler than the surrounding space, sometimes contrastingly so; the orbicular varies much in size and form, the reniform is rather narrow kidney-shaped, and tends to a little constriction from the outer side.

There is scarcely a feature in this maculation that does not vary to some extent and there are few specimens in which all the features are as described; but that is the general impression given by a series, and which can be traced in the vast majority of all examples that come under inspection. The range of expanse is from 28 to 35 mm. in the series before me, and exceptional examples will reach $1\frac{1}{2}$ inches or 37 mm. The average example is about 31-32 mm. in expanse.

EUXOIA PERSONATA MORR. is, on the whole, a somewhat smaller species. The largest example in my series of 10 males and 6 females is 32 mm., in expanse, while the average does not exceed 29-30 mm. The ground color usually contains a distinct tinge of reddish and the surface is coarsely powdered, yet lacks that blotchy appearance seen in the darker examples of *detersa*. Taken as a whole, the series does not suggest *quadri-dentata*, but does contain an approach to the *messoria* type. There is no pale streak in the sub-median interspace beyond the claviform, although there may be a slightly paler area to the t.p. line. The median vein is not white or pale marked, veins 4 and 5 are not rayed, although the s.t. line may be slightly indented at those points. The ordinary spots are less contrasting than in *detersa* and the reniform is distinctly broader, more regularly kidney-shaped, the outer margin never bent inward to form a constriction. Perhaps the most characteristic feature of this form is the completeness and distinctness of the median lines, the t.p. being usually crenulate and broadly outcurved, while in almost all examples there is a traceable median shade line, which becomes obvious in many specimens.

In the series before me the *detersa* come from St. John, New Brunswick, VIII, 18-30; Ottawa, Ontario, VIII 24, IX 8; Webster, New Hampshire IX 8; Cohasset, Mass., IX 3, X 15; Albany, New York, IX; Anglesea and Bayside, New Jersey, late August and throughout September. *Personata* is from Canada, VII 27, IX 14; Denver, Colorado, VI 10; Rounthwaite, Manitoba, no date; Aweme, Manitoba, VII 13, VIII 25.

It is certain, of course, that the distribution of both species is wider: but material of the latter is short because the species is a common one. *Personata* was described from Galena, Ills.

NOTES.

STILL ANOTHER CASE OF NATURAL GRAFTING.—Mr. H. Groh's note in the June number of THE OTTAWA NATURALIST recalls to my mind that at a field meeting of the Natural History Society, at Chatham Island near Victoria, on the 7th May last, an instance of a natural graft of an oak tree was found at the spot where the excursionists landed. The tree is but a small one and at a point about four feet from the ground a branch has apparently been bent over and become incorporated with the trunk, leaving an oval opening about 18 inches in diameter. One of the ladies of the party, realizing its suitability as a frame,

had her photograph taken in it. The tree Mr. Groh writes about is certainly a curiosity well worth preserving.

J. R. ANDERSON.

In The Popular Science Monthly, Professor John B. Smith, Sc.D., of Rutgers College, recently contributed a most interesting article entitled "Insects and Entomologists: Their Relations to the Community at Large." In the second part of the paper, which makes mention of some of the men, now all dead, who devoted their lives to a study of insects, the following paragraph will be read with interest by readers of THE OTTAWA NATURALIST:—

"Last of all in this list of those who have been influential in the development of the fight against insect pests, because his loss is one of the more recent, is Dr. James Fletcher, of Ottawa, Ontario. Who of the entomologists attending the annual meeting of the American Association does not remember his hearty and cheering presence? Who does not remember his cordial greeting, his constant good nature and the directness and convincing qualities of his contributions to our discussions and debates? As for the work that he did in Canada—none could have done it as he did. He was widely informed, not a narrow specialist, he was a student of men as much as of insects, and he commanded the confidence of his constituency. It will take two men or more to carry on the work that this one did alone."

The Treasurer of the Club has had handed to him one dollar which came addressed in typewriting to "The Secretary, THE OTTAWA NATURALIST, Experimental Farm, Ottawa." No letter or name accompanied the above remittance. The Treasurer would therefore be much obliged if the sender would at once correspond with him.

CORRESPONDENCE.

EDITOR, OTTAWA NATURALIST:—

The following from the Colonist, of 1st July, is a very faithful account of an occurrence which I believe to be most unusual, and which may be of interest to the readers of THE OTTAWA NATURALIST. I may state that the sparrows, cock and hen, flew down, from the top of a building, at Laddie, the hen leading the attack.

"Homeward bound pedestrians on Yates Street, between

Broad and Douglas, at 6 o'clock last evening witnessed the unusual spectacle of a pair of courageous little sparrows (evidently filled with parental anxiety for their fledglings) attacking an Aberdeen terrier, of whose inquisitive explorations they were apparently in fear. The dog belonged to Mr. J. R. Anderson, late Deputy Minister of Agriculture, and was not once but repeatedly assailed by the cheeky little feathered arabs, which in turn would flutter above it, occasionally darting down to peck at the surprised terrier. When the dog would swiftly pursue one of the pair its mate would attack from the rear, thus diverting the enemy. It was the dog which tired first of the game, in which (the dog being no aerialist) the birds had all the better of the argument.

J. R. ANDERSON.

BOOK NOTICES.

THE HOUSE FLY, *MUSCA DOMESTICA*, LINNÆUS—a Study of its Structure, Development, Bionomics and Economy, by C. Gordon Hewitt, D.Sc., Dominion Entomologist, Ottawa, Canada, and late Lecturer in Economic Zoology in the University of Manchester: Manchester, at the University Press, 1910.

This volume of 195 pages which has recently appeared is a most valuable publication. In 1907, 1908 and 1909, Dr. Hewitt published in different volumes of the Quarterly Journal of Microscopical Science, three parts of his paper on the House Fly. These parts have been bound together in the present volume, with many additional facts. Part I. treats of the Anatomy of the Fly; Part II., the Breeding Habits, Development, and the Anatomy of the Larva; Part III., the Bionomics, Allies, Parasites, and the Relations of *M. domestica* to Human Disease. In addition to the fairly complete account given in Part III. the appendices at the end of the volume will be found of particular interest at this time when so much warfare is being waged against this extremely dangerous insect. Such subjects are discussed as "The Relation of Flies to Summer Diarrhœa of Infants;" "Flies and Milk," etc.

A. G.

CATALOGUE OF THE ODONATA OF NORTH AMERICA, by Richard A. Muttkowski. Bulletin of the Public Museum of the City of Milwaukee, Vol. I., article 1, pp. 207.

This well-prepared catalogue, which was issued on June 27th, is a publication which will be widely welcomed by students of the Odonata. Such a catalogue has been much wanted. It

presents in convenient form what purports to be a complete list of these insects from the North American region. The author has had the co-operation of the leading students in this order in the preparation of the catalogue; the classification and nomenclature employed, therefore, represents the more approved and advanced ideas of odonatologists. The publication is an important one, and will undoubtedly be much sought after. It should be in the hands of all Canadian students of these neuropteroid insects.

A. G.

The Fortieth Annual Report of the Entomological Society of Ontario has recently appeared, and as usual contains much valuable information about the insect pests of Canada, especially those injurious to the crops of the Province of Ontario. As most of the insects, however, are found throughout the Dominion, all can profit by reading the excellent assortment of papers presented.

The report, as formerly, contains a summary of the proceedings of the Annual Meeting, the election of officers, address of the President, reports of different branches, directors, etc., etc., together with the papers read at the meetings.

Among the more important addresses and papers, mention may be made of the following, which appear in the order given: Gibson, Arthur, "Report of Insects of the Year, Division No. I;" Ceasar, L., "Observations on a few Insects of the Season;" Gibson, Arthur, "Nests of the Brown-Tail Moth in Importations of French Nursery Stock, 1909;" Treherne, R. C., "Nursery Work in Ontario;" Morris, F. J. A., "Some Guests at the Banquet of Blossoms;" Hewitt, Dr. C. G., "House Flies and their Allies;" Lyman, H. H., "The Origin and Diffusion of Entomological Errors;" Sanders, G. E., "Conflicts between Ants;" Gibson, Arthur, "The Spruce Bud Worm, *Tortrix fumiferana*, Clem.;" Winn, A. F., "The Snow White Linden Moth." Swaine, J. M., "Notes on Fruit Tree Scolytids;" Bethune, Prof. C. J. S., "Observations on Ontario Insects in 1909;" Lochhead, Prof. W., "Injurious Insects in Quebec, 1909;" Fyles, Rev. Dr. T. W., "Adaptation in the Structure of Insects;" Jarvis, T. D., "The Acarina, with a host index to the Species found in Ontario;" and "The Entomological Record for 1909," by Arthur Gibson, which fully maintains its high reputation.

The report concludes with a portrait of the late Dr. Brodie, of Toronto, and five other full page plates.

N. C.

The sixth annual issue of the Ontario Natural Science Bulletin, published by our sister society, the Wellington Field-Naturalists' Club, of Guelph, Ont., has come to hand, and is a neat seventy-page volume which worthily maintains the fine character of the publication. This year, perhaps even more than usual, a large proportion of its space is devoted to articles and notes which represent the work of Ontario naturalists on Ontario subjects. Many of these contributions are local lists which put on record the results of years of patient collecting and observation, and are real additions to the biological knowledge of the province. Among the groups thus treated are the Orchids, Compositæ, Amelanchiers and Cruciferae, among plants, and the Butterflies and Cynipidæ among insects. A number of new records and range extensions of birds and plants also appear. Several articles written in a less technical vein are scarcely less welcome in their way, than the foregoing. The volume closes with a report of the winter meetings of the Club, which were evidently of a high order as indicated by the subjects presented.

H. G.

In a recent number of the Proceedings of the Portland Society of Natural History, Vol. II, Part 8, Mr. W. C. Kendall contributes an article on "The Fishes of Labrador." The paper is based mainly upon a collection of fishes made during the expedition of the Bowdoin College party to Labrador in 1891. Seven of the species recorded, it is stated, have hitherto never been reported from Labrador. Notes are also given on some species collected in other places on the trip. A list of all the species definitely recorded from Labrador follows, with authority and date of each record. This authority and date refer to a chronological bibliography and list of collections, in connection with each of which is given a table showing the nominal species recorded from Labrador, the locality and present identification of those contained in each work or collection.

This paper should prove of much interest to Canadian ichthyologists. The author states that the aquatic fauna of the region is in many respects similar to that of Greenland and more northern waters, and that it may be reasonably expected that Greenland marine fishes at least, not yet recorded from Labrador, may yet be found there.

The article is the fifth one on the scientific results of the expedition. The third paper of the series, "Some Recent Additions to the Labrador Flora" by Fernald and Sornborger, was published in THE OTTAWA NATURALIST, Vol. XIII, pp. 89, 107.

A. G.





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PLANT PHYSIOLOGY VERSUS PSYCHOLOGY.

BY H. T. GUSSOW, DOMINION BOTANIST, OTTAWA.

When an infant of tender years performs spontaneously some purely instinctive feat, proud parents wonder at his early manifestation of intellect. When he succeeds in calculating, in reasoning, we take it as a matter of course as the awakening of intellect. Intellect is said to be the power of the human soul by which it comprehends, as distinguished from will power and senses of touch, hearing, etc. *Homo sapiens* is the only animal possessing a soul; a soul by which we distinguish between good and evil, for this knowledge is absent in other animals. Animals have a similar faculty, namely instinct. Now, this term is used to describe actions which are spontaneous, which are a natural desire arising in the mind. The difference between intellect and instinct I understand indicates a certain faculty of forethought present in intellectual beings, in human beings, which when only spontaneously or involuntarily dictated becomes instinct. It has been shown that no amount of training is capable of developing this power of discrimination—acting properly in the proper place—in even the most intelligent of animals. It is a long recognized fact that man and all other animals possess certain gifts which make them totally different from any other organic being.

In these more highly developed forms of creation we can locate the motive power in the nerve centres, which regulate physical and psychical functions or impulses. Although plants are all more or less capable of certain striking reactionary movements, which testify that they possess the sense of feeling (*Dionæa*, *Mimosa*, etc.), yet in the absence of nerve centres acting upon a well organized nervous and muscular system we are inclined to regard these functions as merely responding to local irritation. But when regarding really sensible movements of which some plants are capable—so capable that they become perceptible to the observer—then we do not for a moment consider the

possibility of some kind of system in plants analogous to the nervous system in animals, but simply regard them as involuntary, spontaneous, natural responses. In animals we term such actions instinctive for the reason that we can observe the working of a brain power, and knowing the function we are satisfied that they are instinctive. People who are familiar with the growth of plants in rooms have had occasion to observe their desire to turn to the light. Thus they are enabled to make the best of the unnatural conditions; they must indeed succeed in obtaining as much light as possible, or they will die. What compels the plant to this action? Grain that has been laid flat on the ground after a storm, or heavy rain, will begin to grow erect after a few hours, and, under normal circumstances, it will "get up" sufficiently to produce its seeds. The sole object of grain is to produce seeds, and the plants endeavor to perform this purpose at all costs. When examining grain that is rising up again we notice that the stem bends in the nodes until it is quite erect. The nodes here act similarly to the joints in animals. Physiologically this is simply an expansion and contraction of certain cells in the nodes. Nature, I presume, is responsible for this function? Climbing plants (*Wisteria*, *Hedera*, etc.), send out their flower-bearing shoots far beyond the shade of their leaves, and if prevented in this movement by a repeated tucking of these shoots underneath others, the plant will postpone the opening of the flowers for a considerable time until it succeeds in getting towards the light; if, however, continued, the flowers will eventually open, the plant doing then its utmost to become fertilized. These movements in plants which are often strongly perceptible, make the observer realize that they serve some purpose, and this action to fulfill a set aim is simply natural. Is it? The plant growing towards the light, the grain "getting up" after a storm, both to escape destruction, the climbing plants anxiously endeavouring to become fertilized, are these merely physiological functions, or are they instinctive? Is this really wonderful or is it simply nature? But why then are similar functions in man and animals, intellect or instinct, not simply nature? Nature then is the motive in plants which performs wonderfully intelligent feats—as they are not capable of reasoning? We have often seen recorded most surprising feats performed by domesticated and wild animals in their search after food. Now consider for a moment the germinating *Cuscuta*. The coil contained in the seed pushes to the surface when germinating and the top revolves slowly, snake like, erect, until it spies a suitable host plant to which it may attach itself and find food ready and available upon which to maintain itself. This parasitic plant finds no food in the soil and must succeed in

reaching a living plant and is hence endowed specially with the power of motion. But what will this little plant do if we remove a large number of plants in its immediate neighborhood and provide it with props of all kinds of inorganic matter (glass rods, pins, matches, etc.)? It grows towards these obstacles but turns away scornfully after realizing its error, and continues its life crawling about until it has succeeded, as it generally does, in discovering the living plant, or plants. Is this also nature, this intellectual power of discrimination? Then, dear reader, if you answer in the affirmative, give your reasons and explain nature, instinct, intellect! An infant beginning to walk eagerly catches hold of anything to support itself, but when having mastered a few steps it indignantly refuses support—this not being needed becomes dispensable. Plants like *Ampelopsis* or *Clematis* attach themselves by means of haustoria or tendrils for support. This function becomes immediately arrested if we provide them with supports by tying them up. The plants having achieved their purpose consider it unnecessary to support themselves and haustoria and tendrils remain inactive. Several genera of Amaryllidaceæ have the power, under given conditions, of moving their anthers towards the style, but they only so exert themselves when no insect fertilization is likely to take place.

I have chosen here examples which strikingly illustrate these points, they exist in hundreds of others, and probably in all plants; only far less readily perceptible. We strangely hesitate to regard plants as being possessed of anything more than spontaneous, responsive, actions. We disregard the fact that plants, being confined to their place of growth, cannot display their intellectual powers like animals capable of moving about. The movements which I have referred to certainly are intelligent, we cannot deny this. Within comparatively recent years botanists have begun to pay attention to such phenomena. And, if the physiologist has an explanation for many phenomena, yet not all are satisfactorily explained, and whether we have psychological functions besides, is a question the study of which will make botany one of the most interesting of the sciences. Charles Darwin, the great natural philosopher, the distinguished geographer, geologist, mineralogist, zoologist and botanist, also advanced our knowledge of psychology more than is generally acknowledged. His observations directed our thoughts into these channels. Those who are unfamiliar with his works—"Climbing Plants," "Movements in Plants," "Insectivorous Plants"—should read them and they will get a glimpse of this marvellous man's mind. He has left, in his son Francis a powerful observer who goes further than his father, who refers

to the *Drosera*, a plant much beloved by him, as like a highly sensitive animal. Francis Darwin, in his address before the British Association, actually refers to the instinctive power of memory in plants! In Europe many investigators have interested themselves in this study, and, in 1908, at one of the meetings of the Royal Academy of Sciences in Vienna, Dr. Haberlandt, one of our foremost botanists, declared that the intellectual physiological functions in plants find their perfect analogy in the intellectual psychological functions of mankind. So after all, Aristotle, the celebrated Greek philosopher, forestalled modern ideas by speaking of the soul of plants!

My remarks on this subject I trust will not be misunderstood, though many will ridicule the idea of a plant psychology. But the ardent observer, the true lover of the study of plants, may find in these observations some hints to make the science of botany still dearer to him, when realizing that he deals not only with an inanimate soulless vegetation.

BIRD MIGRATION IN NORTHERN BRITISH COLUMBIA.

BY REV. J. H. KEEN.

The following notes may be of interest as helping to show the movements of the migratory birds in this region. They are scrupulously correct as far as they go, but they were made during the brief intervals of leisure in a busy clergyman's life, and are by no means as complete as they might be. In 1906 no observations were made, as the writer was away from home.

The regularity with which some migrants appear is truly wonderful. The humming-bird and white-bellied swallow, for instance, have varied scarcely more than a fortnight during the ten years covered by these records, and the robin less than three weeks during the same time.

The failure of the osprey to appear during recent years is strange. He is too large to be overlooked, especially as a sharp look-out has been kept for him.

Most of the resident species of birds here are partial migrants, as appears by the obvious increase in their numbers in spring, and a corresponding decrease towards winter.

EARLIEST SPRING APPEARANCE OF MIGRATING BIRDS AT METLAKATLA, B.C.

A.O.U. No.	1900	1901	1902	1903	1904	1905	1907	1908	1909	1910
761	Robin.....	Mar. 14	Mar. 18	Mar. 27	Mar. 13	Mar. 19	Mar. 17	Mar. 16	Mar. 27	Mar. 3
433	Rufous bkd. Humi.-bird....	Apr. 10	Apr. 20	Apr. 18	Apr. 23	Apr. 14	Apr. 10	Apr. 13	Apr. 26	Apr. 20
758a	Olive-backed Thrush.....	May 29	May 4	.....	June 4	May 29	May 23	May 4	May 1	May 4
614	White-bellied Swallow....	Apr. 27	Apr. 18	Apr. 20	Apr. 18	Apr. 15	Apr. 11	Apr. 15	Apr. 28	Apr. 29
652	Summer Warbler.....	May 23	May 25	.....	June 3	May 22	.....	June 2	May 23	June 10
646a	Orange-crowned Warbler..	Apr. 14	Apr. 14	.....	Apr. 24	May 4	Apr. 23	Apr. 24	Apr. 15	May 3
364	Osprey.....	May 24	June 2	.....	.....	May 10	.....	.....	.....	.....
542a	Savanna Sparrow.....	Apr. 18	Apr. 11	Mar. 31	Apr. 26	Apr. 19	Apr. 23	Apr. 25	Apr. 25	May 1
697	Pipit.....	.....	Apr. 27	.....	Apr. 25	.....	Apr. 19	Apr. 10	Apr. 21	May 8
557	Golden-crowned Sparrow..	.....	Apr. 28	Apr. 25	May 1	May 2	Apr. 26	May 1	Apr. 27	May 2
685	Wilson Warbler.....	.....	May 19	.....	May 22	May 22	.....	May 2	May 11	May 9
554	White-crowned Sparrow..	.....	May 1	.....	Apr. 28	Apr. 30	.....	Apr. 29	.....	.....
243a	Red-backed Sandpiper....	.....	.....	Apr. 21	.....	Apr. 14	Apr. 29	Apr. 29	Apr. 4	Apr. 28
206	Sandhill Crane.....	.....	.....	.....	.....	May 7	Apr. 30	Apr. 30	Apr. 30	May 1
536a	aplاند Songspur.....	.....	Apr. 8	Apr. 3	.....	Mar. 18	Apr. 5	Apr. 5	.....	Apr. 26
583	icoln's Song Sparrow....	.....	.....	.....	.....	.....	May 2	Apr. 27	.....	May 3
585a	T. wnsend's Sparrow....	.....	.....	.....	June 16	.....	Apr. 24	Apr. 25	Apr. 25	May 7

EXCURSION TO GREEN'S CREEK.

The first fall excursion of the season was held to Green's Creek on Saturday afternoon, September 24th. The outing was most enjoyable in every way. The party, although only seventeen in number, left the Post Office in a large van at 1.45, and arrived at the destination an hour later. The coolness of the afternoon undoubtedly kept many from attending. It is many years since the Club used buses for an excursion, and although the result was not a financial success in the present instance, the experiment is well worth a repetition another year. In the old days of the Club many an enjoyable outing was held in such conveyances, and given warmer weather there is no reason why similar excursions in the future could not be held successfully to nearby places not reached by any of the railways.

Green's Creek is about six miles from the Post Office, out on the Montreal road. In the spring of the year when the water is higher and when there are more flowers, birds and insects about, the Club should, in the opinion of the writer, arrange to hold another outing to the same locality.

Mr. Alex. McNeill, Chief of the Fruit Division of the Department of Agriculture, piloted the party to the satisfaction of everyone. On leaving the bus we first of all went along the Canadian Northern Railroad track a short distance and examined an interesting cutting where our Leader told us much of geological interest.

Although nothing uncommon in the way of botanical specimens was collected, still many plants of interest were observed. Large beds, so to speak, of beautiful autumn asters were abundant; *Aster puniceus* was particularly admired. Mr. McNeill found a fine example of giant puff ball (*Lycoperdon giganteum*). The specimen was 41 inches in circumference; it was still in a growing condition and possibly might have exceeded even that size if it had been left longer. It was found growing at the base of a very rotten pine stump. The roots of the stump were examined and found to be permeated in every direction with the mycelium. This is a comparatively rare find, although Mr. McNeill reported that he had found a similar puff ball a few weeks previously about 200 yards from the spot where the above specimen occurred. When taken home and cut it was found to be in perfect condition, and when cooked proved excellent eating to those who tasted this delicacy. Practically all of the family of puff balls are edible. Many are fairly abundant, and, for want of information, large numbers are allowed to go to waste. Those who have tried puff balls, either

stewed or fried, or, in fact, cooked in any way suitable for mushrooms, will bear witness to their delicious flavor.

The day was too dull for insects to be moving about, but close search revealed many specimens. Large numbers of the bug *Lygaeus turcicus* were seen clustered on several kinds of plants. A single specimen of the Monarch butterfly was found by one of the ladies. Although late in the season some larvæ were still found to be feeding. The false caterpillars of one of the sawflies were seen in numbers feeding on willow, and a single specimen of the larva of the noctuid moth, *Apatela impressa*, was collected. A specimen of the moth, *Noctua clandestina*, was found beneath a flat slab of stone, and one of *Xylina grotei*, which was resting on a flower. Some colonies of ants were examined, the species being the common ones, *Lasius niger* var. and *Myrmica scabrinodes* var. Mr. G. E. Sanders found a specimen of *Cremastogaster lineolata* attached by its jaws to the antenna of a specimen of *M. scabrinodes*. Several lately dealeated queens of a *Lasius* species were found hibernating under stones. The case-bearer, *Coleophora tiliæ joliella*, was collected from basswood by Mr. G. O. McMillan. This species is rare in the Ottawa district.

Beneath a flat stone a young milk snake was found. It had evidently but recently gone into hibernation. Scurrying across a pasture field was an old ground hog, and down at the creek many specimens of the interesting clay nodules were seen and examples taken by members of the party.

Birds were scarce with the exception of robins, quite a number of which were seen.

At 5 o'clock the party left the creek, all feeling that they had had a most delightful afternoon.

A. G.

REPORT OF THE ENTOMOLOGICAL BRANCH, 1909.

The Leaders of the Entomological Branch present herewith a brief report for the year 1909. The members of the Branch have been active during the year, not only in the Ottawa district, but elsewhere throughout Canada. The season on the whole, comparatively speaking, was a poor one for collecting purposes, but where any systematic work was done, many desirable species were captured or found. In the Ottawa district a number of interesting specimens were taken, chiefly of the orders Lepidoptera, Hymenoptera, Coleoptera and Neuroptera. All of these captures have not as yet been worked up. A beginning has been made of a list of neuropteroid insects, exclusive of Odonata.

Much work, however, is yet to be done, before such a list could be presented. The Caddis-flies, Stone-flies and May-flies are not by any means well known and an interesting field is here awaiting investigation.

During the year several meetings of the Branch were held at the houses of some of the members. These were most enjoyable, many specimens being brought for examination and short papers on various subjects presented.

The Branch was glad to welcome to Ottawa Dr. C. Gordon Hewitt, who succeeded our late co-worker, Dr. Fletcher, as Dominion Entomologist.

Among the many insects collected in the district during the year, the species mentioned below are of special interest. As stated above, considerable work is yet to be done in getting much of the material taken during the year accurately determined. As the species are worked out, mention of the more interesting will be made in the annual Entomological Record, prepared by Mr. Gibson, and published in the Annual Reports of the Entomological Society of Ontario.

LEPIDOPTERA:—

Ampelophaga versicolor Harris. This rare species was collected near Britannia on July 26th (Baldwin)

Sphinx luscitiosa Clemens. This hawk-moth is also of uncommon occurrence in the district. Two specimens were taken near Britannia, one on July 9th and another on July 22nd (Baldwin).

Harrisimemna trisignata Walk. Mr. H. Groh found a full-grown larva of this species on ash, at Hull, on August 28th.

Tapinostola variana Morr. Britannia, July 28th (Baldwin).

Ennomos subsignarius Hbn. Another visitation of these moths appeared at Ottawa on August 5th and 6th. Large numbers of the moths were seen throughout the city, but the swarms did not seem so large as they were in 1908.

Tortrix fumiferana Clemens. Thousands of the moths flying around trees and shrubs in the district, July 20th.

Sparganothis flavibasana Fern. Mature larvæ collected from Lonicera, June 15th (Gibson).

Psilocorsis fletcherella Gibson. Larvæ found on *Populus tremuloides*, June 10th (Gibson).

Scythris impositella Zell. Mer Bleue (Young).

HEMIPTERA:—

The following species, all collected by Mr. W. Metcalfe, are new records for the district.

Livia maculipennis Fitch. On pine, April 30th.

Livia vernalis Fitch. On pine, April 30th.

Aphalara calthæ Linn. May 10th.

Aphalara marginata Harris. June 7th.

Psylla carpina Fitch. On ironwood, August 25th.

The Leaders of the Entomological Branch would gladly welcome to the meetings of the Branch any of the members of the Club who are interested in any way in insect life. The subject is extremely fascinating and anyone who cares to take up the study of insects will find a very wide field for investigation. As there is so much yet to be learned about almost every kind of insect, any careful observation on the habits of these creatures is of value.

W. H. HARRINGTON, ARTHUR GIBSON, C. H. YOUNG, J. W. BALDWIN.	}	Leaders.
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NOTES ON THE FLORA OF THE NEREPIS MARSH, NEW BRUNSWICK.

BY A. B. KLUGH, QUEEN'S UNIVERSITY, KINGSTON.

At Westfield, New Brunswick, where the Nerepis River empties into the St. John River, there is an extensive marsh the flora of which is rich enough to be worth recording.

On August 12th, 13th, 14th and 15th, 1910, I explored this marsh in a canoe, and found that most of the upstanding vegetation in the centre consisted of *Scirpus fluviatilis*, *Scirpus validus*, and *Zizania palustris*. I finally selected a portion of the west shore as a favourable place to make an ecological survey.

There is not a sufficient depth of water, except in the narrow channel, to preclude the development of Helophytes (marsh-plants) and consequently the Hydrophytes (aquatics) are found between and among the Helophytes, and no clear line of demarcation exists between these two ecological groups. But a zoned distribution is observable depending upon the depth of the water, and it will be noticed that the outer zone, where the water is from 8 inches to 3 feet in depth, is composed mostly of the *Limnæa* formation of Hydrophytes. The following plants occur in this zone:—

Potamogeton heterophyllus. Abundant.

Potamogeton perfoliatus. Common.

Potamogeton pectinatus. Common.

Myriophyllum alterniflorum. Common.

Vallisneria spiralis. Common.

Nymphæa advena. Abundant.

Castalia odorata. Frequent.

Utricularia vulgaris. Frequent.

Ranunculus aquatilis capillaceus. Frequent

Zizania palustris. Abundant.

Scirpus validus. Abundant.

Scirpus fluviatilis Scarce at this point, but very abundant further up the marsh.

The next zone is apparent where the water is 8 inches and less in depth and contains the following plants:—

Potamogeton dimorphus. Frequent.

Hippuris vulgaris. Frequent.

Isoetes echinospora braunii. Common.

Zizania palustris. Abundant.

Lobelia Dortmanna. Frequent.

Scirpus americanus. Common.

Alisma Plantago. Frequent.

Sagittaria latifolia hastata. Common.

Najas flexilis. Frequent.

The inner zone is found in the wet soil from the margin of the water inwards and is composed of the following:—

Spartina Michauxiana. Abundant.

Scirpus americanus. Common.

Sium cicutae-folium. Common.

Glyceria canadensis. Common.

Calamagrostis canadensis. Common.

Scirpus atrovirens. Common.

Dulichium arundinaceum. Common.

Polygonum Muhlenbergii. Common.

Campanula uliginosa. Frequent.

Juncus filiformis. Common.

Potentilla palustris. Scarce.

Menyanthes trifoliata. Frequent.

Onoclea sensibilis. Common.

A RECORD CATCH.

BY L. H. SITWELL, *Captain.*

The salmon fisherman from the Gaspé, the sea trout artist from Nova Scotia, the specialist on the Rainbow trout from British Columbia, the tarpon enthusiast from Florida escaping the glorious Canadian winter, the Mahsur crank from India who knows no better game fish than that which his heathen climate affords, have their yarns about their respective countries, districts and game fish. The story I am here recording refers to a fish-eating bird commonly called a loon, but

more properly known as the Great Northern Diver, *Gavia immer*. The cry of this bird is well known to the lover of the rod in the solitudes of Lakeland; it is a weird uncanny sound to the tenderfoot, a plaintive mournful cry, especially before wet weather.

I am not writing this story with a view of puffing up the Grand Trunk Railway and the Algonquin National Park as a holiday resort, for that fact is amply expounded in the various folders issued by that illustrious corporation.

The trout season had just been heralded in by a burst of fine weather and the old longing to get busy with "the spots" came over me before the plague of flies prevented pleasure. The date was 7th May, 1903, the day warm, trout hungry, speckled beauties up to three pounds waiting to be caught. Black bass were also abundant but out of season and biting freely. I managed to get some lovely silver minnows at the rear of the Superintendent's cottage and armed with a light greenheart rod, a reel with not too much line on—that somewhat old and rotten—a double length casting line of fine gut and a pellet of buckshot for a sinker, I started off to fish on the long trestle to the east of Algonquin Park Railway Station. I was out for sport and I certainly got it. My first strike was a bass which fought gamely and was returned to the water somewhat tired. I put on a fresh minnow and cast in again into about fifteen feet of clear cold water; hardly had the bait gone down five feet when it was siezed and carried away at a rapid rate, and thinking I had hooked a large trout I paid out line to enable the fish to swallow the hook well before striking. I struck and the pace increased and my little rod bent almost double, without a sign of checking the rush, and when my line was more than half run out up comes my fish in the shape of an old cock loon hooked apparently firmly by the beak. I had to lower the tip of my rod as his weight was too great for it and simply held on, trusting to luck that the line would hold. I was near the end of the trestle and managed to edge on to firm ground. Then began a battle royal. The bird, dived, twisted, turned, flapped his wings and tried to fly but he got dragged down by a straight pull. Finally, the line got twisted under his right wing and the hook was torn from his mouth and became fast in the big sinew of the right wing. Now, he had more power as his head was free and I had great difficulty in holding him down. To make matters worse my reel dragged out and fell on to the ground at my feet and I dared not stoop to pick it up as all my attention was needed to mind the bird. Before long he began to show signs of fatigue and I managed to drag him shorewards by degrees, the line getting tangled at my feet. I had till now been fighting for an

hour, when to my joy I saw the work train pull into the siding across the trestle with engine No. 667 in front. Her engineer I knew well as a sportsman and I yelled like a wild Indian for Cameron. Off he dropped and came over to me, and to his eternal credit he went into the ice cold water up to his waist and stood there until I could get Mr. Loon near enough for him to grab. There was enough life left in the bird to make several strikes at Cameron's hands, but finally he was caught by the neck and brought ashore. I got his wings in between my trembling knees while Cameron, with chattering teeth, held his neck until I cut the hook out of his back. I got him under my arm with his neck in my hand and marched him across the trestle where Mr. Bartlett, the Superintendent of the Algonquin Park resides, and who had been watching the latter part of the performance, having been disturbed by my shouts for Cameron. My captive was duly handed over and put into a large wire netting enclosure on the lake shore where he remained for two days, and on my return to Cache Lake a few days later, Mr. Bartlett told me that as the bird would not live in captivity he had let it go free. He was a good fighter and deserved his life in the end, but I fancy he would confine his diet to weeds for a while and leave minnows alone until he had forgotten his experience with them.

ANIMAL INSTINCT.

BY R. C. TREHERNE, GRIMSBY, ONT.

A rather interesting example of animal instinct occurred within the last year, and in recalling the circumstances I thought it might be of interest in the pages of THE OTTAWA NATURALIST.

At a certain boarding house in Guelph, Ontario, there was a canary, caged and hanging before a window. During a meal, while we were all seated around the table, this canary suddenly became greatly excited. It twittered and flew wildly against the bars of the cage evidently attempting to escape. It continued this procedure for possibly a minute, but finally subsided to a corner of the cage, as far away from the window as possible. While we were all watching the agitation on the part of the canary, we became aware of the reason. A hawk, presumably a sparrow hawk, was perched on the fence railing not 10 yards from the window, and, even while we were watching, it flew to the window and then back to the fence. It remained on the fence rail for 3 or 4 minutes and then presumably finding its

attempts to catch and kill the small canary futile, finally flew away.

Two thoughts occurred to me at the time. First, it was interesting to observe how the canary, born and bred in a cage, could recognize danger on the instant; and, secondly, I found myself wondering: would a wild bird on the approach of a hawk show as much agitation as did this little canary? Possibly a wild bird would, if it was caged under similar conditions, but I feel morally certain that if it was allowed the free life of the woods, its first motive would be self-preservation and it would not attempt to make itself conspicuous by any form of agitation or flight. I remember at the time thinking that the canary—by domestication and lack of experience—had not developed the sense of self-preservation while it could realize danger. However, the realization of danger was the most important observation, and being so it helps to recall other instances of a similar nature.

To one who has raised chickens, for instance, how usual it is to notice a hen call her chickens to her when any danger approaches. She can spy a hawk aloft far quicker than can a human being and can realize that it is a hawk and that her chickens are in danger even if she had never seen one before. Is not this case quite similar to the canary? They are two cases of pure instinct—instinct being defined as a term including all original impulses and that apparent knowledge and skill which animals have without experience.

I was reading only the other day about a case, told by Ernest Thompson Seton, of a "young mink, still blind, which sucked at a mother cat till fed and then tried to kill her." Surely, if such a case was true, and I have no reason to doubt that it was not, coming from such an authority, it is interesting to notice the hereditary instinct of legitimate prey present in the mind of this young mink. I believe it is a generally recognized rule that among wild animals it is very uncommon to find them destroying one of their own kind. This young mink would not have attacked its own mother and yet it realized, even in that young state of its career, that the cat was lawful prey.

Such cases as these demonstrate very forcibly that natural untaught wisdom of the animal world—and we designate it as instinct. Classify it as we will, however, we could not say it was the product of mental activity, or in other words reason similar to the human reason.

Nevertheless, with but a moment's thought we find that a great deal of the conduct in the human life is the result of this same unconsciousness, unreasoning obedience to natural forces. How common it is for us to utter exclamations of surprise or

fear, to give vent to emotions for which we cannot account. We have no reason why we do these things—things perhaps we often regret after the occasion has passed—we can only classify them as instinct. It is undoubted that a child is entirely governed by stimuli up to a certain stage in its life—until the dawn of reason gradually breaks and we get development from the animal to the human plane.

In closing I would just like to draw attention to similar conditions in the plant world. Compare an animal, a child just born, for instance, in a darkened room with but one window, with a plant growing in a darkened place with but one loop-hole of light. Both turn instinctively to the light. In the former the reason implies a nervous system, but in the latter we are taught it is a purely mechanical process. And yet there is a similarity. Again, Huxley informs us that a frog, from which the brain has been removed, will retain its centre of gravity even when revolved. Compare this frog with a plant placed in an inverted position, with the root upwards and the stem downwards. If growth continues this plant will right itself and will grow normally. This cannot be explained, yet the fact remains that there is a similarity between the frog and the plant. And so on, we could find similar instances of comparison which only serve to show the great complexity of nature, and the uniformity of all things.

In such a short article, such instances as I have recorded open up a great field of conjecture; and, I for one, would be greatly interested to read accounts in this magazine of recorded observations which tend to illustrate the difference between animal instinct and reason.

PRELIMINARY LIST OF THE CRATÆGI OF THE OTTAWA DISTRICT.

BY HERBERT GROH.

Encouraged by the results which have attended the closer study of the Hawthorns in other parts of Eastern North America, and knowing that no such study had been made, as yet, at Ottawa, I was led, in the spring of 1909, to undertake systematically the collecting of material for this purpose.

For my first attention I chose the section of country reaching southward from the city to the Rideau River, and lying, roughly, between Bank Street on the east, and the Experimental Farm and the Hog's Back locks on the west. While not confining my work to these limits, I endeavoured to cover this area with some degree of thoroughness.



Specimens in flower were taken from the trees in June; and others, from the same trees, were taken for the fruit, when it matured. Notes were taken at the time of collecting, on such points of importance which might be lost in the drying, as the number of styles, the number of stamens, and the color of the anthers; and numbered tags were fastened to the trees when they were first visited to preclude the possibility of mistakes when returning to them later. Flowering and fruiting specimens were secured from about fifty trees, most of which showed some variation, which was the reason for their being selected.

Material of all the specimens was then submitted to Mr. W. W. Eggleston, of the New York Botanical Garden, an acknowledged authority on the genus and the contributor of the revision of *Cratægus* in Gray's New Manual, Seventh Edition. Mr. Eggleston has distinguished in this material fourteen species and varieties, and has regarded ten other specimens as hybrids.

In view of the incompleteness of the survey of the Ottawa district, so far accomplished, and also owing to the fact that further specimens have been collected this summer, which, together with a considerable amount of material collected earlier by Professor John Macoun, have still to be named, no treatment of the subject of Ottawa *Cratægi* can yet be attempted. A list is here given, however, which it is hoped may serve as a basis for the work which still remains to be done. The following species were collected by the writer in the localities indicated after each name.

CRATÆGUS.

ROTUNDIFOLIA Moench. E. of Dow's Swamp; Hog's Back; Victoria Hospital; E. and W. of Beaver Meadow.

ROTUNDIFOLIA Moench. var. FAXONI (Sarg.) Eggleston. Bank of Rideau River, W. of Billing's Bridge.

JACKII Sarg. Hog's Back locks.

MACROSPERMA Ashe. Glebe; Bank Street, Stewarton; Montreal Road, beyond Eastview.

ALNORUM Sarg. Woods in C. E. Farm Arboretum; Ottawa South.

GRAYANA Eggleston. S. of Dow's Swamp; Hog's Back; bank of Rideau River, W. of Billing's Bridge.

FLABELLATA (Bosc) Koch. Glebe; Harbord locks.

PEDICELLATA Sarg.? W. of Dow's Swamp.

POLITA Sarg. E. of Dow's Swamp.

SUBMOLLIS Sarg. W. of Dow's Lake; N., E. and S. of Dow's Swamp; near Hog's Back; Ottawa South.

BRAINERDI Sarg. var. EGGLESTONI (Sarg.) Robinson. Ottawa South; bank of Rideau River, near Hog's Back.

BRAINERDI Sarg. var. ASPERIFOLIA (Sarg.) Eggleston. E.

of Beaver Meadow.

MACRACANTHA Lodd. Glebe; Ottawa South; S. of Dow's Swamp.

PRAECOX Sarg. S. of Dow's Swamp.

MACROSPERMA Ashe. x ROTUNDIFOLIA Moench. Billing's Bridge.

MACRACANTHA Lodd. x MACROSPERMA Ashe. S. of Dow's Swamp.

MACRACANTHA Lodd. x CRUS-GALLI L. S. of Dow's Swamp.

MACRACANTHA Lodd. x PUNCTATA Jacq. Ottawa South; E. of Dow's Swamp.

MACRACANTHA Lodd. x. W. of Dow's Swamp; Hog's Back; Billings' Bridge; W. of Beaver Meadow.

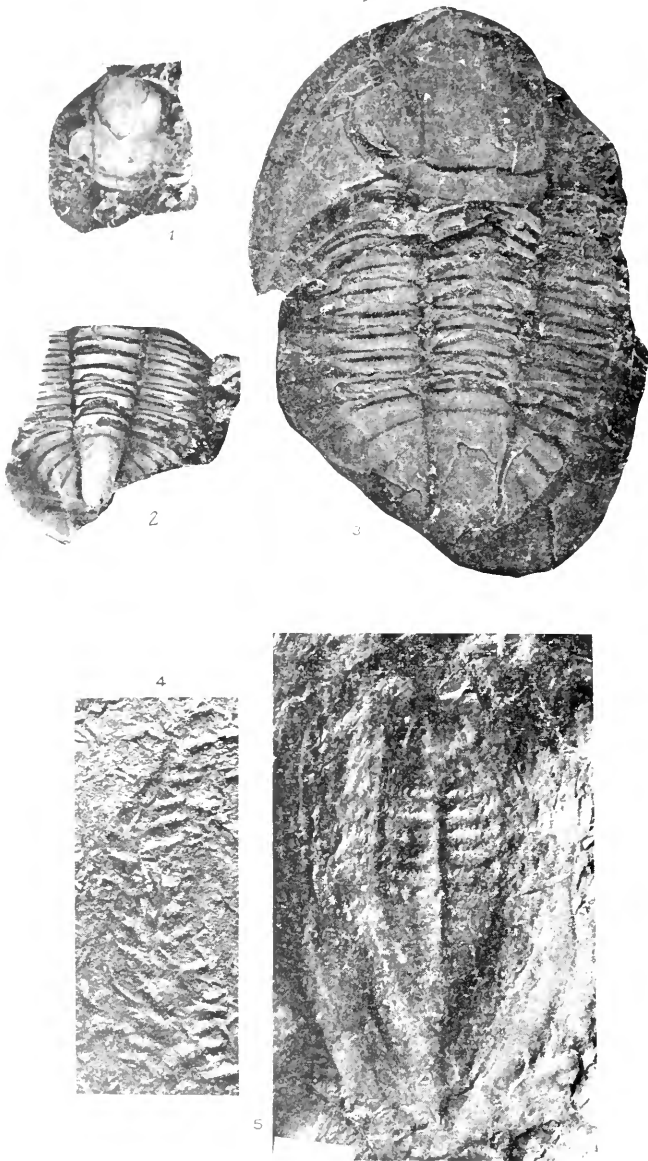
NOTE.

PLANTS INJURED BY CREOSOTE.—For some time past considerable speculation has been indulged in regarding the curious and somewhat mysterious malady which has affected many varieties of plants in this city, the leaves turning black and falling before maturity. Roses, delphiniums, laurels, maples, ferns and some other plants, were the principal sufferers. The gardens in the vicinity, to the northward and eastward of the city creosoting plant, were amongst the first to suffer, last season being bad and the present season worse. Then last season the leaves of the eastern maples in front of the Union Club and the Presbyterian Church turned black and fell, and on examination I thought the infection to be of a fungous nature; this season they are only slightly affected, the streets in the vicinity having been paved last year with creosoted blocks.

A few days ago I was asked to look at the plants on the southern boundary of the Empress Hotel grounds. These I found to be in a very bad state and the suspicions I had entertained as to the cause seemed to be amply confirmed, viz., the exhalations from the creosoted blocks in Belleville Street. The plants on the northern boundary next to Humboldt Street, which street was also paved with creosote blocks, are not affected whilst those on the other or northern side, being the southern side of the Macdonald property, are badly affected. Our prevailing winds during the summer are from the south and southwest, and this fact seems to indicate that the creosote exhalations are directly responsible for all the injury. How plants can be protected adjoining newly paved streets I cannot say, but it is certain that much injury to gardens seems likely to result in the future from the cause mentioned.

Victoria, B.C., 29th July, 1910.

J. R. ANDERSON.



NEW TRILOBITES FROM THE CHAZY NEAR OTTAWA.



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ON TWO NEW TRILOBITES FROM THE CHAZY NEAR OTTAWA.*

BY PERCY E. RAYMOND.

BATHYURUS SUPERBUS SP. NOV. PLATE II, FIGS. 1—3.

Entire test broadly oval in outline, the breadth varying from .6 to .8 of the length. Dorsal furrows deep on thorax and pygidium, but shallow on the cephalon. Axial lobe narrow and rather low, not being raised much above the general level of the surface.

Cephalon short and wide, surrounded by a very narrow concave border. Glabella nearly smooth, expanding slightly in front of the eyes; marked by two pairs of faint furrows. Eyes very large, low, extending back to the neck furrow and forward to the middle of the glabella. Free cheeks wide, convex, the genal angles drawn out into spines which extend back to the fifth or sixth segment of the thorax. Surface of the test smooth except for fine striæ which are rather prominent on the inner margin of the free cheek.

Thorax of nine segments. Axial lobe narrow. Pleura with deep furrows.

Pygidium nearly semicircular in outline, with a broad concave border and a low, smooth axial lobe. The pleural lobes are marked by four pairs of wide, unfurrowed ribs which can be traced across the concave border. The axial lobe is crossed by one prominent ring, and two fainter ones. Behind the rings are a series of pairs of hardly visible pits. Test covered with faint irregular striæ.

The hypostoma is about as broad as long, almost straight in front, semicircular behind; muscular attachments in front of the middle; side wings narrow. It is very similar to the hypostoma of *Bathyurus extans*, but broader in front.

Length of the largest specimen 74 mm., width 58 mm. A smaller specimen is 40 mm. long and 25 mm. wide. One pygi-

* Published by permission of the Director of the Geological Survey of Canada.

dium is 18 mm. long and 30 mm. wide, while another is 12 mm. long and 21 mm. wide. A very large cephalon is 27 mm. long and 58 mm. wide.

This species is closely related to *Bathyurus extans* (Hall), but differs from that species in being wider, in having a much less convex axial lobe, a depressed and rounded, instead of a very convex and subtriangular pygidium, and a much wider concave border on the pygidium. The surface of the glabella of *B. extans* is quite granulose, while the test in this species is smooth. The species also attains a much larger size than *B. extans* or any other species of the genus.

LOCALITY. This species seems to be rather common in a layer of dark gray dolomitic limestone southwest of the outcrop of the Black River and Lowville at La Petite Chaudière, Mechanicsville, Ontario, and has not yet been observed in any other stratum. This layer is supposed to belong to the Chazy.

The entire specimen, which is probably the largest *Bathyurus* known, was collected by Mr. J. E. Narraway, and is in his collection. The other specimens figured were collected by the writer and are in the collection of the Geological Survey. Mr. Narraway has a pygidium of this species which he collected some years ago from a loose fragment of rock in Ottawa South.

The only other *Bathyurus* known from the Chazy is *B. angelini* Billings, a species which is peculiar in that the axial lobe of the pygidium extends across the border to the posterior margin.

ISOTELUS ARENICOLA SP. NOV.

For a number of years fragments of a large *Isotelus* have been found in the sandstone of the Chazy about Ottawa, but as the cephalon was unknown, it was not possible to determine what species was represented. It has usually been listed as *Asaphus* or *Isotelus canalis*. (See Sowter, T. W. E., OTTAWA NATURALIST, Vol. II., pp. 11-15, 1888; Ami, H. M., Appendix to Dr. Ells' "Geology of Ottawa and Vicinity," 1901). A free cheek recently found by the writer at Britannia supplies the missing information, and this, with the large headless specimen collected by Richardson at Deschenes, furnishes the material for the description which follows.

DESCRIPTION.—Cephalon, judging from the free cheek, nearly three-fourths as long as broad, surrounded by a wide concave border. Eyes large, situated less than their own length from the posterior margin of the cephalon. Free cheek broad, with the genal angle drawn out into a short, broad, flat spine. Thorax of eight segments, the axial lobe narrow for the genus—one-third the total width. Pygidium roughly triangular in out-

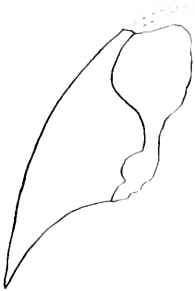


Fig. 1. *Isotelus arenicola*. Outline of free cheek and portion of cranium from Britannia. One-third natural size.

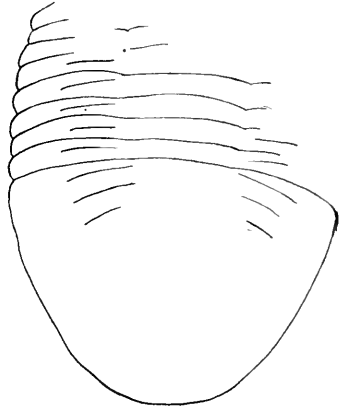


Fig. 2. *Isotelus arenicola*. Outline of the specimen collected by Richardson at Deschenes. One-third natural size.

line, three-fourths as long as wide; border concave. On the specimen described, which is a cast of the interior, there are two rather distinct ribs on each of the pleural lobes. The axial lobe is hardly distinguishable.

Width of thorax at back of fourth segment, 135 mm., width of axial lobe at same point, 45 mm.; length of pygidium, 98 mm., width, 130 mm. The specimen is only very slightly flattened. The total length of this specimen appears to have been about ten inches. Another specimen, described below, seems to have been at least four inches longer.

This species is more closely allied to *Isotelus gigas* than to any other species, the pygidia of the two forms being almost alike. The axial lobe of the thorax of the species here described is, however, much narrower than in either *I. gigas* or *I. maximus*. *I. gigas* has no genal spines at maturity, and *I. maximus* has a shorter and more nearly semicircular pygidium. *I. harrisi* has a wider and shorter cephalon, and *I. platymarginatus* has a much wider concave border around the pygidium.

A rather remarkable specimen of this same species was found by W. C. King, Esq., on the shore of Lake Deschenes at Britannia. This specimen is an impression of the lower surface of the trilobite, and shows a longitudinal ridge corresponding to the central furrow along the axis of the ventral side of the animal, 10 pairs of transverse furrows, and the impression of the hypostoma—first noticed by my friend, Mr. Narraway. The doublure of the pygidium has also left a wide smooth impression, but in the cephalic region the hypostoma is the only portion of which there are any traces remaining. The specimen was found by Mr.

King on a waterworn surface of the beach, partially covered by the shingle, and many details of the structure have doubtless been removed since it was first exposed to the action of the elements. The outline of the hypostoma is rather faint on the specimen, but the excellent photograph made by Miss Bentley brings it out clearly. The forks are rather short and far apart, and the anterior portion is narrow, so that the general form of the hypostoma is more like that of *Isotelus harrisi* than *I. gigas*. The total length is 75 mm., the greatest width, 65 mm.; length of the body portion, 53 mm., width, 50 mm.

The transverse furrows are the impressions left by the gnathobases of the basal joints of the legs. These gnathobases were evidently long and very heavy, but the specimen has been so abraded that all details are obscured. The first six pairs of impressions are longer and deeper than the four behind. The first eight pairs seem to belong to the thoracic appendages, while the last two belong to the pygidium. From the posterior tips of the hypostoma to the first gnathobases of which traces are present there is a distance of about 22 mm. without impressions. In *Isotelus gigas* the hypostoma normally extends back to the posterior margin of the cephalon, so that it seems that in this specimen the impressions of the first two pairs of gnathobases under the thorax may not have been preserved. In that case, the six pairs of strong impressions may represent the last six pairs of thoracic segments, and the pygidium might begin with the first of the fainter ones.

Two specimens of *Isotelus*, somewhat similarly preserved, have been figured. One is Billings' specimen from the Trenton at Ottawa, and the other was described by Mickleborough and by Walcott from a specimen found near Cincinnati. Both of these specimens, however, show the trilobite itself, as well as the impression. Both show the long heavy gnathobases of the coxopodites, and it becomes evident that, as the coxopodites are attached directly under the dorsal furrows, the increase in the width of the thoracic lobe, which is so marked a feature in *Isotelus*, is due to the great development of these gnathobases. The writer believes that this impression on the ripple-marked sand of the Chazy gives a clue to the development of the gnathobases. Apparently *Isotelus* was a bottom crawler, and the gnathobases may have served as ambulatory appendages. In both the specimens of *Isotelus* mentioned above as retaining the appendages, the gnathobase of a thoracic appendage is nearly as long as the remainder of the appendage, and being a single rod, and not jointed, is much more useful as a lever. On all the specimens known, the gnathobases are strongly developed on the thorax, and only feebly so on the pygidium. Becher found

that the appendages under the pygidium of *Triarthrus* were flattened and adapted for swimming, while those under the thorax could be used either in swimming or crawling. It would seem that this sort of specialization had gone still further in *Isotelus* than in *Triarthrus*. Here there is a large pygidium, probably provided with swimming organs (Walcott found traces of them under the pygidium of the specimen he described), and under the thorax the inner portions of the appendages were strengthened to function as ambulatory appendages. In *Triarthrus*, a form adapted primarily for swimming and secondarily for crawling, the appendages are very long, and extend far beyond the outer margins of the test, while in *Isotelus* the appendages are hardly long enough to reach the outer margins. The swimming power had to some extent been sacrificed in the adaptation to crawling. *Triarthrus* depended on its swiftness in swimming to escape from its enemies, and lacked the power of enrolment. *Isotelus*, a slower moving, but heavier-shelled animal, protected itself by complete enrolment.

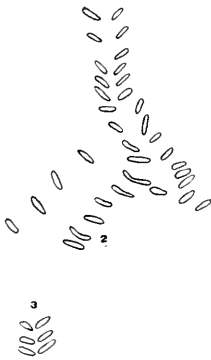


Fig. 3. Diagram of the trails on a slab of sandstone found at Deschenes. 1 is the trail shown in the photograph on the plate, and 1 and 3 are supposed to have been made by an *Isotelus*.

Certain trails found by the writer on the surface of slabs of sandstone from the Chazy at Deschenes tend to confirm the suspicion that the gnathobases were used as ambulatory organs. A diagram and photograph of one of these trails is here reproduced, and it will be seen that it is exactly the sort of marking that would theoretically be produced by a trilobite which was crawling with the aid of the gnathobases only. The trail numbered I in the diagram can be traced for about 100 mm. on the slab, and consists of a series of pairs of approximately parallel ridges, arranged on opposite sides of a narrow furrow. The ridges are inclined at angles of from 30 to 60 degrees to the direction of the furrow. Each ridge is about 10 mm. long, and the furrow is from 3 to 5 mm. wide. The slab is a mould of the

impression made in the sand, and the ridges correspond to the depressions made by the gnathobases. The trail numbered 3 is similar to the one described, but the one numbered 2 is of a different sort.

The increase in width of the axial lobe, caused by the development of the gnathobases in the adaptation to the crawling mode of life, explains the parallelism which exists between certain genera of the *Asaphidae*, and the parallelism between *Nileus* and some of the *Illecebridae*. A number of forms, arising from different stocks, were becoming adapted to near-shore life, and all found that enlarged gnathobases assisted them in their new mode of life. Thus the narrow-axised *Asaphus* produced *Onchometopus*, *Isoteloides* produced *Isotelus*, and *Symphysurus* developed into *Nileus*, just as some as yet unknown form developed into the *Illecebrus* of the sands of the Potsdam.

LOCALITY.—This species is represented in the collections at the Museum of the Geological Survey by a thorax and pygidium from Deschenes, and a free cheek from Britannia, which are holotype and paratype respectively. There is also a partial thorax and pygidium collected by James Richardson in 1853 from the sandstone of the Chazy at West Hawkesbury. The pygidium of this specimen is 72 mm. long and about 110 mm. wide, and shows a single rib on each pleural lobe. The axial lobe of the thorax is very narrow, being only 33 mm. in width. The total width appears to have been somewhat over 100 mm. The fourth specimen was found loose at Point Claire, but was undoubtedly from the Chazy, which outcrops there. This specimen shows the posterior portion of the hypostoma and portions of six thoracic segments. The forks of the hypostoma are very short, and the body portion is convex. The axial lobe of the thorax is 53 mm. wide, and the total width of the thorax is 160 mm.

EXPLANATION OF PLATE II.

1. *Bathyrurus superbus* Raymond. A small cranidium. About natural size.
2. The same species. An imperfect thorax and pygidium. Slightly smaller than natural size.
3. The same species. A nearly complete specimen. About natural size.
4. Trail, supposed to be that of an *Isotelus*.
5. Impression of the ventral surface of a trilobite, presumably *Isotelus arenicola*. About one-fifth natural size.

NOTES ON THE WHITE-THROATED SPARROW.

BY L. MCI. TERRILL, WESTMOUNT, QUE.

Even after fifteen years' acquaintanceship, I still look forward to the arrival of the White-throated Sparrow as a chief event in the spring migration.

Birds confine themselves chiefly to the open country at this time; in fact few wood-dwellers have begun to arrive. Hard-wood groves carpeted with Hepaticas and other blossoms hold some attraction for bird life, but in the gloom of the evergreen swamp few notes are heard. Here, the hardy Skunk-cabbage is alone strong enough to force its way through snow and ice-water; a Winter Wren occasionally bubbles forth its overflow of spirits, and possibly at twilight you may hear the Hermit Thrush, yet it requires the frequency of the White-throat's cheery whistle to make one feel entirely at home.

Immediately on their arrival (on the average about the 27th of April) one may find these sparrows paired and settled in their breeding haunts. After the first of May it is usual to hear individuals in city gardens (in one instance a lumber yard in the heart of the city was chosen by a bird which sang nearly every morning from the 14th to the 20th of May), but these birds are more likely northern than local residents. During the three or four weeks following their arrival the White-throats sing a great deal; even at night one will often hear a sudden burst of song. Usually the same number of notes are uttered, though the variation in pitch and inflection is considerable. Later, when the breeding season is far advanced, notes are frequently omitted; often the first two alone are uttered, the second being much shortened and abruptly terminated. One feels, on hearing this late summer song, that the bird has not finished what it started to say; as if the impulsive singer were denied the right to sing yet could hardly repress the song. The abrupt full-stop suggests sadness,—oblivious for the moment, the White-throat is suddenly reminded of the dying summer. Still later, in late August and September, though individuals will sometimes sing the spring song in its entirety, it is more usual to hear the first note only and that much shortened, an utterance that would readily escape detection.

Comparatively few birds commence nesting in May, though I have found several complete sets in that month. On May 15th, 1910, my earliest record, I located two partially completed nests; a week later found these nests abandoned, and two others with one and four eggs respectively. This habit of abandoning nests when disturbed, is common with such birds as the Ovenbird.

Chestnut-sided and Canadian Warblers, is almost universal with the White-throat in this district. Having examined a great many nests I can only record two or three instances in which the bird has returned to lay, after being flushed from an empty nest or from a nest containing one or two eggs.

On the other hand, if the bird has commenced incubating she will rarely desert. I have never identified an egg as having been removed from an abandoned nest to a new one, yet I am quite satisfied that this is a common occurrence; at least, any eggs in a nest at the time of abandonment will have disappeared on a return visit. More than this, the birds will often remove a quantity of lining, no doubt to serve in a new venture.

The nest is a substantial structure, usually built on the ground, and the bird is fastidious in regard to certain materials apparently necessary to give satisfaction. Various substances compose the body of the nest; generally plant stalks, withered grasses and bark shreds, on a foundation of skeleton leaves, with a lining similar to that employed by the Swamp Sparrow, usually of bleached grasses. The main distinction from other sparrows' nests lies in the outer rim of green mosses which is never, to my knowledge, absent; often suggesting in this respect nests of the Phœbe Flycatcher. Sometimes, in very wet woods, there will be an additional understructure of particles of decayed wood, raising the nest slightly and permitting of drainage. Moisture is apparently essential to the White-throat's welfare at this season; possibly they would have no objection to nesting in a dry bare place (the Ovenbird safely combats the disadvantages of ground nesting in the barest of woods) were it not that the swamps contain their chosen food. Occasionally, in hilly country with a predominant growth of conifers, the White-throat will cohabit with Juncos on the dry slopes of hill pastures, when the nest is usually built in the thick of some shrubby evergreen bush. In the same locality, down in the tamarack-girt sphagnum bogs, it is also usual to find the nest above ground; the respective lack and density of undergrowth being chiefly responsible for this departure. Above all other spots, an opening, either path or glade, in damp evergreen woods is chosen, while adjoining Black Ash swamps usually accommodate a few pairs. The opening in thick woods is essential as little shade suffices; secondly, this opening should be carpeted with ferns and grasses, and especially with the running vines of Swamp Raspberry and Bedstraw. Occasionally the nest is built on top of a mossy mound or stump (especially in the wetter woods) hidden beneath a canopy of ferns; but more often it is hidden in a tangle of Bedstraw.

Descriptions of eggs are usually inadequate except by com-

parison; only thus can one appreciate the difference between eggs of Song, White-throated and Swamp Sparrows. All of these might be roughly described as spotted with brown on a light greenish ground; but on comparison, taking eggs of the Song Sparrow as a type of reddish brown, the others become respectively, distinctly brick-red and umber-brown. Of course, eggs of the White-throat are generally, though not invariably, larger than the other two species. Four eggs are usually deposited; less commonly three and five. The foregoing remarks apply for the most part to first layings, as the White-throat rears at least two broods in a season, usually the first in the early part of June and the second in mid-July, though some birds delay until August.

As the rank growth in the damp woods advances with the summer, the birds seek more open woods and second growths, where they nest in brush heaps and evergreen bushes as well as on the ground. In so doing they simply avoid the uncongenial depth and density of undergrowth similarly as in the sphagnum bogs earlier in the season. The White-throat gives little indication as to the location of its nest; likely you will hear the male sing, but not a note of alarm until you flush the female, when both birds immediately join in an angry outcry. If, however, the nest contains young and the parent is not on the nest, you will likely be notified when some distance away. As far as I know the female sparrow alone incubates her eggs; though once on a hot day at noon I flushed two birds from a rather exposed nest. This nest contained newly hatched young and no doubt the parents were endeavoring to protect them from the sun's rays. Leaving the locality and returning several minutes later, I had a good view of both birds covering the nest with outspread wings.

There is considerable individuality in the mode of leaving the nest; a bird building in bushes will usually slip quietly to the ground and steal away on the far side, eventually flying to a perch overhead, when the alarm note is sounded. In the case of ground-nesting, the bird usually flushes directly from the nest and immediately seeks a perch. Occasionally, however, she will slip away as quietly as a mouse and get some distance from the nest before taking flight. This method of evacuation is more common when the nest contains young, in which case you are fortunate in seeing the bird before hearing her. In whatever manner the bird may be flushed she will usually seek a perch above ground before giving vent to alarm, this alarm being expressed in a "chip" repeated at intervals, a note much more metallic than that of other resident sparrows.

In late July and early August, whilst many birds are still

with fledglings, one may hear the migratory "tsip" of earlier broods preparing to leave the woods. This is done gradually; by the middle of August small flocks are to be found in thickets and hedges of the more open country. From then on the deeper woods become very quiet, though there are always a few birds detained with late broods, even after the Wood Pewee's note is no longer heard. I have heard a White-throat in full song, in its breeding haunts, as late as September 27th (1908), but this is unusual. During September and October they are to be found chiefly flocking with other sparrows in the hedges of the open country, in the outskirts of woods, along river banks and in city gardens. In these situations they often utter their alarm notes, but I have yet to hear a White-throat singing in the open country.

By the middle of October the bulk have departed, and toward the end of the month practically all have gone; though I have one exceptional record, November 22nd, 1908, when I secured an immature bird and saw another.

My observations on the White-throated Sparrow were made in the counties of Laval, Jacques Cartier, Laprairie, Terrebonne and Compton, Province of Quebec.

FIELD NOTES OF CANADIAN BOTANY.—II.

BY EDWARD L. GREENE.

A year has passed, and somewhat more, since the first instalment of these notes was published. That paper, as may be seen by reference to it in the issue of *THE NATURALIST* for September of last year, consisted of notes on the vegetation of a tamarack marsh at Strathroy, western Ontario; and since I had not completed my account of the region as a whole, I may as well resume at the point where I left off.

I had descended to the marsh by a well-beaten path, evidently the trail of children and others of the Strathroy villagers who naturally resort to the place to gather its choice floral treasures in spring and summer. I left the spot from another side where there was no path; and on ascending to the slightly higher ground of the low hills that shut in the marsh on two sides, I encountered a low sumach thicket which, although it was the middle of June, was not yet in foliage. The sumachs are all late in coming into leaf, and this colony was at that stage when the new shoots are a few inches long, and the leaves barely beginning to unfold. There was that in the first near view of these shrubs, just emerging from their winter condition, their branches still



almost naked, which impelled me to halt and inspect them more closely. There were plenty of clusters of fruit remaining in fair condition from the autumn before. The drupelets were those of the group of *Rhus glabra*; and this was a surprise, because the first glance at the branches had convinced me beyond possibility of doubt that the colony was of the *R. typhina* group; not that they manifested that dense velvety, or rather plushy indument like that of the horns of stags when the horns are newly grown. There are *Rhus typhina* allies, unquestionably such to all who know them, that have no trace of the velvet or plush on their branches at any time. These are conditions of which the botanists who write the descriptive manuals know nothing. The book does not yet exist in which the most fundamental distinctions between these exceedingly common shrubs, those of the *glabra* type and those of the *typhina* type have been given. What the most essential characters of the two groups are, I proceed to state; and first, those marking the *typhina* group. The young branches are *cylindrical*, or *terete*, to use the good botanical term, which means that the cross section is in outline a circle; also the bark of such young branches is of a *deep or dark green*, without trace of bloom or pallor. In every form or phase or distinct species of the *glabra* alliance such young branches are not only *pale or whitish with bloom*, they are never cylindrical or terete, but always plainly *angled*, their cross sections never circular, always angular, more or less definitely and acutely so. By such clear and definite notes as these may the botanist out of doors distinguish between these two types of sumach even in mid-winter; and both types are common over an area that embraces almost all of North America east of the Rocky Mountains. And the points of difference here emphasized have not been known to the writers of our manuals sitting in the herbarium, although herbarium specimens exhibit them.

I shall have more to say concerning the sumachs of Western Ontario by and by.

This perhaps more distinctively southwestern part of the great province, as I traversed it from Sarnia near the southern point of Lake Huron to Hamilton on Lake Ontario, and as I have walked some scores of miles of it in pursuit of botanical knowledge, has to me the appearance of what may have been from the first a gently undulating prairie country broken into sections of small extent by many woodland-belted rivers and their numerous lesser tributaries.

Across the prairie looking eastward from Strathroy I noted as at the probable distance of a mile and more a stretch of timber, where I supposed I should find a water-course of some kind, and on the wooded hills above one special desideratum, *Thalictrum*

dioicum. On reaching the woods, I found there no river or stream or streamlet, nor any spot at all where one would expect that species of *Thalictrum*; but I was slow in reaching the woodland destination because of the interesting objects—botanical—which I met with along the railway. The botanist in a prairie country always makes the railroads his highway as a pedestrian, because along such line only can he hope to find strips of prairie land that were never overturned by the plow, and where remnants of the original native plants of the region have stood chances of survival.

The first half-mile or so eastward from Strathroy by the railway is low prairie land, at least now, though almost doubtless it may have been wet timber land originally, the Sydenham River near which Strathroy was built being well timbered, like other streams of the region, all along its course. To the plant associations of this half-mile of low moist prairie I shall return later; but the boundary of this low land, at the eastward, is a low but broad ridge of dry and light sandy soil, perhaps a glacial deposit, or else an ancient bank of the river now a half-mile distant. The railway has been cut through this sandy ridge, and the land on the sides of the track is prairie never yet broken by the plow. On the northwestward slope of this slight elevation, under that protection from cattle which the railway fences secure to many an easily extinguished native flower, I recognized, even before I had come very near the spot, a fine colony of an old favorite not seen by me before for many a year, *Erythrocoma triflora*, the Three-flowered Avens, or Three-flowered Geum. This is one of several beautiful early spring flowers which botanists and lovers of wild flowers in Wisconsin, and in Michigan a generation ago, knew as the earliest things of spring, and they sought it as they did the Pasque Flower, *Pulsatilla Nuttalliana* and *Ranunculus rhomboides* on the bleakest and coldest exposures of the knolls of glacial drift, where alone either one of the three was ever to be seen. Of course in the middle of June in western Ontario the *Erythrocoma* was past its flowering, but the tufts of soft feathery coma, that as an appendage to the head of seeds is almost as red as the flower itself—these remain until the beginning of summer and render a colony of the plants a thing of beauty as long as they last.

On this same slope I observed a single plant of a violet that I had not met with before, nor have I seen it since in any later travels. As to foliage alone it might have been *V. fimbriatula*, but it had three good marks to preclude its being referred to that common and rather widely dispersed species. Its stout root-stock was widely and multifariously branched, so that the plant as a whole formed quite a broad tuft. Entirely past the period

of its showy flowering, the apetalous summer flowers were as far as possible from standing upright as they do in that species; they lay close along the ground and on slender peduncles clothed with long soft hairs. Here, then, were three abundantly sufficient characters by which to have distinguished this violet as new. At a later date, only a quarter-mile away, growing as its habit is on sandy but damp ground, I saw plenty of *V. fimbriatula*, and here as always with its simple short rootstock, upright apetalous flowers and pods borne among the leaves, and the peduncles stout without hairiness. I am careful to describe both the localities, and the peculiar marks of these plants, in the hope that botanists resident in western Ontario may have an eye to their further investigation, especially in perhaps early May, when they should be in petaliferous flower.

A little beyond this sandy ridge the railway embankment, only a little elevated above the level of the plain, was thickly beset with a dwarf wild rose, now in the middle of June, well in flower. I supposed it to be a colony of my *Rosa pratincola*, an almost herbaceous rose abundant all over the whole prairie region of the Upper Mississippi and its tributaries but this identification will perchance not hold good. It was too early for the fruits, and the plants after all seemed rather too compactly colonized for *R. pratincola*.

At this good point of my route to the woodland I took observation of a grain field as occupying acres on one side along the railway, and on the opposite an equal stretch of pasture land, the pasture being more or less elevated and sandy, this ridge of drift, if such it be, sloping away and becoming evanescent at a distance of not many rods from where I stood within the railway enclosure. In this elevated and sandy part of the pasture close at hand there were blackberry bushes and a scattered colony of sumach, the members of this low of stature, much smaller than those on the hills around the tamarack swamp, and they seemed laden with last year's panicles of different shape as well as heavier than those of the other. As seen from a short distance, I was hoping this might turn out to be a member of the *Rhus glabra* alliance; possibly my *R. arbuscula* of the glacial drift in northern Indiana not so very far away; but an inspection of the shrub, with its branches just budding out into leaf, resulted in the certainty that this also was of the *R. typhina* alliance, possibly the same, specifically, as the other; possibly distinct.

The nearer approach to the woods that I had set forth to reach disclosed evidence that on this side of the prairie also, as on the opposite side of the town, the original limits of it had been somewhat extended, and that of the woodland correspondingly restricted since the first settlement of the country: for now, what

any one not a botanist and close observer would not have doubted about as a part of the pristine prairie, began to show fine patches of *Smilacina racemosa*, at this time in fresh full bloom, while along the fences there was a continuous row of bloodroot, this of course long past flowering. These and a few other plants which by nature are strictly woodland plants, will maintain a foothold and even flourish in the open, long after their forest shelter has been removed, so long as neither the plow nor the ruminants disturb them.

The wooded belt when reached did not prove to be the wild woodland I had hoped to see; nor was there river or even any streamlet coursing through or near it. What I had come to was but a series of well kept groves of young trees, such as the farmers had with excellent economy not only permitted to remain, but had kept clear of woody undergrowths, permitting not much except the native herbaceous plants and a scattered growth of currant and gooseberry bushes, natives of the soil, to remain. The most common tree was beech, but also there was no dearth of red oak, some white oak and bur oak, an occasional ash, more than an occasional linden and black maple, besides such things of smaller stature as *Carpinus* and the hop hornbeam, besides a *Crataegus* species or two. In less elevated and rather damp places I noted the presence of *Dirca palustris* and *Enonymus obovatus*. Where the shade was deepest, chiefly under the beeches and maples, there was abundance of *Arisaema* and of bloodroot, besides yellow violets, and clustered between and upon the superficial root-arms of the beeches was a great abundance of *Unifolium canadense*. In places less shady, and where they were partly open to the sun, there were beautiful patches of *Geranium Robertianum* in full flower at the time; also here and there a tuft of scarlet columbine. I have observed scarlet columbines all the way across the United States from the Atlantic to the Pacific, and have long known them in the Rocky Mountains of Colorado, and in both the Coast Range and the Sierra Nevada. Botanists in Europe and in America have distinguished several species, and I doubt not most of them are valid. This one of western Ontario at once presented one mark that was new to me among this group. The basal leaves were more elegantly and narrowly cut than any I had observed either east or west, and also they were of an almost whitish glaucous hue, though all of a sudden the stem leaves all, even the lower, were of the usual green of columbine leaves. And this plant is certainly not *Aquilegia canadensis*, for the sure mark of that is that its follicles when grown and mature spread away from one another at the top, and are even almost recurved. In the plant of western Ontario the follicles closely cohere to the very tips, and are even then con-

nivent rather than otherwise. The plant may not be new or undescribed; for careful people who have studied these plants in their native haunts in various places, and have cultivated them together have been obliged to distinguish several. Beyond doubt those listed and defined by Dr. Small in his excellent "Flora of the Southern States" are good. This plant of Ontario may perchance be one of those, but quite as probably it is neither; and assuredly it is not *A. canadensis* whatever it be.

Traversing this delightful succession of groves, I came at last to a dry open space, where the soil was sandy and the ground more elevated. By the presence of two or three other plants not seen before that day, I recognized the elevation as a continuation of the glacial drift I had passed an hour before. The best of these were *Ranunculus fascicularis* and *R. rhomboideus*. Both were past flowering and in good fruit; but they recalled again very vividly the gravelly knolls that in Wisconsin so long ago I used to visit early each spring to see and gather, among others before named, these two rare buttercups. I am informed by my friend Professor John Macoun that Goldie, who was the discoverer of *R. rhomboideus* and who published the species, almost a hundred years ago, was a settler in western Ontario, and botanized about Strathroy; so that here, without knowing it at the time, I was on classic ground for Canadian botany.

A COLONY OF CLIFF SWALLOWS AND OTHERS.

BY NORMAN CRIDDLE, TREESBANK, MAN.

While collecting along the banks of the Souris River near Treesbank on July 26th of this year, I came across several colonies of Cliff Swallows with nests built on the almost perpendicular banks of the stream. The first of these were well out of reach, but eventually I discovered two on quite a low cliff situated close to some convenient mud, which probably accounted for the unusually low site chosen. The two colonies contained about 130 nests, which were some 200 yards apart, the lowest being only five feet from the more even ground beneath and but a foot from the top. These were much bunched together and gave quite a strange effect to the cliff owing to their dark, pear-shaped forms and somewhat elongated necks against the lighter back-ground. Many of the young birds had already left their nests and could be seen flying with their parents, while others were only partly fledged, and several nests still contained eggs, though in an advanced stage of incubation.

As is well known, most swallows are attacked in their homes

by a very disagreeable parasite closely allied to the obnoxious bed bug, in fact many persons still believe that these insects are identical, and, as a result, condemn the swallows for spreading the true bed bug throughout the country. Needless to say, however, this is not the case, for though the unsavoury odour is identical a casual examination will convince any observant person of the difference between the two insects.

The colonies referred to above proved no exception to the general rule, in fact the nests inside and outside were simply swarming with this bug (*Æciacus hirundinis*), as were also the cliffs below the nests and for several feet on either side of them, while every crack and cranny was full of the disgusting insects in all stages of growth; many were so inflated with blood as to appear quite red. There was, also, an almost incessant shower of the bugs falling upon the earth beneath, and during the short time I spent in examining and collecting a few of the creatures, fully a dozen dropped upon my hat and clothes, so that I was glad to discard them and have a dip in the river. Afterwards I tried to entice a couple to bite me, but in vain, showing that they evidently preferred to confine themselves to the feathered tribe.

To me it seems remarkable that the young birds managed to survive at all. While the substance sucked from the parents during the brooding period must be very great, yet, with the exception of three partly fledged young found dead some twelve feet away, which may have been victims, no evil effects were observed.

The colonies were undoubtedly old ones, as was indicated by the broken nests partly built upon, and also by the great quantity of refuse beneath. This is doubtless why the bugs were present in such abundance.

It has not been my good fortune to run across more than about a dozen colonies of Cliff Swallows, but all these have invariably been situated on cliffs or barns either facing the north or east, so that they were sheltered from the sun during the hottest part of the day. My experience with Bank Swallows is that they always choose the north or eastern cliffs facing the sun. Perhaps this is merely a coincidence, but be that as it may, either the difference in habit or situation of nests seems to be responsible for a lack of bugs among the Bank Swallows, as I could not discover any in their vicinity, while the insects were quite active on and about the sheltered nests of the Cliff Swallows during a greater portion of the afternoon.

A species of *Æciacus*, probably identical with the Swallow Bug, is sometimes found in poultry houses, and I have also discovered them in a stump containing a pair of nesting Tree Swallows. Barn Swallows, as is well known, are also much

infested with them at times, especially when there are several together. The reason why swallows are so much attacked is probably due to their habit of returning to the same breeding place for several years in succession, and thereby making much more profitable hosts for the bugs than birds that change their nesting abode each season. It is also interesting to recollect that the nesting period of swallows only covers, at most, three months, so that the bugs are obliged to fast for nine months of the year. Most of this time, however, is spent in hibernation.

NESTING OF THE AMERICAN OSPREY.

BY W. J. BROWN, WESTMOUNT, QUE.

The heavy dense woods of tamarack, black spruce and balsam, with poplars and birches scattered here and there, which skirt the shores of the Gulf of St. Lawrence, are an excellent breeding ground for the American Osprey. From May 28th to June 15th of the present year twenty nests of this bird were located in an area of timber extending some twelve miles along the coast. The nearest nest from the shore was about one mile inland; then they appear to extend horizontally half a mile apart, placed on the very top of all sorts of trees, generally dead ones. In one instance two or three nests were but two hundred yards apart.

It is easy to find these huge nests of the Osprey, as they can be seen some eight hundred yards away with the sitting bird moving her head in all directions looking for possible enemies. As soon as you are detected—and you can count on the fish hawk seeing you half a mile away—the bird slowly rises off her nest and comes up to meet you, making all the time a whistling note and performing certain revolutions characteristic of the species. As you approach the nest it is more difficult for one to locate it, as these evergreen woods are very heavy and the underbrush equally so. However, the bird is overhead and practically leads one to the nest. Some of the nests are situated in small clearings and are, therefore, more easily found. As stated, it is easy to locate the nests, but it is quite another matter to procure the eggs. The largest nest examined was between five and six feet across and about two feet deep—built largely of sticks and lined with seaweed and grasses. The others were not quite so bulky, averaging about four to five feet. The only way to get into these nests is to hug the tree with one arm and work an avenue or lane over the side of the nest with the other hand. This is an extreme-

ly hard and hazardous undertaking and occupies a full half hour at least.

On May 28th five nests were examined containing three fresh eggs each. One was on top of a dead poplar 45 ft. up; two in live pine, about 60 ft. up, and one each in dead tamarack and balsam 50 ft. up. The following day two other nests were examined and they contained two fresh eggs each. On June 14th nine nests were located all containing three eggs each—which were on the point of hatching. A number of other trees were unclimbable. The birds apparently begin laying in this locality about May 24th. All of the sets taken were nicely marked as is usual with this species, the ground color being almost covered by the reddish coloration.

FALL EXCURSION.

An excursion of the Club was held to the Experimental Farm on Saturday afternoon, October 9th, when a fair number of members and others were present to inspect the fine grounds and Arboretum of this institution. Among the features especially attracting attention were the extensive hedges, demonstrating the value of various shrubs and trees for this purpose; the group of cedars or Arbor Vitae showing what a range of horticultural types may be obtained; the curious Maiden-hair tree *Ginkgo biloba*; some Japanese Anemones, which were still in the height of bloom, after most other flowers were out of season, etc.

An object lesson of considerable interest was the collection of wild, unimproved apples. The Old World *Pyrus baccata*, with its tiny fruits scarcely larger than peas, and the native American crab apple *Pyrus coronaria*, with somewhat larger, but extremely unpleasant fruits were strikingly in contrast with the large, fleshy, attractively colored and flavored apples which we know, fortunately, so much better.

Following the copious rains of a few days previous, mushrooms of several kinds were much in evidence. The characteristic circular colonies of the "Fairy ring" mushroom, *Marasmius oreales*, were especially noticeable in the thick sod of the Arboretum.

The majority of the trees had already lost the brilliance of their autumn foliage, but those which were still in this conspicuous garb, together with the scarlet fruits of the barberry, the burning bush, and others, were much appreciated. Remarks were made by the leaders on the cause of autumnal coloration, and on such other topics as were suggested by the observations of the afternoon.

H. G.

NOTES.

CLAY NODULES. In the account of the September excursion to Green's Creek, which appeared in the October issue, a mention was made of the interesting clay nodules, which occur there in such numbers. Since, the Editor has received from Dr. Percy E. Raymond, of the Geological Survey, some notes on these nodules, which will undoubtedly be of interest to our readers.

"Toward the end of the 'Great Ice Age' there was a lowering of the northeastern portion of the North American Continent with respect to the sea level, and, as a result, the great river valleys became, for a time, arms of the sea. One of these arms extended up the St. Lawrence as far as the upper end of Lake Ontario, with a side bay which occupied the Ottawa Valley for at least 200 miles west of Montreal. Another covered the region occupied by Lake Champlain, whence the name 'Champlain epoch.'" often applied to this time. At that time, as now, the rivers, descending from the low highlands to the north and west, brought down sand and fine mud which was deposited over the sea bottom. With the mud came quantities of leaves from the northern forests, and occasionally, insects, feathers of birds, and bones or bodies of animals. In the sea itself lived such a fauna as is found off our northeastern coasts; whales, seals, various fish, barnacles and bivalves. As the animals died, their bodies or shells were buried in the constantly accumulating mud, and, being protected from rapid decay by the exclusion of the air, the harder portions have been preserved as fossils such as are found in the nodules at Green's Creek and Besserer's Grove.

"The exact method of formation of these nodules, or any nodules, is hardly known, but it seems probable that the acids which are the product of the decay of the organic matter had something to do with the formation of the cement which has hardened the clay for from one-half an inch to one inch in all directions from the fossil which forms the nucleus. It is, indeed, remarkable how closely the outline of one of the nodules follows the specimen within it.

"These nodules have furnished quite a fauna and flora, thanks to the persistent collecting of Dr. Ami and the members of the Field-Naturalists' Club. Nearly all the forms belong to species living at the present time, though a few, notably the insects, are now extinct. The fauna and flora are interesting as showing an instance in which organisms representing the life of both sea and land are preserved in the same bed, and as showing the great physical and climatic changes which may take place in a (geologically) short time. Sir William Dawson said of this flora that it 'represented the greatest refrigeration of

which we have any evidence,' and the fauna, with its seals and Saxicava, is certainly Arctic. The time which has elapsed since the retreat of the sea from this area probably is approximately the same as that required by Niagara for cutting its gorge, that is, as variously estimated, from 7,000 to 50,000 years."

A SIMPLE METHOD OF WATER PURIFICATION. By G. G. Nasmith, Esq., Ph.D., and R. R. Graham, Esq., M.B. A level teaspoonful of chloride of lime should be rubbed into a teacup of water. This solution should be diluted with three cupfuls of water, and a teaspoonful of the whole quantity should be added to each two gallon pail of drinking water. This will give .4 or .5 parts of free chlorine to a million parts of water and will in ten minutes destroy all typhoid and colon bacilli or other dysentery-producing organisms in the water. Moreover, all traces of the chlorine will rapidly disappear.

This method of purification has been tested with Toronto Bay water inoculated with millions of bacteria. Every germ has been destroyed and it has been unnecessary to boil the water.

This method should be very valuable for miners, prospectors, campers, and those living in summer resorts where the condition of the water might not be above suspicion.—Ontario Board of Health, Circular No. 35.

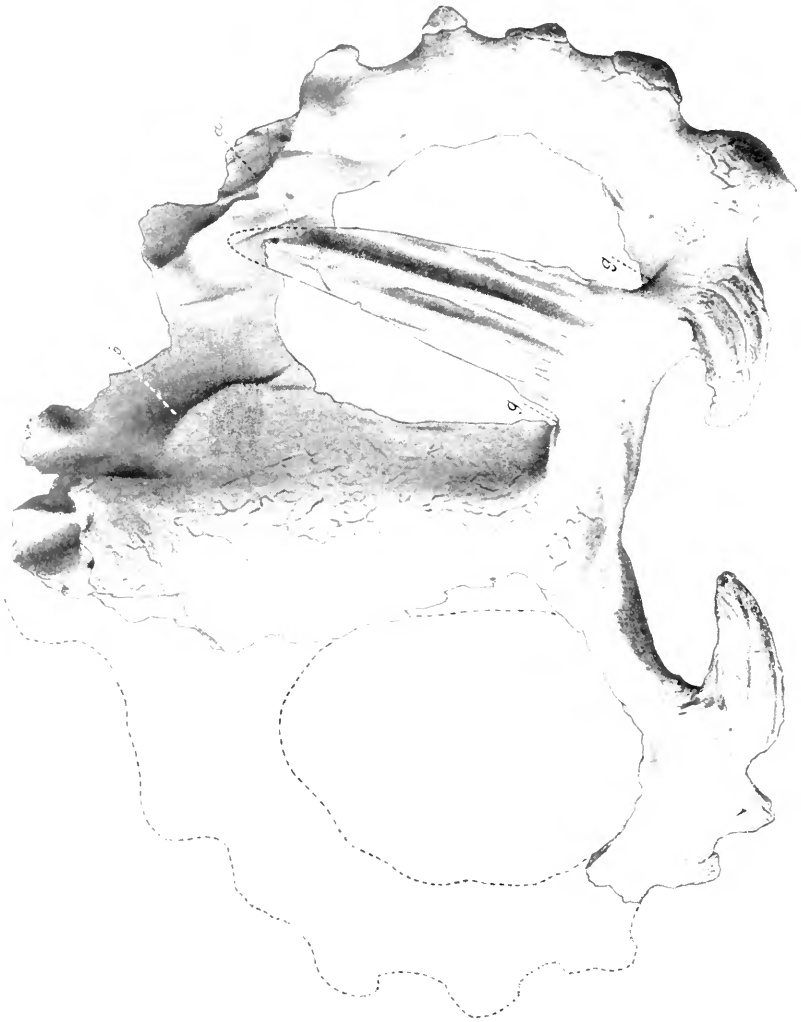
NEST OF WILSON'S SNIPE.—The following note appeared in *Forest and Stream*, of September 10th:—

"In Ashbridge Marsh, south of Gooderham's byres, in front of the Stanley Gun Club shooting house, a Wilson's snipe's nest was found by R. Buchanan, May 12th, 1910. When found, it contained the full clutch of four eggs. It was frequently visited by Mr. Alberts and others, and the eggs were hatched out between the 1st and 2nd of June. The nest and eggs were taken by Mr. Alberts and are now in the possession of James Munro. The male bird was frequently seen and sometimes on top of the trap house. The female was hard to flush, and lay close during all the shooting, if not approached from the path of the trap house."

A photograph is published in *Forest and Stream* which shows a gun was lying beside the eggs in the nest; and a diagram of the position of the nest shows it to be nine feet from a much-used path and twelve yards from a shooting platform.

W. E. SAUNDERS.





PARIETAL CREST OF CENTROSAURUS APERTUS.
(One-Sixth Nat. size.)



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NOTE ON THE PARIETAL CREST OF CENTROSAURUS APERTUS AND A PROPOSED NEW GENERIC NAME FOR STEREOCEPHALUS TUTUS.*

BY LAWRENCE M. LAMBE, F.G.S., F.R.S.C.,
Geological Survey, Canada.

The defensive frill or crest of Centrosaurus, so singular in its general form and contour, has lately been found to be even more grotesque than it appeared to be at the time of its discovery.

This crest, made up almost exclusively of the coalesced parietals, was originally (1902†) described as appertaining to the species *Monoclonius dawsoni*, Lambe, but was later (1904‡) made the type of the genus *Centrosaurus*. When found by the writer in 1901 in the Judith River (Belly River) formation, on the west side of Red Deer river, Alberta, a short distance below the mouth of Berry creek, a straight, laterally compressed bone, tapering toward one end was with it immediately beneath its lower surface. This bone was at the time supposed to be a horn-core and was described as such in the original reference to the crest and when the genus *Centrosaurus* was established, the parietal crest and the so-called nasal horn-core constituting the type material of the new genus. The discovery during the past summer of the true nature of the "horn-core" is of interest and calls forth the following remarks.

In my description of the crest in the paper published in the *Transactions of the Royal Society of Canada*, vol. X, 1904, the following references to the hinder portion of the specimen are to be found: "The parietal expansion, for the purpose of descrip-

*Communicated by permission of the Director of the Geological Survey.

†Geological Survey of Canada. *Contributions to Canadian Palaeontology*, vol. III. (quarto), part II., On Vertebrata of the Mid-Cretaceous of the North-west Territory, p. 58, 1902.

‡THE OTTAWA NATURALIST, vol. XVIII., p. 81, On the squamosoparietal crest of two species of horned dinosaurs from the Cretaceous of Alberta.

tion, may be said to consist of a longitudinal or axial part, a transverse portion forming the posterior border, and lateral or alar extensions that complete the sides and front margin. . . . The posterior bar near the median line presents a backwardly directed vertical face, which becomes rounded and less robust in the neighbourhood of the hooked processes; it is not, however, quite bilaterally symmetrical, its transverse section near the left hooked process being nearly circular, whilst in the corresponding position on the other side it is decidedly thickened next to the fontanelle. . . . A shallow groove, *g*, more clearly shewn on the right side of the specimen, extends on the anterior side of the posterior bar from the upper surface near the median line downward and then upward in a regular curve, ending at a point in advance of the base of the hooked process. Above this groove the face of the bar presents a broken surface. On the left side the corresponding groove is only faintly indicated, and the bone above it is intact." It is this broken surface on the anterior right margin of the posterior bar which is of special interest at the present time. To this surface the lower broken base of the "horn-core" fits exactly in perfect contact. To Mr. Barnum Brown of the American Museum of Natural History, New York, belongs the credit of having made this discovery whilst on a visit to the Geological Survey at Ottawa during the past summer.

What was at first considered to be a nasal horn-core is thus proved to be a strong, forwardly directed outgrowth or spur from the anterior surface of the right lateral half of the posterior bar passing directly across and over the right fontanelle, the front end of the spur being about one inch only above the surface of the bone forming the anterior border of the opening. Thus the above-mentioned groove, *g*, passes beneath what is now known to be the base of the robust outgrowth. What is surprising is, that there was no corresponding outgrowth from the posterior bar on the left, the surface of the bone there being quite smooth, as already stated.

The figure of the parietal crest accompanying this notice shews the newly discovered outgrowth in its proper position somewhat marring the symmetry of the specimen, but certainly providing food for speculation as to its true nature.

The hooked processes on the posterior margin of the crest of *Centrosaurus* were probably of some use in a protective sense. Projecting beyond the back of the frill, and with a horny covering, they would play an important part in the marginal armature of the frill. The outgrowth over the fontanelle, however, as it lay but little above the general plane of the lateral expansion of the crest was probably enveloped by the covering of the frill and did not shew to any extent above its surface; to be of use

as a spine for defensive purposes it would have projected freely above the crest. Centrosaurus and Monoclonius are regarded as antecedent to forms in which the size of the fontanelles is much reduced, culminating in Triceratops with an entire frill. We could scarcely, however, consider the spur of bone crossing the fontanelle a little above its general plane, as an attempt on the part of Centrosaurus to reduce the size of the opening, although if we accept a Monoclonius-Triceratops phylum as one of the two lines of descent in the Ceratopsia,* we would expect a strong tendency to close the parietal fontanelles in both Monoclonius and Centrosaurus. The presence of the outgrowth on one side of the crest only, further inclines one to the belief that this spur has no morphological significance, but has been induced rather by an inherent tendency on the part of the species to add to the defensive armature in this part of the skeleton.

The figure here given is from the drawing reproduced in plate 1, Transactions Royal Society of Canada, vol. X, 1904, in the writer's paper "On the squamoso-parietal crest of the horned dinosaurs *Centrosaurus apertus* and *Monoclonius canadensis* from the Cretaceous of Alberta," to which is added the outgrowth from the posterior bar in its true position, the original drawing for figure 3 of the above plate being used; one-sixth natural size; *a*, squamosal suture; *b*, post-frontal suture; *g*, groove passing beneath base of bony outgrowth.

THE GENERIC NAME EUOPLOCEPHALUS PROPOSED IN PLACE OF STEREOCEPHALUS (PREOCCUPIED).

In 1902 the writer described a new genus and species of herbivorous dinosaur from the Judith River (Belly River) beds of Red Deer river, Alberta, under the name *Stereocephalus tutus* (Contributions to Canadian Palæontology, vol. III. [quarto], part II., p. 55). As the term *Stereocephalus* has been already used for a genus of insects it is necessary to suggest another generic name for the species from Red Deer river represented by the upper part of a heavily armoured cranium and a transverse, semicircular series of five keeled scutes from the neck or tail. *Euoplocephalus* (Gr., *euoplos*, well armed, and *kephale*, head) is therefore now proposed as an appropriate name for the genus to take the place of *Stereocephalus* as applied to the Cretaceous stegosaur *S. tutus*.

*Monographs of the United States Geological Survey, vol. XLIX. The Ceratopsia by John B. Hatcher, based on preliminary studies by O. C. Marsh, edited and completed by R. S. Lull.

THE BIRDS OF OTTAWA.

BY C. W. G. EIFRIG.

The first list of the birds of Ottawa, published by members of the Ottawa Field-Naturalists' Club, appeared in the third number of the Transactions of the Club, pages 29-34. It was prepared by Messrs. G. R. White and W. L. Scott, and enumerates, as a result of their observations up to 1881, the sum total of 169 species, four of which were later cancelled as erroneous. The second general list, which was to fix the ornithological knowledge of the district for some time, appeared ten years later, 1891 (OTTAWA NATURALIST, Vol. V., April, 1891). Additions, migrations and seasonal lists have since been published.

Then why this new list? A number of reasons make it desirable. 1. Quite a number of additional species have been added since the list of 1891, which enumerates 224 species, the present one 246. 2. The status of quite a number of species has since then been found to be different than given, *e.g.*, many are given as migrants for the district which have since turned out to be summer residents, *i.e.*, breeders. 3. The surroundings of Ottawa, and therewith the haunts of birds, are being changed so rapidly by man, that it seems desirable to make another record of the favorite localities for birds in the neighborhood as they existed in the first decade of the twentieth century, before they are no longer recognizable. 4. Many of the present members of the Club do not possess those early volumes, and many have repeatedly requested the writer to prepare a new list. Besides, it is a labor of love for the writer, who during six years spent all available leisure time in the study of the birds of the region. Never will those delightful hours and days be forgotten, when, whether in the fields or swamps, or woods, or on the lakes of the district, the birds furnished him with varied and interesting experiences, and allowed him many a glimpse into the wonders and mysteries of nature.

The members of the Club who reside at Ottawa, of course, know the topography of the region around the city and even casual visitors to the Capital are filled with pleasant recollections when hearing names like Britannia, Aylmer, Rockcliffe, Experimental Farm, etc., favorite resorts for Ottawans in the neighborhood, where also many of the observations recorded in this list were made. But, for the ever-increasing number of members living far from Ottawa, I quote from the introduction of the second list, pp. 31-32: "The district covered by this list is embraced within a circle of thirty miles radius, with the city of

Ottawa as its centre. It includes, roughly speaking, the Counties of Carleton and Russell in Ontario, and the southern portion of the County of Ottawa in Quebec, and lies between 45° and 46° north latitude. The northern portion of this district is covered by what may be termed the first range of the Laurentian Hills, one of which, known as King's Mountain, has an elevation of 1,125 feet above sea level, and rises about 900 feet above the large alluvial plain lying between it and the Ottawa River. These hills are covered with a great variety of deciduous and evergreen trees, and among them are numerous mountain lakes, varying in size from mere ponds to lakes of five miles and upwards in length (*e.g.*, Meach Lake). Flowing from the north through this range of hills the rapid river Gatineau empties, opposite the city, into the Ottawa, which flows from the west across the centre of the district, widening above the city with a southward sweep into a broad and beautiful sheet of water known as Lake Des Chenes, and again narrowing at the city where, falling over a limestone ridge, it forms the well-known Chaudiere Falls. Below these its course is straighter and narrower, and about twenty miles down it receives from the north the waters of another rapid stream, the Du Lievre. South of the Ottawa is a somewhat undulating tract of country, drained principally by the Rideau, which joins the Ottawa at the city. It is rather a sluggish stream in its upper reaches, through being dammed back at various points for canal purposes, and thus affords several excellent resorts for marsh birds. Much good farming land, with occasional hardwood ridges, is to be found in this part of the district, as well as swamps overgrown with tamarack, cedar, and other cone-bearing trees. The largest of these swamps is a peat-bog in Gloucester Township, known as the Mer Bleue, which covers several thousand acres of land, carpeted to a great depth with sphagnum moss, and producing immense quantities of berries of many kinds, notably cranberries and blueberries."

Thus it will be seen that we have here all the conditions conducive to making habitats for all kinds of birds. Only *Limicolæ*, the shore-birds, find conditions here less and less congenial, as the floods of the Ottawa in May and early June cover all the available sand banks with water, and in August and the following months they are given no rest by the hordes of boys and men who make a practice of going up and down the river in boats armed with all kinds of shooting irons, blazing away at every living thing. This is done all summer, especially on Saturdays and Sundays, so that even breeding birds and fledglings are wantonly slaughtered, so much so, that certain localities that would otherwise teem with bird-life, as Kettle

Island, have become almost devoid of it. The provincial or other authorities ought to put a stop to this practice.

Other localities frequently mentioned in the list are: Beaver Meadow, a delightful dell between wooded ridges, adjoining Hull on the west, north of the first toll-gate on the Aylmer Road; "water-front" which means the wooded shore of the Ottawa between Hull and Tetreauville, on either side of the Canadian Pacific Railway bridge; the Rifle Range the character of which is denoted by its name; the woods beyond it, on the south shore of the Ottawa, which are rich in some of the rarer birds as well as plants; Beechwood, a large tract of park-like hardwood near the cemetery, and Chelsea, on the Gatineau River, five miles north of the city, have yielded rich returns in the study of the birds; Meach Lake, a charming lake about ten miles north of the city, has furnished some records, as also Osgoode with its adjacent swamps along the Rideau, and Cranberry Creek has been visited by the writer and his co-workers. This locality, as well as Shirley's Bay, six miles west of Britannia, the Ottawa River with Kettle and other islands near the Rifle Range, as well as the extensive marshes and swamps near the mouth of the Lievre River, furnish favorite haunts for numerous marsh birds like the rails, ducks and other water-birds.

On a map in possession of the writer, on which distances from Ottawa are indicated by concentric circles, it is found that High Falls, Labelle County, Quebec, is just on the thirty-mile circle, and Inlet, in the same county, a trifle beyond. As the writer made numerous visits to these localities, notes made there are also included in the list.

Two conclusions have forced themselves on the writer as a result of his study of the Ottawa birds, which, however, can only be mentioned here, namely: 1. *That the Ottawa River is an important boundary line in the breeding ranges of birds for this part of Canada*; that is, certain species like the Canada Jay, Rusty Grackle, Pine Grosbeak, Three-toed Woodpeckers and probably several others, *do not breed south* of it, and for certain southern species it forms the *northern limit of their occurrence*, as, for the Chewink, Wood Thrush, Yellow-throated Vireo, Grasshopper Sparrow, and, to a certain extent, the Indigo bird and others. 2. *That the Ottawa River is a migration route* for birds of much greater importance than is generally known. Great flocks of migrant land and water birds travel over it or along its banks, and even flocks of sea-birds use it as a highway, probably to and from James Bay.

In compiling the following list the writer has been given much assistance by several more or less ardent ornithologists, most of whom belong to the Ottawa Field-Naturalists' Club.

In work of this kind, when one observer usually cannot give all his time to it, co-operation on the part of many painstaking and conscientious observers is especially desirable, as indeed in all biological and other investigations. Therefore, this list embodies not only the results of the writer's work, extending over a period of six years, but also many notes and data furnished by Messrs. G. R. and E. G. White, A. G. Kingston, H. U. Morris, and H. Groh, who, together with the writer, frequently held meetings as the ornithological section of the Club. Mr. W. T. Macoun of the Central Experimental Farm and the late lamented Dr. J. Fletcher also furnished a number of valuable items. Especially valuable, however, has been the co-operation of Mrs. R. D. Brown and Miss Lees of "The Pines," Ottawa East, whose charming home with its beautiful surroundings is a perfect thermometer, so to say, for bird-life, be it for the migrant or resident species, their coming and going, greatest frequency, etc. The same can be said of Mr. E. Bedard, the keeper of the Rifle Range, and of his station of observation; he has indeed been of much assistance to me, and his many, often surprising records, were usually borne out by the specimen mounted. To these and several others who have occasionally furnished notes to the writer, also to Prof. J. Macoun, of the Geological Survey, who has always kindly allowed him free access to the collection of skins in the museum, the writer would once more express his sincere thanks.

The order and arrangement of the list is that of the American Ornithologists' Union, which is the standard. The scientific names are also brought up to date, they being those of the third check-list of the Union of 1910, with the exception that the trinomials have been left as binomials for the species, and retained for the subspecies only, for which they are really only necessary. The numbers, however, are continuous, as any others are of no use in a list of this kind. The meaning of the designations of frequency is as follows: rare, 1-5 individuals of that species seen during a whole season; moderately common, 1-2 in a day spent in their proper haunts; common, 5-10; abundant, more than 10. The name of the order is given first, that of the family second.

ORDER PYGOPODES—DIVING BIRDS.

PODICIPIDÆ—GREBES.

1. *Aechmophorus occidentalis*, Western Grebe. Rare accidental visitor. A specimen was caught alive on February 26th, 1904, in the grounds of the Ladies' College and kept alive several days.

2. *Colymbus holbælli*, Holbøell's Grebe; Red-necked Grebe.

A none too rare migrant, probably commoner than suspected. It occurs on the river in April and May and again from September to November. A number are brought every autumn into the market by rivermen. On November 25th, 1908, two were caught in nets on the river and kept alive on the market for several days.

3. *Colymbus auritus*, Horned Grebe. A moderately common summer resident. Breeds on Kettle Island, in cat-tail sloughs, and similar bays in the river and on lakes. Earliest date of arrival April 10th; latest date, October 27th.

4. *Podilymbus podiceps*, Pied-billed Grebe; Dipper. A common summer resident. Earliest date of arrival, April 6th (1909); latest, November 7th. Breeds in similar places as the preceding species. By virtue of its diving ability it is able to keep out of sight much longer than its abundance warrants.

GAVIDÆ—LOONS.

5. *Gavia imber*, Loon. A moderately common summer resident, which arrives as soon as the ice begins to open up in the rivers, about April 20th, but sometimes before, as in 1908 one was seen on March 25th. They are usually gone by the middle of November, when their favorite resorts, the lakes to the north of us, are freezing over, but in 1905 one was seen as late as December 18th. By May 24th they usually have their set of two eggs laid. This bird is a great ornament to our lakes and its shooting for sport or pastime should in every way be discouraged.

6. *Gavia stellata*, Red-throated Loon. A very rare accidental visitor. The last and only date for Ottawa is November 12th, 1885, when a young female was shot by Mr. T. R. Coursolles.

ALCIDÆ—AUKS, MURRES AND PUFFINS.

7. *Fratercula arctica*, Puffin. This queer-looking marine bird is also a rare accidental visitor. The only one recorded from here was shot in October, 1881.

8. *Uria lomvia*, Brunnich's Murre. The record of this bird, a northern marine species, is a strange and interesting one. It was first noticed in this vicinity November, 1887, near Papineauville (G. White), but in December, 6-12, 1897, it came to Ottawa in numbers for the first time. Since then the bird comes almost every year, and about the same time. In 1907, they began to arrive on November 25th, but in 1908 the first ones, 400-500, were seen on December 19th. The bulk of these flights seems to be heading towards the Great Lakes via the Rideau River, and lakes; the remainder presumably towards James Bay. Probably none of these birds ever get back to their native sea coast; they are picked up dead and dying in the country traversed by them. They die of starvation. Why they should

thus migrate to their doom with such persistency is difficult to explain. Many are, of course, also shot by gunners.

ORDER LONGIPENNES—LONG-WINGED SWIMMERS.

STERCORARIIDÆ—SKUAS AND JAEGER.

9. *Stercorarius parasiticus*, Parasitic Jaeger. Another marine species of the north which can only be a rare accidental visitor here. A young bird was shot on September 4th, 1909, on the Ottawa, near the mouth of the Lievre River, and is now in the writer's collection.

LARIDÆ—GULLS AND TERNS.

10. *Larus hyperboreus*, Glaucous Gull. This arctic species has been but lately added to the Ottawa list. On December 2nd, 1905, Mr. E. Bedard of the Rifle Range shot the first specimen. He claims that this species forms a part of the enormous flights of gulls and terns moving regularly up and down the river. They are easily distinguished from the Herring Gulls. Other dates of Mr. Bedard are: March 26th, 1907, eleven seen; April 5th, 10th, and 12th, 1908, and March 31st, 1909.

11. *Larus marinus*, Great Black-backed Gull. A casual visitor. May 2nd, 1885, one was seen near Kettle Island (G. White); also one at the same place April 9th, 1906, by the writer.

12. *Larus argentatus*, Herring Gull. This fine bird is a moderately common breeder here and a sometimes abundant migrant. The bulk come at end of March and beginning of April, the earliest date being March 26th, 1904. The species breeds along the Ottawa in suitable localities and on the lakes northward. The bird has been seen here as late as December 7th (1907).

13. *Larus delawarensis*, Ring-billed Gull. This common species of the Great Lakes and the sea coast undoubtedly has always been among the hosts of migrant birds passing up and down the Ottawa, still the first definite record of it for Ottawa was only made in December, 1908, when Mr. E. Bedard captured one alive. He kept it with several ducks in a small enclosure, where it developed an unsuspected amount of viciousness in attacking, killing and then eating his fellow-captives.

14. *Larus philadelphia*, Bonaparte's Gull. This is a not uncommon migrant, which in early May is sometimes found in numbers over the river. It probably nests on some of the lakes not far north of here, as young birds are found here in August. Earliest and latest dates are: May 2nd (1908), and October 7th (1907).

15. *Sterna hirundo*, Common Tern; Wilson's Tern. A casual visitor and probably a more common regular migrant

than known. For, after a few isolated records of its occurrence here had been made up to 1909 it suddenly, on the 30th of May and 1st of June of that year, appeared in great numbers over the river, flying westward. Many surprises like that and probably a number of unrecorded species would undoubtedly await one who could give his whole time to watching the river during migration.

16. *Sierna paradisæa*, Arctic Tern. This delicate, beautiful "sea-swallow" has been seen and taken for the first time on the same day, 30th of May, 1909, as the preceding species. They were probably heading for James Bay. The presence of these ocean birds in numbers on certain days, shows that the Ottawa is a migration route of greater importance than has hitherto been supposed.

17. *Hydrochelidon nigra surinamensis*, Black Tern. This inhabitant of large inland marshes is a rare casual visitor here. On May 28th, 1888, Mr. E. White saw six on the Ottawa, and Mr. McCarthy took one at Britannia, August, 1908.

ORDER STEGANOPODES—TOTIPALMATE SWIMMERS.

SULIDÆ—GANNETS.

18. *Sula bassana*, Gannet. This is another marine species that can now be taken into a list of Ottawa birds for the first time, it having been first recorded and taken at Shirley's Bay on October 14th, 1909. It, otherwise, is found only in the Gulf of St. Lawrence and along the northern coasts and islands both in the Old and New World, and even here in certain circumscribed localities only.

PHALACROCORACIDÆ—CORMORANTS.

19. *Phalacrocorax auritus*, Double-crested Cormorant. A casual visitor. One was taken about 1st October, 1890, at Shirley's Bay; a later date is October 17th, 1904, when one was brought in to Mr. Henry, the taxidermist. Finally, on May 27th, 1906, Mr. Gemmill shot one on the Ottawa River. Probably commoner than supposed.

PELECANIDÆ—PELICANS.

20. *Pelecanus erythrorhynchos*, White Pelican. This fine large white bird is entitled to a place on this list on the strength of a specimen captured at Manotick, 12 miles from Ottawa, May 26th, 1904, and reported by the late Dr. Whiteaves in THE OTTAWA NATURALIST.

ORDER ANSERES—LAMELLIROSTRAL SWIMMERS.

ANATIDÆ—DUCKS, GEESE, SWANS.

21. *Mergus americanus*, American Merganser. A common migrant and a not uncommon breeder. It may almost be said to be a resident, as witness these dates: 12th November, 20th

December, 1908 (17 seen), 12 January, 1909 (3 seen). The bulk of the species, however, arrive from about April 6th to 18th. At Arnprior Mr. H. U. Morris saw a female with eight young on June 12th, 1909.

22. *Mergus serrator*, Red-breasted Merganser. A much rarer migrant and breeder than the preceding. Breeds in the sloughs and ponds near Templeton, where on June 20th, 1897, Mr. G. White saw ten young able to follow their mother. Dates: April 1st, October 20th.

23. *Lophodytes cucullatus*, Hooded Merganser. A common summer resident and abundant migrant. In autumn many are brought to the market by gunners. Like the American Merganser it breeds in cavities in hollow trees or stumps. Dates from April 3rd (1906), to November 6th (1905).

24. *Anas platyrhynchos*, Mallard. A regular but rare spring and fall visitor. Much less common than farther west or south. On April 6th, 1909, Mr. E. Bedard saw one and on October 19th and November 6th, 1905, Mr. E. White saw several in Lochaber Bay, near Rockland.

25. *Anas rubripes*, Black Duck. The old well-known and well-beloved Black Duck, *Anas obscura*, has of late been made into two species, *A. rubripes* and *A. tristis*, the Red-legged and the Black-legged Black Duck, by Mr. William Brewster, of Cambridge, Massachusetts. He claims for the red-legged kind larger size, more northerly breeding range and some differences in coloration from the other, the black-legged species. Other authorities, like Dr. Dwight, of New York, claim that these differences are only due to difference in age, so that there would, after all, be but one species. Without entering into a discussion of this matter here, we can say that, if there are two kinds, we have both. However, most of the Black Ducks shot in this vicinity are the large, red-legged kind, *Anas rubripes*. This is a common migrant and breeder here, arriving from the 2nd of April on, and some staying well into November (17th, 1909). They breed in sloughs and similar localities.

26. *Anas tristis*, Black-legged Black Duck. In October, 1908, Mr. E. Bedard captured two from a small flock and kept them alive for a long time. One had blackish feet and bill, the other red legs and green bill; both, however, were of small size, and both were taken from what seemed to be one family. This would lend color to the contention that these differences are but phases in the appearance of the one species.

Anas platyrhynchos, *Anas rubripes* or *tristis*, Brewer's Duck. The hybrid form between Mallard and Black Duck is one of not too infrequent occurrence here.

27. *Chaulelasmus streperus*, Gadwell. Rare accidental visitor.

A female was shot on the Ottawa from a small flock October 29th, 1885, by Mr. W. F. Whitcher.

28. *Mareca americana*, Baldpate. A regular but rather scarce spring and fall visitor; more common formerly. Dates: April 20th, 1906, a pair at the Rifle Range; November 6th, 1905, three seen in Lochaber Bay.

29. *Nettion carolinense*, Green-winged Teal. A rare migrant or spring and fall visitor; apparently much rarer in spring than fall, when a small number of young ones are to be seen in market. On October 12th, 1908, three were taken at Shirley's Bay and in the same year three spent all August in a small pond near Hurdman's Bridge.

30. *Querquedula discors*, Blue-winged Teal. A moderately common migrant and breeder. More common than the preceding species. Arrives about May 1st and leaves about middle of October. On May 24th, 1908, one was seen dabbling in shallow water along Beaver Meadow water-front. They breed also on Kettle and Duck Islands and similar localities.

31. *Spatula clypeata*, Shoveller. A scarce fall visitor. The following are all the available dates: fall of 1882; two seen October, 1883; two shot in 1886 by Mr. W. P. Lett; on September 16th, 1908, Mr. G. White shot two near Rockland and on November 2nd of the same year, he saw four at the same place, all birds of the year.

32. *Dafila acuta*, Pintail. A rare spring and fall visitor. Arrives about middle of April and leaves in November. Mr. E. White saw several at Bear Brook April 13th, 1905, and saw many and shot several at Lochaber Bay, November 6th, 1905.

33. *Aix sponsa*, Wood Duck. This most beautiful of all ducks still holds its own with us as common migrant and breeder. Along wooded streams and on sylvan lakes and ponds, where it can find cavities in trees and stumps for its nest, the Wood Duck may be found over all the Ottawa district throughout summer. In fall many are brought into the market by gunners, mostly plainly plumed young birds, but also a number of the fine adult drakes. These should not be shot, for it is a pity to destroy and pluck so much beauty, besides the bird is on the vanishing list over a large part of its territory. They arrive during the first half of April (dates: April 6th, 12th, 15th, 16th), and leave in October (October 19th, 1905, twenty seen in Lochaber Bay). The latest date I have is November 6th, 1903.

34. *Mareca americana*, Redhead. A rare fall visitor. On October 17th, 1907, Mr. E. White saw a flock on Shirley's Bay.

35. *Mareca vallisneria*, Canvas-back. This desideratum of all epicures is an even rarer fall visitor than the Redhead. On October 28th, 1906, one was shot here.

36. *Marila marila*, Scaup Duck; Greater Blue-bill; Black-head. One of our most common migrants. In April large flights can be seen travelling westward over the Ottawa and in October eastward. This species, together with the Black Duck, Hooded Merganser and Golden-eye, furnish the greater number of the ducks brought into our market in fall, it being second in point of numbers. Dates: April 6th, (1909); November 9th (1908).

37. *Marila affinis*, Lesser Scaup Duck, Lesser Blue-bill. A much less common migrant than the preceding. On October 12th, 1908, Mr. N. Lachance took one on Shirley's Bay; November 6th, 1905, Mr. E. White a fine adult male on Lochaber Bay, and November 15th, 1903, one on the Rideau.

38. *Marila collaris*, Ring-necked Duck. Another far from common spring and fall visitor. May probably sometimes be overlooked and taken for the Greater Scaup, which it much resembles. On October 27th, 1907, Mr. N. Lachance shot several on Shirley's Bay.

39. *Clangula clangula americana*, Golden-eye; Whistler. An abundant migrant, and not a few remain with us all winter on open places in the rivers, as along the Des Chenes Rapids. The first migratory ones are seen along the Ottawa, March 24th (1908), and the remaining days of March, but during the first half of April large flights can be seen ascending the river, the last date for the spring migration being May 3rd (1908). The return movement is heaviest in October and early in November.

40. *Charitonetta albeola*, Buffle-head; Butter-ball. This rotund little duck is a moderately common migrant. In the flocks of migrating ducks usually a few of this species are seen, as on April 17th, 1908, when Mr. E. Bedard saw five among hundreds of other ducks at the Rifle Range. On October 22nd, 1906, Mr. N. Lachance saw nine on Shirley's Bay, among them a fine adult male, one of the latter also being brought to the market on the 26th of the same month.

41. *Harelda hyemalis*, Old Squaw; Long-tailed Duck. An abundant migrant from and to Hudson Bay and the far north. The vanguard arrives about April 2nd, but from the 16th to May 16th large flocks pass westward via the Ottawa, returning during the end of October, well into November, on the 9th of which (1905) a male was shot on Brewery Creek and presented to the writer.

42. *Somateria dresseri*, American Eider. A rare accidental visitor, though it probably is sometimes overlooked. A young male was shot by Mr. G. White on the Ottawa, November 9th, 1889. This is the only positive record so far.

43. *Somateria spectabilis*, King Eider. This is another northern marine species which now makes its appearance on the

Ottawa list for the first time. Up to November 2nd, 1908, there were no records of it, when Mr. E. Bedard shot four young birds at the Rifle Range, out of a flock of about 75, which went up the river as far as Pembroke, where they were also seen. On December 2nd of the same year, another flock came along, out of which ten or more were shot near Ketchum's boathouse. Next day more went up. Finally, May 8th, 1909, Mr. E. Bedard claims to have seen 28 passing up the river. Either this species is now changing its habits and migration routes, or they have, until 1908, been overlooked.

44. *Oidemia americana*, American Scoter. An irregular and rather rare spring and fall visitor, unless they also will deign to visit us more often in future. On May 4th, 1909, and May 5th, 1908, Mr. E. Bedard saw several flocks of Scoters passing up the river. On September 1st, 1908, a fine adult male was in the market here, shot nearby, and on October 7th of same year two immature specimens.

45. *Oidemia deglandi*, White-winged Scoter. Of the same undecided status as the preceding species. The dates I have are: October 28th, 1904, one in the market; October 22nd, 1906, Mr. N. Lachance saw seven at Shirley's Bay, out of which he shot two immature specimens; May 4th, 1909, Mr. E. Bedard shot one near the Rifle Range.

46. *Oidemia perspicillata*, Surf Scoter. Like the foregoing, if anything rarer. On October 13th, 1908, Mr. E. Bedard shot an adult male, and on October 29th of same year three immature ones.

47. *Erismatura jamaicensis*, Ruddy Duck. A rare irregular fall visitor. On October 15th, 1907, Mr. N. Lachance shot a young female on Shirley's Bay.

48. *Chen hyperborea nivalis*, Greater Snow Goose. Apparently other geese than the Canada Goose pass over our district, but until more are secured this species must be put down as a very rare accidental visitor. The only available record goes as far back as 1867, when Dr. Van Cortlandt shot one above the Chaudiere Falls, the head and wings of which were in the possession of the Ottawa Literary and Scientific Society until destroyed by moths.

49. *Chen caerulescens*, Blue Goose. Another extremely rare accidental visitor here from the far north. Three specimens of this goose were shot by Mr. G. R. White within a few miles of the city on October 11th, 1886.

50. *Branta canadensis*, Canada Goose. This magnificent and truly Canadian bird is a common migrant here and until within comparatively recent years undoubtedly bred in the district. I was told by natives that it nested, till lately, at Echo

Beach Lake, Quebec, about 35 miles in a straight line from the city. The earliest date for its arrival here from the south which I have is March 16th (1898). From then till well into May (9th, 1907) its wedge-shaped flocks enliven the air, and again in the fall from October 11th to about November, 20th.

51. *Branta bernicla*, Brant. This abundant eastern migrant is only a very rare accidental visitor with us, the only record being a specimen shot some thirty miles down the river by Mr. P. Thompson in the fall of 1887.

ORDER HERODIONES—HERONS, STORKS, IBISES, ETC.

ARDEIDÆ—HERONS, BITTERNES.

52. *Botaurus lentiginosus*, Bittern. A common summer resident, breeding in large and small swamps and sloughs. They come in the spring as early as April 6th, and stragglers remain as late as October 30th.

53. *Ixobrychus exilis*, Least Bittern. A very rare summer resident at Shirley's Bay.

54. *Ardea herodias*, Great Blue Heron. This large bird, popularly but erroneously called "Blue Crane," is still a common figure with us, though most possessors of guns deem it a piece of great heroism and marksmanship to kill every one they see. Its heronies, collections of big bulky nests up in trees in swampy, flooded woods, are found here and there in the district. Extreme dates of arrival and departure are: March 17th (1907), and November 17th (1909).

55. *Butorides virescens*, Green Heron. A rare visitor to us from further south, in the fall. It has been taken once by Mr. W. E. Saunders on the banks of the Rideau. As it nests not far to the south of us, along the St. Lawrence, and as this species has the habit in common with other herons to take a little ramble northward from their breeding grounds before departing to the south in fall, it should be looked for more assiduously and will probably be found more regularly.

56. *Nycticorax nycticorax naevius*, Black-crowned Night Heron. This is a summer resident of circumscribed local distribution. It nests on Kettle Island, and there it is not rare, otherwise it is. But even at Kettle Island, birds in the adult plumage are rare and none had been taken here till September 10th, 1907, when Mr. E. White shot two adult males in a little spruce and cedar thicket near Hurdman's Bridge. One was seen by him also late as October 19th (1905) in Lochaber Bay.

(To be continued.)

THE MIGRATION OF SOME NATIVE LOCUSTS.

BY NORMAN CRIDDLE, TREESBANK, MANITOBA.

We read from time to time, and have done so for many years past, of vast hordes of locusts darkening the sky, as they sweep onward, from unknown breeding grounds; how they devastated the crops and ate up every living leaf in any locality they happened to make a stopping place, and in fact left behind a desolate and leafless waste where a few hours previous all had been luxury and beauty. Such is said to be the case, at times, in parts of Africa, India and certain South American countries. There is, however, no longer any mystery connected with these visitations. Science has explained all that; has discovered the breeding grounds and is doing much to eliminate the injury by guarding against attacks and providing for them when they occur.

We are not, as a rule, apt to associate our common grasshoppers—many of which, however, are true locusts—with those devastating species. In fact, of all our many different kinds we usually claim but one as truly migratory, namely, the Rocky Mountain Locust, *Melanoplus spretis*, the locust made famous by having a special commission appointed to investigate its ravages. This species, in the past, has done immense damage to vegetation mostly in the United States, but it also invaded a great portion of Manitoba in the seventies, and is specially remembered on account of its having practically swept the Red River Valley clear of vegetation. Since then there have been two minor outbreaks confined to southern Manitoba, the locusts having evidently flown from somewhere south. In spite of the prevalence of this species in Manitoba at times it is very doubtful whether it can be classed as a native, a distinction which, after all, we are not anxious for.

Leaving out *M. spretis* we have still several destructive species, foremost among them being the Lesser Migratory Locust, *Melanoplus atlantis*, with several minor lights such as *M. gladstoni*, *M. femur-rubrum*, *M. angustipennis*, *M. packardii*, *M. minor*, *M. bivittatus* and others, all of which are very injurious at times and migrate regularly during the months of July and August.

It is a wonderful thing this migration. Few animals are free from a desire or instinctive stimulus to move to other parts and so spread the species. Plants, also, are constantly doing it by means of their seeds, and those that cannot go far by their own exertions, fasten themselves to such as can, and so, as with ourselves, air, land and water, are all made use of for the purpose of travel.

With regard to grasshoppers, it is strange that their regular periodic movements have been largely overlooked, though no doubt this is partly due to a lack of knowledge as to where to look. At Aweme, Man., where locusts have been troublesome of recent years, one instinctively looks up towards the sun, taking care to get behind some building, or in some way hide the sun's disc and then, if there are any flying, they will be easily observed within a radius of from one to fifteen diameters from the sun.

When a locust has the instinctive incentive to fly it is said to inflate the air sacks along the side of its body; it then rises with a spiral movement, round and round, higher and higher, until reaching a height of some hundred feet or more and feeling the resistance of the wind, it sails slowly away, usually flying with its head facing the breeze if it is at all strong, and gradually getting higher as it moves along with it, until it becomes a mere speck of glistening whiteness, when close in line with the sun and invisible elsewhere. When there is no breeze it will return obliquely to earth to await a more favourable opportunity.

That this desire, or instinct, to fly elsewhere is no sudden impulse is shown by the fact that a locust when disturbed seldom flies any great distance, and in fact seems incapable of doing so, while those that are prepared rise easily. Nor is the movement due to lack of food, as one often sees them rise in the midst of plenty. No, it is Dame Nature's way of spreading her children over the country, and she has taught them, through the law of natural selection, to go and also how to prepare for their journey.

The migratory season commences soon after locusts reach maturity, that is when they have passed their final moult, and some three or four weeks before they commence laying eggs. It lasts almost a month. There is not, however, a continual movement, only hot sunny days are chosen and even then the locust is dependent on the wind which not only carries it along but also indicates its direction. The days most preferred are those when the breeze averages some fifteen miles an hour, though lesser winds, as well as higher, are used to advantage; locusts seldom fly, however, when the wind is blowing hard.

It is interesting to watch these movements on a gusty day, when calm one moment and breezy the next. Then every fresh gust is taken advantage of and one sees hundreds of locusts rise on such occasions, as if having waited their opportunity. It is the same while looking up towards the sun, one moment will only discover a few, the next a perfect swarm moving at different angles owing to the breeze having slightly different directions at

different heights. And so the journeys continue, first east, then west, south or north, as the wind varies. At night they apparently drop to earth* to infest new neighbourhoods or perchance rise and move elsewhere next day. But not all go, among the Orthoptera especially Nature has made a wise provision. Some are endowed with long wings; these are built specially for locomotion and conveying the insect long distances. Others of the same species have short or rudimentary wings which oblige them to stay at home. So that while the long-winged forms seek new homes, there are enough short-winged brothers and sisters to carry on the family at home and incidently the work of destruction also.

BOOK NOTICE.

DISTRIBUTION AND MIGRATION OF NORTH AMERICAN SHORE BIRDS. By Wells W. Cooke, U. S. Department of Agriculture, Biological Survey, Bulletin No. 35, 100 pages and four half-tone plates, by Fuertes.

This publication is another valuable contribution towards a knowledge of the habits of North American birds. It deals, as the title indicates, with distribution, breeding range and migration, and also touches upon the economic side of the question which has hitherto received very little attention. The author claims that, so far as present knowledge goes, the evidence of food eaten is wholly in the birds favour, as no shore bird has yet been discovered to do harm to any appreciable extent; while many, such as the Upland Plover and Killdeer are of very great use to agriculture in destroying noxious insects. A special plea is made for the general protection of all shore birds in spring time, especially the Golden Plover, which is in a fair way to joining other extinct species.

The book is throughout an extremely useful work, covering, as it does, the range—both winter and summer—of birds inhabiting the whole of North America.

N. C.

*It is well known that some grasshoppers travel throughout the night. Such an instance is related by Prof. S. J. Hunter of *Dissosteira lemoinei*, and though I have no direct evidence, it is possible that some of the Manitoba species are also nocturnal during the migratory season.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-seventh annual meeting of the Entomological Society of Ontario was held at the Ontario Agricultural College, Guelph, on November 3rd and 4th.

The important address of the meeting was delivered by Prof. J. G. Needham, of Cornell University, on "The Role of Insects in Water Life." No one is more fitted for a discussion of such a subject than the eminent investigator from that great seat of learning at Ithaca. For many years Prof. Needham has made a close study of aquatic insects and his work on certain of the groups is unique. After some introductory remarks on the existing relations between animal and plant life in our waters, he discussed the exceeding great importance of a thorough knowledge of the life habits of aquatic insects in its direct relationship to fish culture. Much information was given on the value of insects as food for young fish. He pointed out how certain species could be reared very easily in large numbers. The waters of Canada and the United States were as productive acre to acre as the land. Large areas of water which at present are practically worthless from an economic point of view, could by scientific water farming be made of greater value than the best of land farms. Beautiful lantern slides were shown which illustrated the life-histories of certain species of dragon flies, stone flies, may flies, etc. At the conclusion of the address Prof. C. C. James, Deputy Minister of Agriculture for Ontario, spoke briefly of the importance of the subject, as did also President Creelman, of the O.A.C.

During the afternoon of the first day's session, papers on economic entomology were presented by Messrs. Gibson, Williams, Morris and Treherne, dealing with the injurious insects which were complained of in their respective districts. In addition to these papers Mr. L. Cæsar spoke of the "Insects of the Year in Ontario," and Dr. Hewitt on "The More Injurious Insects in Canada during the Year 1910."

In the other sessions the following papers were read or presented by title: "Leaf-eating Beetles," by F. J. A. Morris, Port Hope; "The Pool" and "Notes on the Season of 1910," by Rev. Dr. T. W. Fyles, Hull, Que.; "Collecting in the White Mountains," by H. H. Lyman, Montreal; "Spread of Diseases Amongst Animals and Man by Acarids," by T. D. Jarvis, Guelph; "The Horse-radish Flea Beetle," by A. F. Winn, Montreal; "Further Notes on Basswood Insects" and "The Entomological Record for 1910," by Arthur Gibson, Ottawa; "The Migration of Some Native Locusts," by Norman Criddle, Treesbank, Man.; "Some Observations on the Practical Import-

ance of Parasitic Insects," by Dr. C. Gordon Hewitt, Ottawa; "Scolytidae of the Larch," by J. M. Swaine, Macdonald College, Que.; "Notes on the Breeding of *Tropidopria conica* Fab.," by G. E. Sanders, Ottawa, and "The Bean Root Maggot," by J. E. Howitt, Guelph.

All of the above papers and addresses will be published in full in the forthcoming annual report of the Entomological Society of Ontario, which will appear early in 1911.—A. G.

NOTE.

THE CLARKE NUTCRACKER IN MANITOBA.—A bird has been received at the Experimental Farm which has been identified as the Clarke Nutcracker or Crow, *Nucifraga columbiana* (Wils) Aud., the specimen agreeing perfectly with published descriptions, and specimens in the Geological Survey, of that bird. This specimen was received early in September from Mr. W. D. Black, Margaret, Man., whose brother shot it on the banks of the Souris River in that province. The Clarke Nutcracker has not previously been recorded, to our knowledge, from any Canadian station east of the Rocky Mountains. In Macoun's Catalogue of Canadian Birds it is reported to have been "rather common at Banff, Rocky Mountains, in 1891, and breeding in the mountains; common in the Crow Nest Pass in August, 1897; in the summer of 1885, when the Canadian Pacific Railway was being built through the Rocky and Selkirk Mountains, the bird was very common around the camps, and apparently living on their refuse (*Macoun*)." It occurs widely in British Columbia and Alaska, keeping generally to mountainous country. In Coues' "Key to North American Birds," it is said to be a bird of the coniferous belt of the West, ranging from within the Arctic circle in Alaska, to Lower California and Mexico, and eastward to the eastern spurs and foothills of the Rockies, with casual appearances in Kansas, Nebraska, Missouri, and Arkansas. The States mentioned lie within the same meridians as Manitoba; therefore, while the present extension of the range of the species is a noteworthy one, it is not one which might not reasonably have been expected.

In his letter, Mr. Black makes some interesting observations on the habits of the Nutcracker, which are worthy of quotation here. "This bird made no sound or noise that I could hear, but perched on a tree or shrub, from whence it would suddenly swoop to the ground, and pursue a cricket or grasshopper, and, after catching it, it would return, and after hitting its prey against a limb of the tree it was sitting on, would devour it. The actions of this bird resemble a Canada Jay's somewhat, as does its color, but of course it is much larger."—HERBERT GROH.





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CLUB MOSSES.

BY F. J. A. MORRIS, PORT HOPE, ONT.

Few who worship Nature in her primeval shrine of the ancient wood can fail to have noticed some of these pretty evergreens on the forest floor. One kind with conspicuous fruiting spike woodmen and others know as Club Moss *par excellence*, but apparently the plants have always been favorites of the more simple peasantry, and in England their household names are legion. Many of these folk-names are of the quaintest—Foxtail, Staghorn, Buck-grass, Creeping Bur, Forks and Knives, Foxes' Claws, Lamb's-tail, Running Moss, Robin Hood's Hat-band, Tod's Tail, Traveller's Joy, Wolf's-claws; of these a few have migrated with early settlers, and occasionally in Canada you hear the names "Staghorn" and "Wolf's Foot" applied, but more generally the common species are distinguished as "Hemlock Club Moss", "Ground Pine", "Running Pine", and "Ground Cedar" or "Trailing Christmas Green".

Even the unhappy town-dweller gets glimpses from time to time of the fairer scenes of boyhood or the home of his rustic ancestry; for cartloads of *Lycopodium* are drawn to the city markets in December for Yule-tide decorations. The spores, too, of some species are gathered for commercial purposes, being dusted over pills to prevent them from sticking together; as a fixative for dyes; and for flashlights in photography, in pyrotechnics and on the stage, the spores containing more than half their bulk in a highly inflammable oil. On the mountain-sides of Cumberland in the English Lake District, I have sometimes shaken the fruiting spikes of *L. clavatum* over a lighted match and seen how instantaneous the combustion was.

These points of curious interest fade into nothingness compared with the importance of the plant to a student of evolution. The systematic botanist may be content with placing the Club Mosses among ferns and fern allies as sporophytes, but they throw a highly illuminative side-light on the doctrine of descent.

The spore-producing plants occupy a position mid-way between the lowest forms of vegetation, which are purely aquatic, and the highest, which are terrestrial. They are all more or less amphibious, their spores requiring water to germinate in. But with *flora* as with *fauna* there are amphibians and amphibians. The Club Moss among plants, like the Duck-billed Platypus among animals, is a living fossil, and the importance of its bearing on the question of origins can hardly be over-estimated. It may be said recently to have come into its own and reaped the reward of its conservatism; for it has been given a prominent place in that splendid floral tribute to Darwin, Prof. Bower's "Origin of a Land Flora"; easily the most notable contribution (in English) ever made by Botany to the Theory of Evolution, and the first philosophic treatise on the subject since the labours of men like Hooker and Gray were supplemented by their greater contemporary's "Origin of Species".

The Club Moss has been a hide-bound conservative ever since the Coal Age, pursuing the even tenor of its way uninfluenced by change and progress towards higher forms as evinced by the more adaptive members of the vegetable kingdom. Æon after æon its policy has been the same; its stock argument, that what was good enough for its primitive ancestors is good enough for it. Clad in the same simple armour and wielding the same weapons as when first it left its aquatic home and started on the war-path in its daring conquest of earth, this pigmy of the forest still subsists; and strange sights it must have seen in its time.

It saw the first forests ever formed, those dense jungles of rank vegetation, tree-ferns and giant horse-tails—*quorum pars magna fuit*, indeed, for Club Mosses abounded then. It saw the ancient whorled or radial outgrowth—such as is preserved in the Horse-tails, in the branching of certain Conifers, the foliation of the Juniper, or the parts of a flower—superseded by a more and more complex system of spiral symmetry as in the phyllotaxy of our modern forest trees; it saw its cousins the ferns evolve larger and larger leaf-areas, and it saw the idea adopted and adapted all down the line, each new type bettering the instruction till they reached the umbrageous foliage of more recent vegetation as it dominates to-day. It watched plants pass from the primitive strobiloid form of terminal fruiting spike, such as survives in the *Lycopodiums* and *Equisetums*, with their analogies in *Ophioglossum* or the cones of pines and spruces. It was present at the inception of seed formation whereby the earliest Gymnosperms (Cycads) first broke away from the aquatic nursery to which the Lycopod still clings; and it witnessed the miracle of the floral envelope replacing the wasteful vagaries of the wind by the ordered efforts of myriad insect myrmidons, a marshalled

host of winged allies. With what astonishment it must have seen its neighbours, the Lady's Slipper, the Wood Lily and the upland Harebell, blossom forth in all their glory to repel the wanton advances of the spendthrift breeze, turning a deaf ear to all its airy whisperings and yielding to the embrace of the frugal honey-gathering bee.

More than all, from amphibian through reptile to bird and beast, it has watched unfold the whole drama of animal life on earth, through scenes grotesque and monstrous, to culminate in the grandeur of man; and in all probability it will see that drama draw at long last to its tragic close.

It has been outdistanced in the race and nearly all its compeers and contemporaries have passed to their grave. Yet still on that grave it grows green and lives undaunted beneath the shadow of alien giants no longer sporophyte, claiming elbow room among flowering herbs and other such new-fangled forms of life.

Of all the members of this conservative family probably the archetype of our land plants is *Lycopodium selago*, or its woodland next of kin *L. lucidulum*. The plants are very similar, and an examination of either will serve to show the underlying *idea** (to use a Platonic term) that informed their prototype. It is that of a simple vegetative shoot of unlimited apical growth, with a radial output of small leaves, each leaf subtending a sporangium or spore-case. The lines of development shown in the genus as now extant are all subservient to the two great functions of nutrition and reproduction, they consist in the formation of (a) branches, (b) roots, (c) cones (i.e., terminal fruiting spikes or strobiles). In the simplest forms the branching is dichotomous, that is, by the forking of the apex into two growing tips; the process being repeated again and again so that the plant in time has many leafy shoots on which to produce its spore-cases; the development of branches in *L. selago* usually stops here, the species growing for the most part on rocks and exposed mountain sides. But in *L. lucidulum* a further step has been possible owing to its growing in damp shady situations; when the erect stem has branched and re-branched several times, it becomes top-heavy and sinking under the weight of the superstructure totters and falls into a recumbent position on the forest floor; here a pall of dead leaves and decay settles down upon it and in the darkness the shining green leaves that fringe it densely from end to end forsake their office, grow yellow and die. The mother stem is buried; but she is not dead, and she thrusts down rootlets on the under side into the rich vegetable

*Vide Bower's Land Flora, pp. 288-365.

mould, thus nailing herself down inch by inch to the ground and enabling the vigorous shoots at her head to get a good foot-hold and stand erect some inches away from where in her day she stood and flourished.

The first step made, then, in locomotion by the individual plant is by branching dichotomously, and the second is by rooting laterally as in the overweighted stems of *L. lucidulum*. This second mode of land-grabbing is an important advance on *L. selago* and leads to the formation by a single plant of extensive colonies, say a yard in diameter. At first the plant, rooted at the base, grows erect for a term of years; then it begins converting the lowest length of its stem from an upright leaf-bearer to a prostrate root-bearer. The next step in the division of labour is to make these successive acts of the vegetative and the locomotor simultaneous.

The beginnings of this advance are seen in *L. inundatum*; the stem is weak and prostrate and creeps along from 2 to 4 inches a year by thrusting rootlets into the sand (or peat) at its growing tip; in fact, it walks along by loops like a geometrid caterpillar or the Walking-leaf Fern; soon after the part beyond the root-anchor has found its sea legs, so to say, the brittle stem severs connection: the growing tip is cut adrift and left to steer a course for itself. It is not often that you find a plant more than 5 inches long and it may have 2 or 3 sets of roots on its creeping stem; the stem, meantime, carries on the vegetative function and is closely fringed with small leaves all along and all round—though those on the under side curve upwards for light and air. The stems also branch laterally 3 or 4 times in their few inches of length; some of these branches are weak and prostrate, rooting at their tip, but one at least (usually the first) is strong and erect, surmounted by a terminal fruiting spike.

The other species which stand higher up in the scale of evolution have stems that are regular runners and extend for yards, sending out at intervals more or less complex systems of lateral branches for vegetative and reproductive purposes. In one species (*L. obscurum* or *dendroideum*) the running stem is subterranean and destitute of leaves; in the other three (*L. annotinum*, *L. clavatum* and *L. complanatum*) they are surface-runners and more or less leafy.

Throughout this course of upward progress the Club Moss may be regarded as attempting by various means to make its way over the ground. From this point of view, the production of a horizontal runner is the most important step in the whole line of advance, since it enables the plant to throw out branches and fertile shoots laterally at various points without interfering with its continuous forging ahead. On this principle of classification

we have two kinds of Club Moss, viz., those without running stems and those with running stems.

The first class comprises *L. selago* and *L. lucidulum*, the two species we have seen reasons for considering primitive; and as though to compensate for the defects of their upright terminal growth, they have both devised the expedient of *detachable branches*. Near the apex of the annual growth, just above the region of fertile sporangia, 2 or 3 deciduous gemmæ or viviparous buds are formed. These detach themselves from the growing axis or are blown away by the wind and form new plants by striking root on contact with the ground. It is a purely vegetative form of reproduction and dispenses with the intermediate stage of the prothallus. It has its analogy in the bulbils of *Cystopteris bulbifera*. In many plants it is the roots that thus reproduce, e.g., the tubers of the potato; and in one species of Club Moss, *L. cernuum*, a more or less tropical kind, are found similar subterranean nuclei for plant-multiplication.

These gemmæ represent the plant's supreme effort at land-grabbing; their attempt to jump a claim. This is borne out by a curious fact I have noticed in *L. lucidulum*: the deciduous buds are centrifugal in nature; they nearly always are thrust forth on the side remote from the older and prostrate stem; if they do not always face in the direction towards which the plant has been struggling forward, they never look straight back towards the centre from which the plant started. In structure they seem to be modified leaves, for they take their regular place in the whorl of leaves, each being in its whorl a substitute for the normal leaf. Usually even when as many as three gemmæ are produced, they are all in the same whorl, or at most in two successive leaf-whorls.

So far we have seen how the Club Moss by adopting a more and more complex system of branching and rooting has progressed as a plant; we have yet to note the steps of advance it has made as a sporophyte. These steps are still on the principle of division of labour and consist in the separation of the vegetative from the reproductive tract. I said a little way back that all the various kinds of differentiation subserved the two functions of nutrition and reproduction. Of course the life-ambition of the plant is to perpetuate its kind; but to be fertile it must first be vigorous, and if you look at a young Club Moss you will see that its first care is the output of a vegetative system, a leafy shoot that will support the later output of sporangia.

In the archetype postulated by Prof. Bower, each of the leaves all round and all up the simple shoot performs a vegetative function and supports a sporangium at its base. The first change is by the lower leaves becoming abortive and no longer bearing

spore-cases in their axils, but simply serving as a nutritive basis for the sporophyte tract above them. This is the point where development has ceased in *L. selago* and *L. lucidulum*; the lowest leaves of the shoot are purely vegetative, the upper are both vegetative and sporangia-bearing, and next season the growth of the main axis goes on uninterruptedly above this year's apex into another similar tract, vegetative below and fertile above. This is the first step in the formation of a cone; two points are to be noticed: the sporophylls are unmodified, performing a purely vegetative function; and the main axis grows on above the fertile area. The second step was made when the Club Moss put out lateral branches as well as lateral roots, *i.e.*, when the runner was developed. This is seen in *L. inundatum*, where the sporangia are limited to a compact terminal spike, the sporophylls are still vegetative and hardly modified, but being appressed and directed upwards they serve to clamp down the sporangia to the main axis and partly protect them; two points are to be noticed: there is no growth possible above the fruiting spike; and the leaves of the spike are still vegetative.

The third step was made when a more or less compound system of lateral branches was introduced, and it consists in a further separation of fertile from vegetative tracts by the leaves of the terminal spike ceasing to be assimilative and becoming scales closely imbricated to protect the sporangia within their folds. In *L. annotinum* and *L. obscurum* these terminal cones or strobiles are sessile immediately on the apex of the leafy vegetative tract; in both the cones are single, in the former on primary branches as well as secondary, in the latter on branchlets only.

The last step, seen in *L. clavatum* and *L. complanatum*, is further to separate the reproductive from the vegetative, by raising the scaly cone on a naked or nearly naked peduncle; in *L. clavatum* this is usually compound, branching near the top into short pedicels, each surmounted by a cone; the branching of the peduncle is usually somewhat one-sided or alternate, and the stronger pedicel is frequently re-divided, so that 3 cones at different distances appear on the peduncle; in *L. complanatum* it is always compound and more symmetrical, by terminal dichotomy of the peduncle, so that a level-topped cluster of cones is the result, often 4 in number by dichotomy of the pedicels.

That this story of the development of the Club Moss from the simple to the complex is not a mere figment of the imagination is shown by various species "throwing back"; instances of this sort of atavism or reversion are not infrequent: evidence of the terminal strobile having evolved from an earlier form of,

shoot fertile throughout is found in the occasional appearance of sterile sporangia at the base of the fertile branch in *L. inundatum*, i.e., in the vegetative tract below the cone; the identity of the scaly cone with the leafy branch is seen in the occasional prolongation of the cone of *L. obscurum* into a vegetative tract above; and sometimes in *L. clavatum* the peduncle with its aborted foliage fails to produce a cone at its apex, showing the bare branch to be a modified leafy shoot.

It is noteworthy that in every member of the family the shoot or branch or branchlet destined to bear sporangia rises sturdy and erect from the ground. Presumably this is to help distribute the spores, the wind having thus a chance to get under them and bear them away on its back. Fern-lovers will readily find analogies in the upright fertile fronds of *Cryptogramma*, *Asplenium angustifolium*, *Aspidium cristatum*, *Onoclea*, *Osmunda*, *Botrychium* or *Ophioglossum*.

NOTES FROM PEMBROKE, ONT.

BY ERNEST THOMPSON SETON.

On November 7th, I called on Dr. G. H. Belaire, V.S., of Pembroke. In his collection I found some interesting local birds and mammals and made the following notes on certain of them.

BLACK SQUIRRELL (*Sciurus carolinensis*).—This specimen, a pure black, was killed one mile west of Pembroke, in November, 1909. It is exceedingly rare here, but others have been seen and two were taken about 1904.

CORMORANT (*Phalacrocorax diplophus*).—This, an immature specimen of the double-crested species, was killed at Mud Lake, 7 miles south-east of Pembroke, about 1907, by an Indian named Pappin. This is the only one ever seen.

WOODCOCK (*Philohela minor*).—This, a very small specimen, was found dead in the town of Pembroke in the summer of 1903. It had killed itself by striking a wire. This is the only one ever seen.

PERSONAL.

Mr. Andrew Halkett, President of the Ottawa Field-Naturalists' Club, and Naturalist to the Department of Marine and Fisheries, left Ottawa on December 8th for Europe. Unfortunately he will be absent from our winter meetings, but we hope to see him back again before the date of the annual meeting. Mr. Halkett's trip is mainly for the purpose of visiting Natural History Museums, Zoological Gardens, Aquaria, etc. He has arranged to spend most of his time in Germany.

THE BIRDS OF OTTAWA.

BY C. W. G. EIFRIG.

(Continued from page 163).

ORDER PALUDICOLÆ—CRANES, RAILS, ETC.

RALLIDÆ—RAILS.

57. *Ralluse elegans*, King Rail. Rare accidental visitor. Mr. G. R. White identified one that had been shot at Billing's Bridge, May 7th, 1896.

58. *Rallus virginianus*, Virginia Rail. A moderately common summer resident. Breeds in large and small cat-tail marshes, like the small ones at Blueberry Point, near Aylmer. On July 13th, 1909, Mr. C. N. Robertson and the writer found the marsh along Cranberry Creek near Osgoode full of the little young ones, which are pitch black. They arrive during the first half of May, just when is hard to say, as they are retiring and secretive. They leave about September 10th.

59. *Porzana carolina*, Sora. Of the same status and habits as the preceding species, perhaps a little more numerous. On May 8th, 1906, one was found dead in New Edinburgh, having probably flown against a wire over night, and on October 29th, 1906, Mr. C. H. Young saw one along the Rideau.

60. *Coturnicops noveboracensis*, Yellow Rail. Being small, in addition to its skulking habits, and in more or less impassable haunts, it may eventually be found commoner than the now available dates warrant. There are only two, October 22nd, 1895, and October 20th, 1909, both records made by Mr. G. R. White. Accordingly, we have to put it down now as a very rare accidental visitor or breeder.

61. *Gallinula galeata*, Florida Gallinule. It is interesting to record this bird in our list, as it probably finds its northern limit of distribution for this part of Canada in the Ottawa district, where it is a rather common breeder in the marshes along the Rideau River at Osgoode and Kars. A nest with seven eggs, partly incubated, was taken there by Messrs. W. E. and F. A. Saunders, July 9th, 1890. Mr. G. R. White shot one still farther north, namely at Hurdman's Bridge, Ottawa.

62. *Fulica americana*, Coot. A moderately common summer resident in its chosen haunts, the marshes along the Ottawa. There, Mr. E. Bedard shot one May 11th, 1909, and Mr. E. White saw one as late as October 19th, 1905, at Lochaber Bay, and in the same marshes Mr. G. R. White found three nests.

ORDER LIMICOLÆ—SHORE BIRDS.

PHALAROPODIDÆ—PHALAROPES.

63. *Phalaropus fulicarius*, Red Phalarope. A rare accidental visitor. Two only have been taken here, one October 21st, 1886, by Mr. E. White; the other September 1st, 1888, by Mr. G. R. White.

64. *Lobipes lobatus*, Northern Phalarope. Rarer than the preceding species. A specimen was shot September 10th, 1890, at Burritt's Rapids, and identified by Mr. A. G. Kingston.

SCOLOPACIDÆ—SNIPES, SANDPIPERS, ETC.

65. *Philohela minor*, Woodcock. A moderately common summer resident. Extreme dates are: May 8th, 1908, and October 31st, 1908, when Mr. Bedard, Jr., saw a flock of eleven on Kettle Island, out of which he took several. This is considerably after the soft spongy ground in the woods, out of which they extract their staple article of food, earthworms, is frozen over several times.

66. *Gallinago delicata*, Wilson's Snipe. Jack-snipe. An abundant migrant and moderately common breeder. Extreme dates: April 14th (1904), and November 5th (1906), at which latter date Mr. N. Lachance shot one at Shirley's Bay, which he gave to the writer.

67. *Macrorhamphus griseus*, Dowitcher. A rare accidental visitor. A pair were shot May 22nd, 1890, by Mr. E. White.

68. *Tringa canutus*, Knot. Rare, accidental visitor. A male in full breeding plumage was shot by Mr. E. White on June 4th, 1890.

69. *Arquatella maritima*, Purple Sandpiper. Rare, accidental visitor. One was shot on the Rideau, October 29th, 1885, by Mr. W. Forbes.

70. *Pisobia maculata*, Pectoral Sandpiper. A common migrant in spring and fall. Extreme dates, April 14th, 1909, when several were taken by Mr. E. Bedard, and October 28th, 1907, when Mr. N. Lachance shot one on Shirley's Bay.

71. *Pisobia fuscicollis*, White-rumped Sandpiper. A rare migrant. One was shot in 1883, and two on the 8th, one on the 18th, and two on the 27th of October, 1884, three by Mr. E. White and two by Mr. S. Herring.

72. *Pisobia bairdii*, Baird's Sandpiper. A very rare accidental visitor, the only record being one taken by Mr. G. White, September 11th, 1894.

73. *Pisobia minutilla*, Least Sandpiper. A moderately common migrant. I took one in Hull, September 6th, 1905.

74. *Pelidna alpina sakhalina*, Red-backed Sandpiper. A rare migrant. On October 28th, 1908, Mr. E. Bedard shot three immature ones.

75. *Ereunetes pusillus*, Semipalmated Sandpiper. A moderately common fall visitor. As early as August they are seen in company with the Sanderling and Semipalmated Plover, nimbly scurrying over the sand at the water's edge along the beaches of Kettle Island and similar localities. On August 24th, 1906, Mr. G. R. White saw some at Kettle Island, and on August 12th (1904), specimens were seen by the writer.

76. *Calidris leucophaea*, Sanderling. A moderately common migrant. On October 1st, 1908, Mr. E. Bedard shot two. Its habits are like those of the preceding species.

77. *Limosa fedoa*, Marbled Godwit. A rare accidental visitor. The only record is that made by Mr. G. R. White, who took one of these birds on June 4th, 1902.

78. *Limosa hæmastica*, Hudsonian Godwit. Like the preceding. The only record is October 20th, 1900 (G. R. White).

79. *Totanus melanoleucus*, Greater Yellow-legs. A common migrant. Extreme dates, April 27th (1897), and October 29th (1908).

80. *Totanus flavipes*, Yellow-legs. A moderately common migrant; it arrives and departs at about the same time as *melanoleucus*.

81. *Helodromas solitarius*, Solitary Sandpiper. A common migrant and rare breeder. Mr. E. White has found young, recently out of the nest, along the Ottawa. Extreme dates, May 11th and October 10th.

82. *Tryngites subruficollis*, Buff-breasted Sandpiper. Rare accidental visitor. One was shot near Templeton by Mr. E. White on August 24th, 1886.

83. *Actitis macularius*, Spotted Sandpiper. An abundant summer resident. Seems to be increasing in numbers. Extreme dates are April 24th (1893) and October 30th (1908). The bulk arrives during the first half of May. In the first week of June, their nests, with usually four eggs, may be found, often in gardens or fields far away from water.

CHARADRIIDÆ—PLOVERS.

84. *Squatarola squatarola*, Black-bellied Plover. A moderately common fall migrant, apparently becoming rarer. On October 19th, 1905, Mr. E. White shot one at Lochaber Bay.

85. *Charadrius dominicus*, Golden Plover. Status same as last species. Quite a few are offered for sale in the market each fall, nearly all birds of the year. Dates: September 3rd (1906) to November 4th (1908).

86. *Oxyechus vociferus*, Killdeer. A common migrant and moderately common breeder. In the meadows near Holland Avenue and in those between the city and Blackburn on the



Canadian Pacific Railway, several pairs may usually be seen all summer. It is one of the first arrivals in spring, which announces its presence in no uncertain way, by its shrill call, *killdee, killdee*. Dates: March 27th (1907) to October 15th (1909).

87. *Ægialitis semipalmata*, Semipalmated Plover. This diminutive plover is found in the groups of other small shore-birds on the same beaches along our rivers and lakes, from August to September, the 29th of the latter month being the latest date at hand. It thus may be classed as a moderately common fall migrant.

APHRIZIDÆ—TURNSTONES.

88. *Arenaria interpres*, Turnstone. In the list of 1891 this is called a rare migrant. I have not met with it.

ORDER GALLINÆ—GALLINACEOUS BIRDS.

TETRAONIDÆ—GROUSE, PARTRIDGES, ETC.

89. *Canachites canadensis canace*, Canada Grouse, Spruce Partridge. Formerly a common if not abundant permanent resident, but now a rare one. The Mer Bleue, a large bog a few miles east of the city, was formerly a favorite haunt. It probably is still found in some of the densest and most impassable spruce thickets in the district. In the winter of 1908-1909 Mr. E. Bedard saw one in a thicket at the river's edge on the Rifle Range, and Mr. C. H. Young once told me of several he had seen in a woods near Billings' Bridge.

90. *Bonasa umbellus togata*, Canadian Ruffed Grouse. A common permanent resident. Frequently still found in the small pieces of woodland near the city limits. It should be protected more, otherwise its days will soon be numbered.

[*Lagopus lagopus*, Willow Ptarmigan. It is very doubtful whether this northern species should have a place in our list. The reference to it in the 1891 list: "One shot on the Gatineau in the winter of 1885-6," refers to the shooting of several at Gracefield, which is far beyond the accepted limits of our district. However, having come down so far, they may be expected to turn up any winter within our territory.]

ORDER COLUMBÆ—PIGEONS.

91. *Ectopistes migratorius*, Passenger Pigeon. Formerly a common summer resident, but now evidently extinct here. The last positive dates of its occurrence in the district are the following: on June 6th, 1884, an adult male was shot in Cumming's woods; on May 10th and on August 25th, a male was seen in Col. W. White's garden, and on June 25th of the same year a female and one young were shot near McKay's Lake:

on April 15th twelve, and on May 24th, 1886, one was seen at the same lake; and, finally, in 1887, one was seen on August 23rd in the above-mentioned garden, and on September 3rd one on Kettle Island (Messrs. G. R. and E. G. White).

92. *Zenaidura macroura carolinensis*, Mourning Dove. This desirable, more southerly species can now be added to our list. Specimens were seen near Shirley's Bay on August 20th, 1903. Several were also seen in the summer of 1908. On August 9th, 1910, a young one in the first plumage was shot near Dow's Swamp, thus clearly establishing its breeding here.

ORDER RAPTORES—BIRDS OF PREY.

BUTEONIDÆ—FALCONS, HAWKS, EAGLES, ETC.

93. *Circus hudsonius*, Marsh Hawk. A common summer resident. Can be seen harrying back and forth over extensive meadows having here and there a marshy place. The bulk of the species arrive in early April and depart in October, but extreme dates are, March 25th (1907), and November 7th (1905), when Mr. N. Lachance shot one on Shirley's Bay.

94. *Accipiter velox*, Sharp-shinned Hawk. This little terror to small birds is a common summer resident and less common permanent resident, *i.e.*, a few remain here over winter and then work havoc among the English Sparrows in the city. Favorite nesting sites are the small black spruce trees in the Mer Bleue, where on June 30th, 1909, we found a nest with four nearly fresh eggs. On July 11th, 1904, I found several families of young in the spruce stand near Blackburn Station.

95. *Accipiter cooperi*, Cooper's Hawk. A rare summer resident, and fortunately so, because it is a very destructive species. It arrives in April (17th, 1904), and is still seen in September.

96. *Astur atricapillus*, Goshawk; Blue Hen-hawk. The three accipitrine hawks are the only really harmful ones to farmers and poultrymen. The Goshawk is the largest and fiercest of them, but again, fortunately, it is only a winter resident with us, though a few undoubtedly breed in the big woods in the northern part of the district. A great part of their number migrate, following the ducks, etc., south in October, and return with them in April. In these two months, therefore, they are mostly seen here. Dates at hand range from October 18th (1906) to May 13th (1908). For an account of a migration of this species see OTTAWA NATURALIST, vol. XX., p. 217; and of their ferocity, vol. XXI., p. 96.

97. *Buteo borealis*, Red-tailed Hawk. This large, slowly sailing buzzard is a moderately common summer resident. A pair of either this or the next species may be seen sailing over

most of the larger woods in the district. Dates range from April 11th (1908) to November 1st (1908).

98. *Buteo lineatus*, Red-shouldered Hawk. Of about the same degree of frequency as the Red-tailed. Dates: from March 28th (1909) to November 6th (1907).

99. *Buteo platypterus*, Broad-winged Hawk. A moderately common summer resident. This useful hawk is smaller than the two last named and rather unsuspecting. On June 1st, 1907, while on an excursion of the Club to Chelsea, a section of the party found a dead one in the woods there. On May 8th, 1909, one was taken at the Rifle Range, and on October 16th, 1908, a bird of the year. This is the latest date for the year on record, the first being April 23rd (1908).

100. *Archibuteo lagopus sancti-johannis*, Rough-legged Hawk. This large, useful buzzard is a rare migrant. Dates are: March 16th, 1898, and November 1st, 1908. Probably commoner in migration than supposed.

101. *Aquila chrysaetos*, Golden Eagle. This majestic bird is a rare accidental visitor. It breeds sparingly in the Laurentian Hills north of us, and may do so near the northern limits of our district. A young one, but fully grown, was caught in a trap at High Falls, Quebec, on November 22nd, 1904, and given to the writer. The local taxidermist now and then gets a specimen, shot not far up the Gatineau, and Mr. E. Bedard reports one flying about, over the Rifle Range, for several days in January, 1910.

102. *Haliaeetus leucocephalus*, Bald Eagle. A rare accidental visitor and possibly a rare breeder. There was a nest formerly at Lake Wilson, near Wakefield. One was shot October 28th, 1892.

FALCONIDÆ—FALCONS, ETC.

103. *Falco rusticolus gyrfalco*, Gyrfalcon. Rare accidental visitor. One was shot by Mr. E. White on the bank of the Rideau below Cumming's Bridge, on December 23rd, 1890.

104. *Falco peregrinus anatum*, Duck Hawk. A rare migrant. One was seen April 28th, 1889, by Mr. G. R. White; another at King's Mountain, July 11th, 1890, by Messrs. W. E. and F. A. Saunders. The latter also shot but not secured, another on September 22nd, 1890.

105. *Falco columbarius*, Pigeon Hawk. A rare migrant. On April 9th, 1905, Mr. E. White saw one and on October 5th, 1904, secured another. On May 5th and 11th, 1905, one was seen about Col. White's garden, being attracted there by the presence of some pigeons.

106. *Falco sparverius*, Sparrow Hawk. A moderately com-

mon summer resident. It arrives in April, but usually diminishes in numbers before the fall migration, when it again becomes more numerous. Extreme dates: March 30th (1907) and September 21st (1904). A winter record is January 26th, 1890.

PANDIONIDÆ—OSPREYS.

107. *Pandion haliactus carolinensis*, Osprey. A moderately common migrant and rare breeder. Its bulky nest may be seen on a few of the lakes in the Gatineau district, where campers may also see it perform its fishing tactics. Dates: April 11th (1908), to September 21st (1904): On May 3rd, 1908, Mr. E. Bedard saw a regular flight of them on the Ottawa, no less than eleven being in sight at one time.

STRIGIDÆ—HORNED OWLS, ETC.

108. *Asio wilsonianus*, Long-eared Owl. A rare resident or migrant. The latest dates of its capture are as follows: November 1st, 1901; October 28th, 1904; October 24th 1905; November 4th, 1905. Two of these are in my collection.

109. *Asio flammeus*, Short-eared Owl. Also of uncertain status. Dates of capture are: November 16th, 1894, on which date Mr. G. R. White shot several in a swampy wood, and again on the 6th of November, 1895; on October 20th, 1904, one was taken by Mr. E. White, and on December 2nd, 1905, one by Mr. E. Bedard.

110. *Strix varia*, Barred Owl. A rare resident, more common in the Gatineau district. For an account of a fight between one of this species and a Goshawk see THE OTTAWA NATURALIST, vol. XXIV., p. 97. A female in my collection was taken on November 24th, 1905.

111. *Scotiaptex nebulosa*, Great Gray Owl. This large northern species is an irregular accidental visitor here, becoming rather common at times. In November, 1905, one was taken by a farmer at South March; on February 1st, 1906, one near East Templeton, now in my collection; on January 10th, 1907, Mr. Henry got two to mount, which had been taken near the city a day or two previously; on March 19th, 1908, Mr. E. Bedard shot one on the Rifle Range.

112. *Cryptoglaux funerea richardsoni*, Richardson's Owl. A rare accidental winter visitor from the far north. Late dates are: December 15th, 1903; November 16th, 1906, and in February, 1907, Mr. E. Bedard shot one, which is now in the writer's collection, on the Rifle Range.

113. *Cryptoglaux acadica*, Saw-whet Owl. This diminutive species is a moderately common resident. It lives in thickets composed of spruce, cedar and alder, also in cemeteries and

similar places. On April 11th, 1901, a female was found dead in a yard in New Edinburgh, having a fully developed egg in the ovary. Other dates: October 16th, 1906; January 20th, 1907.

114. *Otus asio*, Screech Owl. This useful little owl has of late years put in an appearance here, and is now a moderately common resident, apparently becoming more numerous. Both the gray and brown forms are seen, the former predominating. On December 8th, 1908, a brown one flew into the kitchen of Dr. Saunders' residence on the Experimental Farm. They are more in evidence in winter than in summer, as they then seem to move into the city to live on the English Sparrow.

115. *Bubo virginianus*, Great Horned Owl. A moderately common resident of the large woods of the district. At High Falls I once saw two in one tree. For an account of one from Inlet, Quebec, which must have had an encounter with a porcupine, see the Auk, vol. XXVI., p. 58.

116. *Nyctea nyctea*, Snowy Owl. This large northern owl is usually a rare accidental winter visitor, but occasionally a big flight comes through, as several years ago, when the local taxidermist received about three hundred. Also, in November, 1906, and December, 1907 and 1908 he got several from the Gatineau valley, one being from Farrelton.

117. *Surnia ulula caparoch*, Hawk Owl. Another rare accidental winter visitor from the far north. Dates are: October 9th, 1906, one shot in Beechwood; November, 1906, one taken in Graham's bush, Ottawa East; January 20th, 1907; April 5th, and May 8th, 1908, on which dates Mr. E. Bedard shot several at the Rifle Range. Perhaps they are commoner and stay longer than usually supposed.

ORDER COCCYGES—CUCKOOS.

CUCULIDÆ—CUCKOOS, ANIS, ETC.

118. *Coccyzus americanus*, Yellow-billed Cuckoo. A rare summer resident, arriving late in May. It may be found in bushy woods, vine-covered trees, etc., as at Blueberry Point and along the Base-line road, east of the Catholic cemetery on the Montreal road.

119. *Coccyzus erythrophthalmus*, Black-billed Cuckoo. A moderately common summer resident, locally even common; in 1909 it was more numerous than ever before. It is found in similar localities as the Yellow-billed, also in orchards. On September 7th, 1908, a dead one was found in Beechwood; most of these birds are gone, however, long before that time.

ALCEDINIDÆ—KINGFISHERS.

120. *Ceryle alcyon*, Belted Kingfisher. A common summer

resident. Dates extend from the 8th of April to the 23rd of October. One or two pairs usually nest in the gravel pit at Britannia. This bird, being a decided ornament to our rivers, creeks and lakes, should be protected and not made the target of prowling boys and men.

ORDER PICI—WOODPECKERS.

PICIDÆ—WOODPECKERS.

121. *Dryobates villosus leucomelas*, Northern Hairy Woodpecker. A rather rare resident, apparently becoming rarer, although it is difficult to assign a reason for this.

122. *Dryobates pubescens medianus*, Northern Downy Woodpecker. A common resident; on some days during migration in April or May it is even abundant. They are also frequently seen in the streets of the city. Dates of greatest abundance, April 8th and May 8th, 1905, at Beechwood and Britannia.

123. *Picoides arcticus*, Arctic Three-toed Woodpecker. Rare resident, more in evidence in the Laurentian Hills north of us than in other parts of the district. On June 14th, 1905, I observed one at Inlet, Quebec, calling and making much ado. Specimens were taken at Ottawa on October 12th, 1907 (Kettle Island); February 13th, 1908; October 28th, 1908; April 3rd, 1909; the last three at the Rifle Range.

124. *Picoides americanus*, American Three-toed Woodpecker. An even rarer resident than the foregoing. Seen 28th and 29th September and 12th and 13th October, 1890 (F. A. Saunders).

125. *Sphyrapicus varius*, Yellow-bellied Sapsucker. A moderately common summer resident and abundant migrant. The earliest arrivals come April 6th, but they reach their greatest abundance about the 26th of that month. Nests with nearly full grown young, in stumps and trees from three to forty feet up, were found June 24th and July 1st. Some remain till end of September.

126. *Phlœotomus pileatus abieticola*, Pileated Woodpecker. A resident which is rare and becoming rarer in most parts of the district, but moderately common in the northern portion of it. At High Falls, its loud, wild call and its striking form of black and white may often be heard and seen. It has even been seen on Parliament Hill. It is the largest of our woodpeckers.

127. *Melanerpes erythrocephalus*, Red-headed Woodpecker. This formerly common bird must now be called a rare summer resident, as one sees only about two to five in a season. The reason for this, undoubtedly, is the fact that there are fewer dead trees left standing than formerly. It arrives in May and remains till well into September.

128. *Colaptes auratus luteus*, Northern Flicker. This large, handsome woodpecker is a common or even abundant summer resident, apparently increasing in numbers. The earliest date of arrival is March 26th (1907), but the bulk arrive from the 5th to 21st of April. Those which breed locally leave by about September 9th, but migrants from farther north continue to pass through till September 30th. A pair had their nest in a hole in a trolley pole at one of the entrances to the Rifle Range, from which a total of 60 eggs were gradually taken, but nothing daunted, they finally brought out their brood of young.

ORDER MACROCHIRÆ—GOATSUCKERS, SWIFTS, ETC.

CAPRIMULGIDÆ—GOATSUCKERS.

129. *Antrostomus vociferus*, Whip-poor-will. A moderately common summer resident. It arrives in the first part of May, April 29th, 1908, being an exceptionally early date; the last are usually heard September 16th, but in 1909 one tarried until October 16th (G. R. White).

130. *Chordeiles virginianus*, Nighthawk. An abundant summer resident. It breeds on many of the flat roofs in the city and therefore may be seen any day performing its wonderful aerial evolutions overhead. It is also remarkable for the regularity of its coming and going, it arriving usually May 16th (some years May 11th), and departing about August 23rd, when large numbers are seen over or near the city. For an account of its nesting on a residence in the city see THE OTTAWA NATURALIST, vol. XIX., p. 56.

MICROPODIDÆ—SWIFTS.

131. *Chætura pelagica*, Chimney Swift. An exceedingly abundant summer resident. Flocks of hundreds may be seen nearly every evening in summer whirling over and into the large ventilator shafts and chimneys of the Parliament, and departmental, buildings, and of some of the public schools. The date of their arrival varies with the meteorological conditions of the seasons, the earliest date being April 22nd (1897), and the latest May 10th; they leave at the end of August and beginning of September (10th last date). In 1883 a live Swift was captured during the first week of February in the house of the late Dr. Whiteaves.

TROCHILIDÆ—HUMMINGBIRDS.

132. *Archilochus colubris*, Ruby-throated Hummingbird. A common summer resident. They arrive during the middle of May, the 9th being the earliest date, and leave about the middle of September (9th to 14th). In 1909, however, owing to the unusually mild autumn one was seen as late as October 16th (G. R. White).

ORDER PASSERES—PERCHING BIRDS.

TYRANNIDÆ—FLYCATCHERS.

133. *Tyrannus tyrannus*, Kingbird. A common summer resident. It arrives early in May (4th to 16th), and the last of the breeding birds leave about August 28th (Mrs. Brown).

134. *Myiarchus crinitus*, Crested Flycatcher. A moderately common summer resident. Its coming and going coincides with that of the Kingbird. But, while the latter is a bird of the open field and meadow, perching on fences and wires, this is distinctly a woodland bird. At Blueberry Point, Chelsea, etc., one or two pairs may usually be met with. At the former place a nest with four eggs, in a Flicker's hole, was found June 12th, 1909.

135. *Sayornis phæbe*, Phœbe. A common summer resident. For an insectivorous bird it comes very early, too early for its own welfare, one would think. The first date is March 28th. A nest with four eggs was found May 14th. The latest date is October 9th.

136. *Nuttallornis borealis*, Olive-sided Flycatcher. This interesting northern flycatcher is a rare summer resident over most of the district, although rather common in its chosen haunts, e.g., the western end of Meach Lake. In places like this, swampy borders of lakes and streams, fringed or overgrown with spruces, it breeds, and there its call: *hoo! take care*, may be heard all day long. The swampy widening of the canal at the Experimental Farm also harbored a pair in 1909. During their migration, from May 17th, they may be seen in the spruces along the water-front, Hull, and around Cache Bay. They leave unostentatiously in August.

137. *Myiochanes virens*, Wood Pewee. A common summer resident. Like most of the flycatchers it arrives late, during the second half of May, the 12th being a very early date. It breeds where there are large trees in open woods or in city streets, where their monotonous *pee-a-wee* may be heard at all hours of the day and sometimes of the night. The local birds have gone by the 1st of September, the 22nd being the latest date for any migrants.

138. *Empidonax flaviventris*, Yellow-bellied Flycatcher. A rare summer resident, breeding sparingly in the Mer Bleue and the silent moist evergreen woods in the northern part of the district. Dates: May 10th to August 15th.

139. *Empidonax traillii alnorum*, Alder Flycatcher. A common summer resident. The name well indicates its habitat. It is common in the alder fringe around the Mer Bleue, in the Beaver Meadow and similar places. Dates: May 19th, August 15th.

140. *Empidonax minimus*, Least Flycatcher, Chebec. A

common summer resident. One never needs to be in doubt whether it has arrived in the spring or not, for its call, *chebec*, hurled out in a somewhat scratchy voice, heralds its presence plainly enough. This is in the latter half of May (11th to 17th), and may be heard in any of our city streets lined with large trees. It leaves in July and early August (10th), the remarkable fall of 1909 again being an exception, when one was seen as late as September 14th.

ALAUDIDÆ—LARKS.

141. *Otocoris alpestris*, Horned Lark. A rare migrant, although when it comes at all it will, locally and temporarily, be abundant. The writer has never met with this bird here, despite careful looking for it. In 1890 a flock remained from April 19th to May 25th, and again from September 26th to October 28th.

141. *Otocoris alpestris praticola*, Prairie Horned Lark. A common spring and summer resident and abundant migrant. This is our earliest arrival from the south, as early as February 10th. The bulk of the species come in the first part of March, but by the end of that month these flocks have again moved on or have scattered into breeding pairs. Nests with eggs may be found in old meadows, etc., as early as March 28th, and fully fledged young in May. It is thus the earliest breeder of our common perching birds. In summer they make themselves less apparent. The latest dates for fall migrants are: November 22nd, 1908; January 12th, 1909, when one was seen.

CORVIDÆ—CROWS, JAYS, ETC.

143. *Cyanocitta cristata*, Blue Jay. A moderately common resident, although most of them move southward for the winter. Their number, for a certain locality, changes from season to season. Mrs. R. D. Brown noticed them fifteen times in January, 1908, but only four times from November 1st, 1908 to March 21st, 1909. In April it is locally abundant.

144. *Perisoreus canadensis*, Canada Jay; Meat Bird. This inhabitant of the northern woods makes the Ottawa River the southern boundary of its range, rarely, even in winter, going far south of it. It is a moderately common resident in the northern parts of the district. At the farm houses along the Gatineau and Lievre it is a daily visitor in winter, especially at butchering time. It nests even earlier than the Prairie Horned Lark, namely in February and March, when the thermometer is often far below zero. For an account of its fearlessness or rather greediness for food, see THE OTTAWA NATURALIST, vol. XXII., p. 65.

(To be continued.)



THE OTTAWA FIELD-NATURALISTS' CLUB.
LECTURE PROGRAMME

1910

December 6th—In the Normal School.

"Some Recent Developments in Canadian Fisheries."
(with lantern slide illustrations)

By Prof. E. E. Prince, Dominion Commissioner of Fisheries.

1911

January 10th—In the Normal School.

"Conservation, or the Protection of Nature."
(with lantern slide illustrations)

By Dr. C. Gordon Hewitt, Dominion Entomologist.

January 24th—In the Hall of the Carnegie Library.

"Local Geology—The Rocks and Their Fossils."
By Dr. Percy E. Raymond, of the Geological Survey.

February 7th—In the Normal School.

"The Natural History of a Hen's Egg."
(with lantern slide illustrations)

By Prof. F. C. Elford, of Macdonald College, Que.

February 21st—In the Normal School.

"Edible, Poisonous and other Fungi."
(with lantern slide illustrations)

By Mr. H. T. Gussow, Dominion Botanist.

March 7th—In the Normal School.

"Bird Study, from a Beginner's Standpoint."
(with lantern slide illustrations)

By Mr. W. E. Saunders, of London, Ont.

March 21st—In the Hall of the Carnegie Library.

ANNUAL MEETING.

President's Address—Mr. Andrew Halkett. Election of Officers, etc.

All Lectures are free and open to the Public. Each meeting will begin
at 8 o'clock sharp.



THE OTTAWA NATURALIST

VOL. XXIV. OTTAWA, FEBRUARY, 1911

No. 11

PRELIMINARY NOTES ON THE "CHAZY" FORMATION IN THE VICINITY OF OTTAWA.*

BY PERCY E. RAYMOND.

The strata which lie between the Beekmantown and the Black River in the Ottawa Valley have been referred to the the Chazy, principally on account of their stratigraphic position. Their character and distribution have been described in the "Geology of Canada," 1863, pp.123-130, and in more detail by Dr. Ells in reports accompanying the various maps covering the region.

The fauna of this formation is unlike the fauna of the typical Chazy of the Champlain Valley in New York and Vermont, and its extension in Canada, and the writer has recently begun some studies at various places between Ottawa and Montreal, with the hope of finding the reason for this change. The present paper is a preliminary one, prepared for the purpose of showing the lithological characters and the range of the principal fossils in the formation near Ottawa.

Since the first description of the formation two members have been defined. The lower portion consists of sandstone and shale, and the upper portion of limestone. The two members have been mapped separately by Dr. Ells, and their distribution in the vicinity of Ottawa is well shown on his map of the region. At the base of the formation are layers of coarse-grained conglomerates and sometimes arkose, lying on the fine-grained dolomites of the Beekmantown. The top of the formation does not appear to have been definitely defined, but it would seem from the maps and descriptions that all the limestone up to the black, lumpy, cephalopod-bearing beds of the Black River were included in the Chazy.

In the vicinity of Ottawa both the sandstone and limestone are fairly well exposed, but no one exposure presents a good

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section of the entire thickness. In order to get an idea of the whole formation, it is, therefore, necessary to measure the rocks exposed at each favorable outcrop, and correlate the various sections. Fortunately there are a few beds which may easily be recognized by their lithology and fossils. One of the most useful of these beds is a very black thin-bedded shale containing *Isochilina? clavigera*, a large and easily recognized ostracod. This bed is exposed opposite Mr. Sowter's house on Broad Street, Aylmer, beside the electric railway one mile west of Westboro, near the ruins of Skead's Mill, and was revealed in a trench on Buena Vista Road, at the corner of Minto Place, Rockcliffe, during excavations made this last summer. A second horizon is indicated by thin-bedded limestone containing *Onchometopus simplex*, and always followed by a layer full of a species of *Beatricea*. This horizon was found at Aylmer, Mechanicsville, and on a road leading to the river from a point just east of Robilliard's quarries on the Montreal Road. A few other easily recognized beds have been found useful in checking up the correlations made on the basis of the two just described.

SECTIONS.

The lower portion of the formation is best displayed at Rockcliffe, where the following section was measured, the beds being given in descending order:—

	Ft.	Ft.
4. Green shale with numerous <i>Lingula</i>	5	5
3. Heavy-bedded, light gray sandstone.....	10	15
2. Rather heavy-bedded light gray sandstone with some cross-bedding, and thin layers of coarse grains of sand. <i>Camarotæchia plena</i> and <i>Hebertella imperator</i> at the base.....	10	25
1. Shaly, thin-bedded, light colored sandstone with lenses of heavy-bedded sandstone. <i>Rusophycus grenillensis</i> and other burrows and trails are common.....	53	78

At this locality the base of the black layer with *Isochilina? clavigera* is about 31 feet above the top of this section. A large part of the intervening strata are concealed here, but are well exposed at the Hog's Back, where the following section was measured.

	Ft.	In.	Ft.	In.
7. Dark brown and black shale with ostracods.....	4		4	
6. Rather pure, dark gray limestone with ostracods and bryozoa.....	1		5	

5.	Gray shale, calcareous in places, with 6 in. pure coarse-grained limestone 4 ft. below the top.....	11	6	16	6
4.	Impure sandy limestone and shale.....	6		22	6
3.	Hard, greenish limestone with abundance of <i>Camarotæchia plena</i>		10	23	4
2.	Greenish limestone and shale, with <i>Camarotæchia plena</i> near the top.....	10		33	4
1.	Calcareous shale with thin layers of limestone and many thin sandy layers. <i>Glossina belli</i> common.....	20	6	53	10

Isochilina? clavigera was not found in No. 7, although other ostracods were plentiful, but this is undoubtedly the *clavigera* horizon. The hard greenish limestone with *Camarotæchia plena* outcrops again in a small cutting in Rockcliffe Park, just below the Buena Vista station on the Electric railway, and is especially well shown in the first bluff south of the town at Rockland, 30 miles east of Ottawa.

The strata immediately above the *clavigera* zone are not fully exposed in any one section, but portions are well shown both at Westboro and at Aylmer. The section at Westboro is as follows:—

	Ft.	In.	Ft.	In.
13. Rusty dolomite, "cement bed".....	2		2	
12. Heavy-bedded, light blue limestone, the upper bed full of large undetermined corals.....	10	9	12	9
11. Concealed.....	16		28	9
10. Heavy-bedded, dark gray limestone. One of the upper layers shows wavy bedding, and the highest layer is full of fossils; <i>Lophospira</i> , <i>Helicotoma</i> , etc....	5		33	9
9. Rusty dolomite, "cement bed".....	3		36	9
8. Black shale and very thin layers of dark gray limestone.....	2	6	39	3
7. Concealed.....	1	6	40	9
6. Blue-black, wavy bedded limestone, <i>Cor-nulites</i> and <i>Isochilina</i> abundant.....	6		46	9
5. Concealed.....	2	6	49	3
4. Cream-colored sandstone, full of black phosphatic fragments.....	3		52	3
3. Sandstone and brown shale, the sandstone full of badly preserved bryozoans....	3		55	3
2. Black shale with <i>Isochilina? clavigera</i> and other ostracods.....	2		57	3
1. Blocky, greenish limestone.....	1		58	3

The strata immediately overlying the *clavigera* zone were well exposed in the trenches at Rockcliffe, especially on Buena Vista Road in front of the residence of Mr. Elfric Drew Ingall of the Geological Survey, who made a large collection of the fossils. A large species of *Loxoceras*, and *Modiolopsis parviuscula* were common in the sandstones, and a few thin beds of limestone associated with them were full of *Leperditia canadensis nana*. A bryozoan, which Dr. Bassler has identified as a *Dekayella* similar to *D. simplex*, Ulrich, was abundant in the sandstone.

Within 20 feet above the *clavigera* zone at Aylmer there are a number of thin layers of limestone almost entirely made up of ostracods, and with the ostracods are found *Helicotoma white-aviana*, *Bathyrurus angelini*, and a *Crytodonta*.

The strata above those exposed at the station on the electric railway are well exposed at the Hogs Back:—

	Ft.	In.	Ft.	In.
8. Blue-gray limestone mostly rather heavy-bedded. Some layers very fossiliferous	10	6	10	6
7. Rather pure dark gray limestone with irregular wavy bedding.	5		15	6
6. Heavy-bedded, fine grained light gray to cream-colored sandstone with <i>Vannucmia</i> and other lamellibranchs.	4	6	20	
5. Dark gray shale, with two or three thin layers of limestone.	1	8	21	8
4. Heavy-bedded sandstone with many replaced bryozoa.	3	9	25	5
3. Shale and thin-bedded black limestone with ostracods.	4	9	30	2
2. Thin-bedded sandstone and shale.	5	9	35	11
1. Heavy-bedded, greenish limestone.	8	6	44	5

No. 1 of this section is believed to be the same as No. 12 of the section at Westboro.

The sandstone, No. 6 of this section, is a very important one, as from it Mr. W. R. Billings obtained the various species of lamellibranchs described by the late Dr. Whiteaves in vol. XXII, No. 6, of THE OTTAWA NATURALIST. This same layer, with the same fossils, was found on the road leading down to the river just beyond the Robillard quarries on Montreal Road, about $\frac{1}{3}$ miles east of Ottawa. The section there is as follows:—

	Ft.	In.	Ft.	In.
12. Massive, impure, dark gray lumpy limestone with <i>Columnaria halli</i> and <i>Ormoceras tenuiflum</i> near the base. Top not seen. Black River.	6		6	

11. Massive buff limestone, the whole surface covered with <i>Phytopsis tubulosum</i> and <i>Terradium cellulosum</i>	9	15		
10. Concealed. Loose fragments of limestone with surface covered with <i>Beatricea</i> were seen just above the top of No. 9. About.	6	21		
9. Shaly, buff limestone with <i>Onchometopus simplex</i> and numerous large ostracods.	3	10	24	10
8. Light buff limestone, thin-bedded at top and heavy-bedded at bottom.	7	6	32	4
7. Concealed, below quarry.	5		37	4
6. Rusty yellow dolomite, "cement beds."	5		42	4
5. Massive blue-black and dark gray limestone.	10	6	52	10
4. Hard, cream-colored sandstone with <i>Vanuxemia</i> and other lamellibranchs.	3		55	10
3. Mostly concealed, but with two layers of hard, dark blue limestone exposed.	5	2	61	
2. Thin-bedded shale.	2		63	
1. Impure, dark blue, heavy-bedded limestone with large ostracods, <i>Cyrtodonta</i> , and <i>Bathyurus angelini</i>	2	3	65	3

No. 4 of this section is believed to be the same as No. 6 of the section at the Hogs Back. No. 5 is the same as the cement beds which were formerly quarried at the Ottawa river at Mechanicsville, and at that locality there is a thick layer of dolomitic limestone 3 feet below the base of the cement beds, which yielded the types and a large number of other specimens of the *Bathyurus superbus* described by the writer in the November (1910) number of THE OTTAWA NATURALIST.

The layer with *Beatricea*, which is not well shown in this section, is an important one. It is especially well exposed near the top of the hill north of Aylmer, and it may also be seen about 15 feet below the base of the Black River at Mechanicsville. The section along the river at Mechanicsville is an excellent one for showing the upper and most fossiliferous part of the Lowville. It is as follows:—

Ft. In. Ft. In.

9. 6 feet of shaly and nodular blue-black limestone, resting on 8 feet of heavy-bedded, impure, dark gray limestone. <i>Strophomena incurvata</i> , <i>Maclurites logani</i> , <i>Columnaria halli</i> , <i>Goniceras anceps</i> , etc. Black River	14	14
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8. Pure, buff colored limestone full of <i>Tetradium cellulosum</i> and <i>T. columnare</i> . Top of Lowville.	3	17		
7. Pure, buff limestone with numerous molluscan fossils	2	10	19	10
6. One layer rather coarse grained limestone. Full of fragments of <i>Bathyurus spiniger</i> .		10	20	8
5. Thin-bedded blue and buff limestone; numerous specimens of <i>Bathyurus extans</i> in the upper part.	7	6	28	2
4. Blue-black limestone with <i>Tetradium cellulosum</i> and <i>Stromatocerium</i>	1		29	2
3. Light gray limestone with numerous limestone pebbles and mollusca.		4	29	6
2. Dark gray limestone, the surface covered with <i>Beatricea</i>		10	30	4
1. Dark gray limestone full of large flat limestone pebbles and many fossils. . .	1	9	32	1

THE FAUNA.

At a number of horizons fossils are quite abundant, but as they do not weather out readily they are not easily obtained in identifiable condition.

From the sandstone and shale of the lower part of the sections at Aylmer, Britannia, Deschenes and Rockcliffe, the following species are known:

<i>Hebertella imperator</i> ,	<i>Ctenodonta parvidens</i> ,
<i>Camarotæchia plena</i> ,	<i>Archinacella deformata</i> ,
<i>C. orientalis</i> ,	<i>Raphistoma striatum</i> ,
<i>Lingula lyelli</i> ,	<i>Lophospira billingsi</i> ,
<i>Glossina belli</i> ,	<i>Isotelus arenicola</i> .

At Aylmer, about 80 feet above the base of the section the following species were collected by Mr. T. W. E. Sowter:

<i>Lingula lyelli</i> ,	<i>Ctenodonta parvidens</i> .
<i>Camarotæchia plena</i> ,	<i>Modiolopsis sowteri</i> .

From the greenish limestone above the shale and sandstone at the Hogs Back and elsewhere we have only:—

<i>Glossina belli</i> ,	<i>Hebertella borealis</i> ,
<i>Camarotæchia plena</i> ,	<i>Isotelus</i> sp. ind.

In the *clavigera* zone or in the limestone and sandstone within 20 feet above it we find:—

<i>Modiolopsis parviuscula</i> ,	<i>Isochilina ottawa</i> ,
<i>Sowteria canadensis</i> ,	<i>Isochilina? clavigera</i> ,
<i>Helicotoma whitearsiana</i> ,	<i>I? clavigera clavigeracta</i> ,
<i>Loxoceras</i> sp. ind.,	<i>Primitia logani</i> ,
<i>Bathyurus angelini</i> ,	<i>Lepeditia canadensis</i> ,
<i>Lepeditella labellosa</i> ,	<i>I. amygdalina</i> .

Heavy-bedded limestones from 20 to 40 feet above the *Beyrichia* zone are very fossiliferous in places, but it is difficult to get good specimens. A *Cornulites* is very abundant in some of the layers. The species which have so far been recognized are:

<i>Zygospira recurvirostris</i> ,	<i>Lophospira bicincta</i> ,
<i>Raphistomina lapicida</i> ,	<i>Pterotheca</i> sp. ind.
<i>Lophospira perangulata</i> ,	

The next bed above this which has furnished any good fossils is the cream-colored sandstone which is exposed at the Hogs Back and near Montreal Road. Nearly all the species identified were described by Dr. Whiteaves.

<i>Lingula lyelli</i> ,	<i>Vanuxemia parvula</i> ,
<i>Clionychia ottawaensis</i> ,*	<i>Sowteria canadensis</i> ,
<i>C.?</i> <i>gibbosa</i> ,	<i>Holopea</i> sp. ind.,
<i>Modiolopsis fabaformis</i> ,	<i>Spyroceras</i> sp. ind.,
<i>Orthodesma antiquatum</i> ,	<i>Isophilina?</i> <i>armata</i> .†

In a dark gray dolomitic limestone within 10 feet above this layer, the following species have been found:—

<i>Tetradium columnare</i> ,	<i>Bathyurus superbus</i> .
<i>Dalmanella</i> sp. ind.,	

About 15–20 feet above this layer are beds of shaly limestone in which the following species are rather common:—

<i>Dalmanella circularis</i> ,	<i>Bathyurus extans</i> .
<i>Strophomena incurvata</i> ,	<i>Onchometopus simplex</i> ,
<i>Cyrtodonta huronensis</i> ,	<i>Isotelus</i> sp. ind.

Just above the preceding are thin layers in which a species of *Beatricea* and *Cyrtodonta huronensis* are abundant. In the upper 15 feet of the section fossils are rather abundant, but there does not seem to be a very great variety. The following are the more common ones:—

<i>Tetradium cellulolum</i> ,	<i>Bathyurus extans</i> ,
<i>T. columnare</i> ,	<i>B. spiniger</i> ,
<i>Strophomena incurvata</i> ,	<i>Bumastus milleri</i> ,
<i>Helicotoma planulata</i> ,	<i>Isotelus gigas</i> .
<i>Spyroceras</i> sp.,	

These lists, incomplete as they are, show at once that all the fossils which belong to the typical Chazy are beneath the *clavigera* horizon, and the deposits of Chazy age end with the limestone which at the Hogs Back and Rock-

*Dr. Ulrich writes me that this is probably an *Ambonychia*, and *C.?* *gibbosa* a *Vanuxemia*, while *Vanuxemia parvula* is a *Ctenodonta*. The types are not accessible at this writing.

†Identified by Dr. Ulrich.

land is so full of *Camarotæchia plena*. There is nothing in the typical Chazy which corresponds to the ostracod layers such as the *clavigera* zone and the limestone in the 20 feet above it. Excepting the ostracods, nearly all the fossils from this horizon upward are species found also in the Black River and Trenton. The fauna found in the upper 15 feet is evidently Lowville. *Tetradium cellulosum* and *Bathyurus extans* being the guide fossils. Many of the fossils found below this layer are known in the Lowville but the absence or rarity of *Tetradium cellulosum* gives the fauna a slightly different aspect. It may be significant that this *Tetradium* first becomes common in beds above the "pebble beds" (No. 1. in the section at Mechanicsville.) The pebbles in these beds are from 1 to 3 inches in diameter and have well rounded edges. They are somewhat greenish in color, and remind one of some of the green limestone layers in the upper part of the Chazy at the Hogs Back. They are in a rather pure limestone matrix which is very fossiliferous, *Cyrtolonta huronensis* being abundant, and cephalopods common. Though it cannot be called a conglomerate, this bed indicates some sort of a physical change, and, coupled with the slight change in fauna, may prove to be of some importance.

While the pebble bed may be the base of the Lowville, it seems more probable that the line should be drawn 35 feet lower down, at the base of the sandstone containing *Clionychia* and *Vanuxemia* (No. 6 of the second section at the Hogs Back and No. 4 of the section on the road beyond Robillard's quarries.)

At the Hogs Back there are two of these thick beds of sandstone, which, coming as they do in the midst of a series of limestones, indicate a pronounced change in the conditions governing sedimentation. The change in the fauna at this point, though not striking, can be seen. The principal difference noted is in the ostracods, which, below this sandstone are often so abundant as to make up the entire mass of certain layers, and, moreover, these ostracods are usually smaller than those found above. Certain species, such as *Isochilina? clavigera* and *Bathyurus angelini*, are not found above this sandstone.

These rocks which lie above the highest bed containing *Camarotæchia plena* and below the sandstone with *Vanuxemia* and *Clionychia* are similar, lithologically, to a formation which occurs in northwestern New York. This formation was described by Dr. H. P. Cushing,* who gave it the name Pamela. The formation, in New York, is from 60 to 150 feet thick, and consists of 10 to 20 feet of shale and sandstone at the base.

*Bull. Geol. Soc. Am. Vol. 19, p. 55, 1908

followed by beds of blue-black limestone, dove limestone, and gray magnesian limestone. The upper portion of the formation is said to lack the black limestone and to consist of alternations of dove limestone and gray magnesian limestone, light gray to white thin-bedded, impure limestone, and yellow water-lime. It will be noted that this succession is very similar to that shown in the sections presented above. The fauna has not yet been described, but it is said to contain numerous small ostracods, an undescribed *Bathyurus*, gastropods, cephalopods, and several species of *Tetradium*.

SUMMARY.

The sections in the vicinity of Ottawa show about 250 feet of strata between the Beekmantown and the base of the Black River. These strata are characterized by two groups of species. The lower 125 to 135 feet contain a small fauna, some of whose species are found in the upper part of the Chazy formation of the Champlain Valley, and this portion is undoubtedly to be correlated with the Upper Chazy, or at least with the Upper Chazy as exhibited north and west of Montreal. The writer some years ago suggested the name Aylmer* formation for the Chazy of the Ottawa Valley, and it will probably be well to restrict this term to the beds characterized by the Chazy fossils, and use it as the local designation of these lower beds.

The upper portion of the section consists of 115 to 125 feet of limestone, sandstone and shale, with fossils more nearly akin to those found in the Black River and lacking the typical Chazy species. The fauna of these beds is very imperfectly known, and, owing to the poor state of preservation of the specimens at most localities, its elucidation will require a considerable amount of field work and study. This portion of the section, while united by several species which range throughout the whole thickness, is capable of subdivision into two members, the lower of which contains most of the shale and sandstone, and the upper the pure limestone. The lower portion contains an immense number of small ostracods, and, in the middle, great numbers of gastropods and other fossils. This member is from 65 to 75 feet in thickness.

The upper member is composed mostly of pure limestone, has a larger fauna than either of the other formations, the upper 15 feet being especially fossiliferous. This is the Lowville of the New York section and the thickness is about 50 feet.

*Annals Carnegie Museum, Vol. III, p. 380, 1905.

THE BIRDS OF OTTAWA.

BY C. W. G. EIFRIG.

(Continued from page 187).

145. *Corvus corax principalis*, Northern Raven. A rare resident, becoming common in the northern parts of the district. On the larger lakes there, e.g., Hawk and Green Lakes in Labelle County, Quebec, small bands are seen every winter and a few usually succumb to the poisoned bait or to the traps put out. In the immediate vicinity of Ottawa it is a rare winter visitor.

146. *Corvus brachyrhynchos*, Crow. An abundant summer resident and rare permanent resident. A few remain about the slaughter houses on the outskirts of the city. About March 15th the large flocks of migrant crows pour in from the south, returning again about November 4th.

ICTERIDÆ—BLACKBIRDS, ORIOLES, ETC.

147. *Dolichonyx oryzivorus*, Bobolink. This charming cornetist of the meadows is a common summer resident with us, rarer in the more wooded portions of the district. It arrives from the 5th to the 12th of May and returns at the end of July and August, the 21st of the latter month being the latest date.

148. *Molothrus ater*, Cowbird. This, our only real parasite among birds, is a far too common summer resident with us. Extreme dates for arrival and departure are: March 21st and October 17th. In 1901, one was seen even in December. On June 16th, 1909, I found a Red-eyed Vireo incubating two of its own eggs together with three of the Cowbird; and on June 30th, another instance of the same kind, only, that one Cowbird egg had already hatched out. Both nests were on the Experimental Farm. The young of the smaller species almost invariably have to perish.

149. *Agelaius phoeniceus*, Red-winged Blackbird. An abundant summer resident. Found in large and small cat-tail swamps. They first arrive March 21st; the local breeding birds move away about August 7th. A little after that the migrants of this species from farther north begin to arrive and once more enliven the temporarily deserted swamps. On October 19th, 1908, about 1,000 were in the marshes near Rockland, some of which remained till November 1st.

150. *Sturnella magna*, Meadowlark. A common summer resident, which seems to be increasing in numbers. The first-comers arrive March 21st; by May 11th a nest with five eggs was found. Our local breeding birds move away about August 8th, but the species becomes common once more in autumn.

Then, most move south in the second half of October, but some are seen in November, and even in December, as on the 27th in 1907, 1st in 1908, and one on January 10th, 1909.

151. *Icterus galbula*, Baltimore Oriole. A common migrant in spring, but rather rare as a breeder, at best only locally moderately common. They first arrive May 6th, increasing in numbers till the 15th, when they decrease again. They disappear unostentatiously in August, and often before. In 1886, one was seen as late as September 16th.

152. *Euphagus carolinus*, Rusty Blackbird. An abundant migrant, whose breeding range, however, begins with the northern limits of our district. On July 12th, 1905, the writer found, on the banks of a pond near Inlet, Que. (32 miles in a straight line from Ottawa), a pair with four recently fledged young. While small bands of this Grackle arrive in April (1st, 10th, 12th, 13th, 18th), the larger flocks come only in May. Their return journey southward brings them through here from September 25th to October 7th.

153. *Quiscalus quiscula æneus*, Bronzed Grackle; Blackbird. An abundant summer resident. They first arrive March 23rd, although in 1906 some were seen as early as March 2nd. Many take up quarters in gardens in the city, where there are large spruce trees, much to the detriment of other nearby nesting birds, the eggs and young of which they like to rob. Their own young are able to fly by May 31st. The last sombre flocks leave about November 1st.

FRINGILLIDÆ—FINCHES, SPARROWS, ETC.

154. *Hesperiphona vespertina*, Evening Grosbeak. A rare, accidental winter visitor; may, however, become temporarily abundant. On March 12th, 1901, two were shot in Rideau Hall grounds. But, they emphatically established their claim to a place on our list by the long stay a flock made in and near the city from February 7th to May 15th, 1909, about which see THE OTTAWA NATURALIST, vol. XXII., p. 263.

155. *Pinicola enucleator leucura*, Pine Grosbeak. An irregularly abundant winter resident, that is, may be abundant one winter and nearly absent the next; may come early one season, late another. Extreme dates of stay: October 30th to April 21st. Lives on rowan and sumach berries, old apples, buds of maple, tamarack, etc. (See THE OTTAWA NATURALIST, vol. XXII, p. 263.)

156. *Carpodacus purpureus*, Purple Finch. An abundant migrant and wanderer, and common breeder. This species also shares the spirit of irregularity that characterizes a number of the truly Canadian birds. It usually arrives from the 1st of March

on, but has been seen as early as February 11th; and leaves up to October 2nd, but has been seen as late as December 29th (1885). Breeds at Blueberry Point, Beaver Meadow, Experimental Farm, and in gardens in the city containing a number of the larger trees.

157. *Loxia curvirostra minor*, Crossbill. Another highly irregular, rare, or abundant migrant or winter resident, and probably a breeder in the northern part of the district. Dates: April 21st, 1883; May 9th, 1907; May 10th, 1882; May 16th, 1905; May 24th, 1905; June 19th, 1889; July 3rd, 1890; August 4th, 1887; October 28th, 1908; November 15th, 1908; November 23rd, 1904.

158. *Loxia leucoptera*, White-winged Crossbill. Status like that of the American Crossbill, if anything somewhat rarer and more roving. In October and November, 1908, large and small bands were roaming about in the vicinity of Ottawa. On February 8th, 1909, Mr. Groh made a Northern Shrike give up its prey, which proved a bird of this species, and a large flock was seen in June, 1882, in Beechwood Cemetery.

159. *Acanthis hornemanni exilipes*, Hoary Redpoll. A rare accidental winter visitor. On January 24th, 1908, three were seen in a flock of common Redpolls (E. White), and Mr. W. L. Scott took several in the spring of 1883.

160. *Acanthis linaria*, Redpoll. An irregularly abundant winter resident and migrant. Some probably breed in the northern part of the district. In 1908 they were present continually from February 14th to May 13th, and in 1909 from January 24th to May 10th. In fall, they arrive about November 1st (earliest October 26th) and are then more or less abundant during the winter months. Summer dates, pointing to their probable breeding, are May 22nd, 1890, June 3rd, 1888, and June 6th, 1882.

161. *Astragalinus tristis*, Goldfinch. Abundant summer resident and occasionally permanent resident, as large flocks wintered here in 1888-89, and a few may be seen nearly every winter. The coming of the migrant individuals is as irregular as that of its congeners; they follow no set rule. They come in March, or April, or May, and leave again, in the same desultory manner, in September, or October, or November.

162. *Spinus pinus*, Pine Siskin. A common winter resident and rare breeder. It has been found here every month from October (14th) to June (7th), and its nest has been found by Mr. Garneau.

163. *Passer domesticus*, English Sparrow. This introduced species has become here, as elsewhere, an unmitigated nuisance.

While being a permanent resident, numbers of the local birds move somewhat farther south in fall. On some of the first mild days in spring I have noticed certain individuals of this species producing a rather pleasing song. A case of erythrism in this species is reported in THE OTTAWA NATURALIST, vol. XXII, p. 64.

164. *Plectrophenax nivalis*, Snow Bunting. An irregularly common and abundant migrant and winter resident. They arrive end of October (earliest 19th) and in November, and disappear in March (latest April 18th).

165. *Calcarius lapponicus*, Lapland Longspur. A migrant of uncertain status, probably far less rare than supposed, as they are difficult to see and flush, when on the ground, and often wild and high up when on wing. First recorded here in 1890, when some stayed in the company of Horned Larks (*O. alpestris*) till May 25th, and again from October 3rd to November 18th (W. E. and F. A. Saunders).

166. *Poæcetes gramineus*, Vesper Sparrow. A common summer resident. Preeminently a bird of the plowed fields and of the roadside, hence its popular name "Groundbird." The first ones arrive about April 6th, and the last depart about October 16th.

167. *Passerculus sandwichensis savanna*, Savannah Sparrow. A common summer resident and inhabitant of moist meadows. Its high-pitched trill may be heard within the city limits, as near the Isolation Hospital. Dates: 31st of March to 29th of September.

168. *Ammodramus savannarum australis*, Grasshopper Sparrow. This more southerly form seems to be among those that are trying to extend their range northward. It has been recorded three times from our district: one seen at Hull by Mr. F. A. Saunders, June 24th, 1898, and again by him in the rear of the Experimental Farm on the 26th, 27th, and 28th of the same month. Then it was not reported again until 1909, when Mr. C. N. Robertson and the writer found it on June 30th in the northwest corner of the Experimental Farm.

169. *Passerherbulus caudacutus*, Sharp-tailed Sparrow. One was shot here in 1882 and subsequently identified by Dr. Coues.

170. *Zonotrichia leucophrys*, White-crowned Sparrow. This handsome finch is an abundant migrant here, passing through Ottawa from May 1st to 23rd in spring, and from September 27th to November 1st in fall. An unusually early one was seen by Mrs. R. D. Brown, April 12th, 1909. During the second week of May their numbers and music attain their high-water mark.

171. *Zonotrichia albicollis*, White-throated Sparrow. This bird, which to most is but a voice which from its retreat in the

thickets and swamps seems ever to be whistling, *dear Canada, Canada*, etc., is a common summer resident, breeding numerously in wet thickets in Beechwood, Beaver Meadow, Rockcliffe, and even within the city limits. It may be found here from April 11th to October 23rd.

172. *Spizella monticola*, Tree Sparrow. An abundant migrant from and to the Hudson Bay region. In fall it passes through from September 17th to October 30th, and in spring from March 23rd to May 3rd. Its song, a sweet *tsewee, tsewee, tsewee wee wee a wee*, is seldom heard.

173. *Spizella passerina*, Chipping Sparrow. This sociable little finch is a common summer resident, making its nest in bushes and small trees, both deciduous and evergreen, as closely as possible to houses. It extends its stay with us from April 5th to September 28th. In 1884, one was seen as early as March 28th.

174. *Spizella pusilla*, Field Sparrow. This dainty little finch with pink bill and feet is a rare summer resident with us, although found to be rather common at Kazabazua, 48 miles north of Ottawa. I have only seen three in six years near Ottawa. Being a southern bird, it should be, other things being equal, more common at Ottawa than north of it. It should be looked for in bushy clearings, pastures, etc.

175. *Junco hyemalis*, Slate-colored Junco. An abundant migrant and moderately common summer resident. In dry or moist evergreen woods, like at Blueberry Point, Rockcliffe, etc., a pair or two may be counted on any day in summer. They begin to come March 23rd (earliest March 3rd), but reach their climax April 25th, after which their numbers decrease rapidly until only the few remaining breeding pairs are left. On July 6th, 1908, I found a nest with four eggs at Meach Lake. The migrant hosts return again in September, the last leaving about October 28th.

176. *Melospiza melodia*, Song Sparrow. This cheerful har-binger of spring is an abundant summer resident. It arrives from the 11th of March on, although the first larger band can only be expected between the 23rd and 25th of that month. The latest date is November 25th.

177. *Melospiza lincolni*, Lincoln's Sparrow. A rare migrant, but owing to its extremely secretive habits, it may be commoner than thought and may even breed within the district. One was taken May 16th, 1884, by Mr. G. R. White.

178. *Melospiza georgiana*, Swamp Sparrow. A common summer resident. Every large and small cat-tail swamp, and even swampy corners in fields, overgrown with willows, harbors one or more pairs. Time: April 21st to October 11th.

179. *Passerella iliaca*, Fox Sparrow. This large, handsome sparrow is a moderately common migrant. If one goes, during the latter half of April, to the fringe of bushes along the railway beyond Britannia, he can be tolerably certain of meeting them. They can usually be heard scratching among the dry leaves on the ground. To hear their flute-like song, a performance between the song of the Purple Finch and Baltimore Oriole, is a rare treat, heard not often south of us. It passes through from April 15th to May 10th, and again from October 4th to November 11th. In 1897 one was even seen on December 4th.

180. *Pipilo erythrophthalmus*, Chewink; Towhee. This is a new arrival in our district and on our list. While it has once been seen far out of its range, in 1894 by Mr. F. A. Saunders, 80 miles north of Ottawa, the first record for Ottawa was made in 1904 when, in July, one was shot by Mr. E. Bedard, in Beechwood and later identified by the writer. Mr. Warwick, of Buckingham, Quebec, has taken one there, in 1902. On June 28th, 1908, two males were seen in Beechwood Cemetery by Mr. E. White, but the year 1909 has so far furnished the most records, as between May 10th and 20th no fewer than five observations of it were made at three different places. This seems to indicate that it also wants to extend its range northward. It should be encouraged in this, and not hindered by persecution.

181. *Zamelodia ludoviciana*, Rose-breasted Grosbeak. A moderately common summer resident. At Meach Lake I found it most common in an old orchard adjoining a deciduous wood. It usually arrives May 11th, and the last are seen about October 1st. In 1908, Mrs. R. D. Brown saw one April 23rd during a heavy migration.

182. *Passerina cyanea*, Indigo Bunting. A rare summer resident, temporarily and locally commoner. While I have seen only six all told in six years, Mr. A. G. Kingston saw, at Meach Lake, about ten at one time, in July, 1909. In certain small circumscribed localities a pair will be nesting year after year, for instance at the northern side of Fairy Lake at the end of Beaver Meadow, Hull. Those seen by the writer were here from May 3rd to at least August 12th.

183. *Spiza americana*, Dickcissel. This more southerly bird of uncertain, ever changing range of distribution, is entitled to a place on our list by the protracted stay of a fine male in June, 1895, at the Experimental Farm, where it was watched closely by Mr. F. A. Saunders and also seen by Messrs. W. A. D. Lees and A. G. Kingston.

TANGARIDÆ—TANAGERS.

184. *Piranga erythromelas*, Scarlet Tanager. This gleam of tropical coloration is a common migrant and a moderately

common breeder in the hills north of Ottawa. In the immediate neighborhood of the capital it is rarely seen in summer. Its stay covers the time from May 13th to October 3rd. On May 23rd, 1909, I saw as many as three in one tree in Major's Hill Park, Ottawa.

HIRUNDINIDÆ—SWALLOWES.

185. *Progne subis*, Purple Martin. A common summer resident. While in many parts of the United States people complain that this fine bird is rapidly decreasing in numbers, it is rather increasing here. Many flourishing colonies are found in martin houses and in the cornices of buildings in Ottawa, and I found usually at least one colony in every town and village in Carleton, Renfrew and Russell Counties, Ontario, and in Labelle County, Quebec, which I visited. They begin to come as early as April 13th and assemble in huge migratory flocks towards the middle of August. On the 22nd of August, 1909, a flock of 5-10,000 was on the Rifle Range all day, all leaving for the south at 7 o'clock p.m. The last stragglers are seen September 5th.

186. *Petrochelidon lunifrons*, Cliff Swallow. A moderately common summer resident. It may be abundant around a certain farm yard, and then no more be seen for miles of territory. Its colonies of gourd-shaped, sometimes two-storied mud nests under the eaves of barns, etc., are a very interesting sight. Time: April 27th (1908) to September 30th (1908).

187. *Hirundo erythrogastra*, Barn Swallow. A common to abundant summer resident. They arrive about the 21st of April (earliest 7th) and the last go September 21st. On August 7th, 1909, I saw a flock of about 500 along the wires of fences, and on the road, near Blanche P.O., Quebec. While many species slip away quietly and unnoticed for their fall migration, all the Swallows, Night Hawks and Blackbirds make their migration very noticeable, by gathering into large armies, the first two in August, the last later.

188. *Iridoprocne bicolor*, Tree Swallow. An abundant summer resident. For an insectivorous bird it comes very early, March 27th being the earliest date, when more or less snow is on the ground and ice in lakes and rivers; but it apparently thrives. On August 14th, 1909, Mr. G. R. White saw thousands with other Swallows on the Chaudiere Islands in the Ottawa River. The last seen to go was on August 25th.

189. *Riparia riparia*, Bank Swallow. An abundant summer resident. This is the last of our Swallows to arrive from the south, coming from May 13th to 20th, although the advance guard in some years comes on the 1st, 3rd, or 8th. As soon as they arrive they at once begin to tunnel their nesting burrows in sand banks, not minding traffic and people in the least.

September 6th is the last date for them.

BOMBYCILLIDÆ—WAXWINGS.

190. *Bombycilla garrula*, Bohemian Waxwing. A rare, irregular winter visitor from the north. The last stay of this beautiful bird at Ottawa took place in the winter of 1908-09, when a flock of 22 took up quarters in the rowan-trees on a much used corner in the city. They remained from December 15th to March 6th. (See THE OTTAWA NATURALIST, vol. XXII, p. 266.) Now and then a solitary one is seen, as in December, 1906, when one came to a small mountain-ash tree on Russell Avenue and stayed there for a week.

191. *Bombycilla cedrorum*, Cedar Waxwing. A somewhat irregular, but usually abundant summer resident. Some years they turn up in March, in others in April or May, and in 1907 they only were seen in June, but then in great numbers. Unusual dates are: December 1st, 1906; February 22nd, 1908. As a rule, the last ones disappear about September 12th.

LANIIDÆ—SHRIKES.

192. *Lanius borealis*, Northern Shrike. A moderately common winter resident. They arrive from the north about October 30th, frequently taking up residence in the city, where they feast on English Sparrows; the latest date for leaving is April 18th (1884).

193. *Lanius ludovicianus migrans*, Migrant Shrike. This, the local breeding form, is a moderately common summer resident, some years rarer than others. The earliest date on which it has been recorded so far is March 25th (1907), and the latest, October 10th (1905).

VIREONIDÆ—VIREOS.

194. *Vireosylva olivacea*, Red-eyed Vireo. An abundant summer resident, although more often heard than seen. In summer, in almost any deciduous woods, one is hardly ever outside of the reach of its somewhat monotonous, prattling song. Time of stay: May 6th to September 26th. How it is often victimized by the Cowbird, was noted under that species, which see.

195. *Vireosylva philadelphica*, Philadelphia Vireo. A rare migrant and probable breeder. As it is small and elusive it may be commoner than supposed. It seems to be one of our latest migrants. On May 17th, 1905, I saw one at Britannia, and May 30th, 1906, in a large warbler wave, four to five near Cyrville. September 4th, 1884, is the only fall date available.

196. *Vireosylva gilva*, Warbling Vireo. A common summer resident, found oftener in the shade trees of the cities than in the woods outside. Like the Red-eyed Vireo, it is a persistent singer, even after all other bird notes have stopped in the heat of

summer, and thus betrays its presence. Time of stay: 6th of May to 22nd of September.

197. *Lanius flavifrons*, Yellow-throated Vireo. A rare summer resident. In six years I have seen four here, two of which were on King's Mountain, July 20th, 1905. They arrive about May 11th.

198. *Lanius solitarius*, Blue-headed Vireo. A moderately common migrant, but rare breeder. They arrive May 7th, and the latest date for them is September 11th (1909). On May 28th 1898, a nest was found at Chelsea, and on August 21st, 1907, I saw fully grown young on Kettle Island.

MNIOTILTIDÆ—WOOD WARBLERS.

199. *Mniotilta varia*, Black and White Warbler. A common migrant and moderately common breeder. This frequenter of the more open, deciduous second-growth woods arrives from April 28th to May 13th; the last are seen September 21st. Breeds in Beaver Meadow, Blueberry Point and similar places.

200. *Vermivora rubricapilla*, Nashville Warbler. A moderately common migrant and breeder, but only in its chosen haunts, viz., the stands of small poplar and birch in low, wet places in woods. In such a spot at Blueberry Point a pair or two can be found any day in summer. More common in the poplar stands around the Mer Bleue. They begin to arrive May 7th, reaching their climax in numbers May 15th. On July 13th, 1881, a nest with four eggs was found at Dow's Swamp. The latest date for them is September 25th.

201. *Vermivora celata*, Orange-crowned Warbler. An extremely rare migrant. On September 27th, 1885, one was taken by Mr. E. White near the eastern end of the city. This is the only record.

202. *Vermivora peregrina*, Tennessee Warbler. A rare migrant; will probably be found breeding in some of the tamarack swamps in the northern part of the district. It passes through Ottawa from May 12th to June 7th (1907), at which latter date Messrs. Chapman and Fuertes saw some in Major's Hill Park. The last are seen September 30th. Its song is a high, sharp *tsip, tsip, tsip, pit it it itereceee*.

203. *Compsolthypis americana usneæ*, Northern Parula Warbler. A moderately common migrant and rarer breeder. Its habitat is tall deciduous trees, as on the west side of Beaver Meadow, where it may be found in summer. It begins to arrive May 7th, reaching its climax May 20th to 23rd. The last are seen September 13th. The song is a somewhat scratchy, *dreer, dreer, dreer*, last note highest and loudest; also a trill like *re-e-e-e-e-e*.

(To be continued.)



BOOK NOTICES.

A LIST OF THE INSECTS OF NEW JERSEY. By Dr. John B. Smith, Professor of Entomology at Rutgers College, State Entomologist and Entomologist to the Agricultural College Experiment Station at New Brunswick, N.J. Annual Report of the New Jersey State Museum, 1909; Trenton, N.J., 1910.

This report, with the exception of 13 pages, is devoted to Dr. Smith's new List of the Insects of New Jersey. It is now ten years since a similar list was prepared by the same author, who is one of our valued Corresponding Members, and who has always been exceedingly helpful to Canadian students of insects, particularly those who study the *Noctuidæ*. The present list, which has recently come to hand, is an extremely valuable publication. The book contains 888 pages, the printing and paper are good and the many illustrations excellent. No less than 10,385 different species are listed, comprising 3,486 genera and 331 families. In the 1899 list 8,537 species were included. It will thus be seen that considerable progress has been made in a knowledge of the insects of the State of New Jersey. Entomologists generally will be grateful to Dr. Smith for this extremely useful contribution to the literature of American entomology. Through the example which he has set in the preparation of these New Jersey Lists of Insects, similar lists are now in preparation for other States in the Union, and in Canada a list of the insects of the Province of Quebec is being prepared by members of the Montreal Branch of the Entomological Society of Ontario and the Quebec Society for the Protection of Plants from Insects and Fungous Diseases, largely through the untiring efforts of Messrs. A. F. Winn, G. Chagnon and J. M. Swaine.

In the preparation of the new list, Dr. Smith has had the assistance of many recognized specialists in the various orders. Unfortunately the edition of the New Jersey State Museum report is a very limited one, and it will be impossible to supply everyone who will want this work with a copy. It is distributed by the Curator of the Museum. Dr. Smith has, however, had some extra copies printed, and the price has been fixed at \$1.50 each. These copies will be available as long as this extra edition lasts.

We desire here to add our sincere appreciation of this recent result of Dr. Smith's labours. May our esteemed Corresponding Member be spared many years to continue the good work he is doing for the advancement of applied and systematic entomology in America.

A. G.

THE OTTAWA HORTICULTURIST: The official organ of the Ottawa Horticultural Society. This new monthly made its first appearance with the January, 1911, issue, and is highly creditable to those who are responsible for its publication. It is not in any way intended to take the place of other horticultural journals, but will be used chiefly for matters of local interest. Besides publishing announcements of meetings, exhibitions, etc., and the Society's Premium and Prize Lists, special articles will appear from time to time on subjects of practical interest to members of the Society.

We extend to our sister Society our best wishes for the future success of The Ottawa Horticulturist.

A. G.

NOTES.

CHANGE IN LECTURE PROGRAMME.—The Lecture Committee announce that the lecture before the Club, for the evening of March 7th, will be given by Mr. R. H. Campbell, Superintendent of Forestry of the Department of the Interior, instead of by Mr. W. E. Saunders, of London, Ont. The title of Mr. Campbell's lecture will be, "How the Forest Grows." It will be held in the assembly hall of the Normal School, and will be illustrated with lantern slides. It is hoped that Mr. Saunders will lecture before the Club at a later date.

MAPS OF OTTAWA.—The Club has still on hand a number of maps of the Ottawa District, which the Treasurer would like to dispose of. Copies can be had from Mr. Herbert Groh, Central Experimental Farm. The charge to members is 5 cents each, to non-members, 10 cents.

A NEW FIELD-NATURALISTS' CLUB.—A society has recently been formed at Picton, Ont., under the name "The Prince Edward County Field-Naturalists' Club" for the purpose of Nature Study and protection and study of birds and native wild flowers, etc. The Ottawa Field-Naturalists' Club extends to this new society its warmest greetings and best wishes for its future prosperity. Our Club was honored by receiving an invitation for our President, Mr. Halkett, to address the new society at one of its winter meetings.

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CONSERVATION, OR THE PROTECTION OF NATURE.*

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The most vital problem to be solved by Canada, at the present time, is to know how we can insure the prosperity of the country and the consequent and incident prosperity of her people. An enormous country is entrusted to our care as a people, a vast heritage of Nature abounding in untold wealth and productive of the greatest good. Nature is not ours to squander, to amass wealth at her expense and enjoy a transient prosperity; it is ours to protect, and the protection of Nature is nothing more or less than the insuring of a national happiness. Through the foresight of the representatives of the people who are charged with the country's weal, that question has been answered, regardless of political creed, and in such a way as to place Canada in the front rank of those nations upon whom the future existence of the world will depend. We must conserve those resources of Nature in which are bound up the very life of this country and its future, and Canada enjoys the privilege of having the first Commission appointed by a national government to promote the conservation of our natural resources.

But it must not be supposed, in fact it is the greatest mistake to suppose, that this is a question which concerns those alone who are charged with the governing of the country. It is one which concerns every Canadian, whether he be an owner of thousands of acres or the rude pioneer blazing the path of progress through the wild unknown: it concerns every citizen.

To the naturalist, however, it should and does appeal with especial force, and it is on this account, because conservation means nothing more or less than the protection of Nature, the prevention of destruction without perpetuation, and because the work of the biologist must form the basis of a large proportion

*An address delivered before the Ottawa Field-Naturalists' Club on January 10th, 1911.

of the principles that will guide us in attaining the end for which we are working, that I have chosen this as the subject of my address this evening. I will endeavour to indicate, somewhat briefly I am afraid, a few of the problems which depend for their solution upon the results of biological investigation. As His Excellency Earl Grey truly said in his address to the Conservation Commission on the occasion of its first meeting: "The future well-being of Canada depends upon the loyal acceptance by its people of the principles which aim at the profitable and scientific development and conservation of your natural resources. I recognize that the future prosperity of Canada depends upon scientific research and upon the efficient application of the results of that research to the industrial and physical life of the people."

We must take a broad view and regard the problem from its æsthetic and ethical side as well as from its practical. We are a practical nation, but there is a growing danger that success and material prosperity may be taken as synonymous with, and as the criterion of, a national happiness, than which there is no mistake more profoundly erroneous.

THE SOIL.

The greatest need of man is food, and his food, directly or indirectly, is a product of the soil. On the producing power of the soil, therefore, the lives of the people as well as the future existence of the nation depend. It will be understood then how important a question the conservation of this great producing power, the fertility of the soil, is to so essentially an agricultural nation as Canada. The supply of the organic constituents of the food of plants is inexhaustible, but this is not the case with the inorganic chemical constituents of the plant food—nitrogen, potassium and phosphorous: and when we speak of the conservation of the essential elements of the soil we refer to these elements, of which the most important is nitrogen. Since 1660 this element has been regarded as one of the sources of the fertility of the soil, and after many years of careful inquiry we have come to the conclusion that the fertility of the soil can be attributed to no one cause: nevertheless, the available nitrogen is one of the chief factors in this fertility. It will naturally be inferred that this is a question of a chemical nature which does not concern the biologist. The day has passed when one branch of science can stand aloof from the rest, as the history of the present problem will indicate. In 1886, Hellreigel and Wilfarth discovered that the nodular growths found on the roots of the leguminous plants, such as peas, clover, alfalfa, etc., contained bacteria which were capable of drawing nitrogen from that large reservoir of other-

wise almost unavailable nitrogen—the air. Plants cannot use the free nitrogen, but require it in the form of nitrates, and this transformation is brought about by the root bacteria found in association with these plants. This discovery afforded an explanation of the long known fact that such leguminous crops enriched the soil. Since that discovery, other bacteria living free in the soil have been found that are capable of fixing the essential nitrogen, and Hall has recently stated that “We may with some confidence attribute the vast stores of combined nitrogen contained in the black virgin soils of places like Manitoba and the Russian steppes to one of these organisms.” Humus is rich in nitrogen, and the bacterial organisms, together with the oxygen of the air, convert this into available plant food. It is owing to the nitrogen-enriching power of such leguminous crops as clover and alfalfa that they are of so great value in enriching soil which has been depleted of nitrogen by other crops. It is on this single fact that the system of the rotation of crops is based, that is, the alternate planting of leguminous crops which increase the amount of available nitrogen in the soil with crops, such as cereals, which use up the nitrogen. This rotation, therefore, is one of the most important means of maintaining the fertility of the soil. Furthermore, by the planting of these leguminous crops we are enabled to inoculate soils previously deficient in nitrogen and accordingly increase their productive power.

Recently, at the Rothamsted laboratory in England, Russell and Hutchinson have made some investigations of more than ordinary interest upon this question of the relation of soil bacteria to fertility. Subsequent to the discovery of the nitrogen-fixing bacteria, the inexplicable fact was discovered that when the soil was heated or treated with an antiseptic such as chloroform to render it sterile, the fertility increased in an astonishing manner. Heating the soil to a temperature of 70 to 100 degrees for two hours doubled the size of the crop. This fact has been known since the time of the Romans and is practised in intensive cultural systems, but the cause of the increased productivity was unknown. These authors find that this increased fertility appears to be due to the fact that when the soil is heated or treated with an antiseptic, all the bacteria are not destroyed, but larger protozoal organisms, akin to *Amœba*, which normally feed upon the bacteria, are killed. In consequence, the bacteria released from their enemies increase and multiply at a rapid rate, which results in an increase in the amount of available nitrogen in the soil.

These investigations will serve to indicate how these questions of the fertility of the soil and the maintenance of that

fertility could not be considered without reference to their biological aspects which are really the fundamentals.

THE PREVENTION OF LOSSES INCIDENT TO THE PRODUCTS OF THE SOIL.

Having taken all the means that are necessary to conserve the fertility of the soil, we are faced, in the production of our crops, whether they may be farm or fruit crops, with serious factors which, if not contended, will more than counterbalance the advantage gained in such conservation. Therefore the combatting of those factors adverse to successful cultivation and production is an integral and essential part of conservation. Of such adverse factors, the chief are plant diseases and insect pests, and I shall consider the latter more particularly as we have at present more accurate data and statistics with regard to their depredations. The immense losses which insects and plant diseases incur are chiefly due to the disturbance of natural conditions brought about when man cultivates the soil and provides large quantities of eminently suitable food for insects often previously subsisting on wild plants. It is generally conceded that a ten per cent. basis may be taken as the average loss on farm crops due to injurious insects, and those who have given their continued attention to the question consider that this is the minimum. On that basis Marlatt estimates that the annual loss in plant products of the farm in the United States, due to insects, is \$650,000,000, and on the same basis our annual loss in Canada would be over \$50,000,000 worth of farm crops. In fruit production insects make a tax of at least thirty per cent. and Chittenden puts the total losses, plus the cost of treatment, at over \$66,000,000 in the United States. To the ordinary person these figures seem incomprehensible, but this loss is capable of estimation on the basis of experience, and those of us who are dealing with these losses daily have no hesitation in maintaining that ten per cent. is a minimum average loss. This is omitting the losses, which are no less serious, due to plant diseases, and those which are due to weeds. It is safe to say that, even with our present knowledge of the methods of combatting these pests, we can effect a saving of at least thirty per cent., and with the increase of such knowledge, which can only be gained by scientific investigation, that percentage will gradually increase. It is necessary that it shall increase, for the soil of Canada supplies the food not only of our own people but of other nations who are looking to the new world and the west for their food supplies.

The conservation of the soil, therefore, rests on two principles

—the maintenance of the soil-fertility, accomplished by scientific methods of cultivation, and the combatting of those factors which reduce the productivity by destroying the soil products, namely insects, plant diseases and weeds. We must put an end to exploitive farming, the taking out and not putting back the equivalent, which is nothing more or less than stealing the nation's wealth; and the farmer who exploits the fertile soil of Canada must be shown that he is criminally taking away the future subsistence of the generations to come.

FORESTS.

The forests of Canada were responsible for the foundation and the early history of the nation, for without the forests there would never have been that great natural resource of fur-bearing animals which lured the first wealth seekers and pioneers to this land rich in forest, river and lake. The forests will be responsible for the future prosperity of Canada, for upon their conservation depends the conservation of the land and water. They conserve the land in virtue of their great function as natural filters, allowing the gradual running away of rainstorms and melting snow, and in the place of wash-outs and floods sweeping away the fertile soil by erosion, a continuous steady flow of water is provided and maintained, and thus the water which we shall require more and more as our natural fuel supplies become more exhausted, is regulated in the best possible manner for the purposes of obtaining power. The maintenance and conservation of our natural water supplies is primarily dependent upon the conservation of the forests, and on the conservation of the water supplies depends the productivity of the land. What would our great western provinces produce if they were not watered by the rivers having their origin on the eastern slope of the Rocky Mountains, the origin and flow of which rivers is directly due to the forests covering those mountains? The setting aside of the greater part of those forests on the eastern slope of the Rocky Mountains as a reserve is one of the greatest prospective actions ever taken by a government. In addition to the intimate relation between forests and the land and water, their effect upon the climate and also upon the health of the people are to be considered. By the majority of people one of the chief functions of the forests is, of course, their utilization. The varied industries which depend upon forest products, from the publishing of a newspaper to the building of a railway, render it still further necessary that we shall not only conserve but utilize in the most economical manner possible and, by afforestation of deforested areas and of areas unsuitable for agriculture, shall

insure the timber needs of the future. The total forest area of Canada is estimated at over 1,250,000 square miles, of which about 400,000 square miles may be considered to be covered with merchantable timber.

Two of the three factors which are chiefly responsible for the destruction of our forests depend for their solution upon the results of biological investigation. The three chief forest destroying agencies are fire, insects and plant diseases, and all are interdependent. Naturally the first appears to be the most important on account of the extremely apparent and ravaging devastation. Nevertheless the destruction caused by insects and plant diseases, though usually working for a long time, insidiously and unseen, is enormous. It is estimated by Hopkins that for a ten-year period, during which investigations were made, the average amount of timber in the forests of the United States killed and reduced in value by insects would represent a loss of \$62,500,000 annually. It is impossible to estimate in the absence of the necessary statistics the extent of the annual loss in Canada to the growing forests, but on a conservative estimate the loss on the annual cut of timber due to insects in Canada would be more than \$2,000,000. The injury to forests by fire receives the serious consideration which it merits on account of its very noticeable character, but insects and fungi carrying on their destruction in apparent secrecy are unobserved until their depredations assume a magnitude such as to render their control almost impossible.

Forest insects are injurious in a number of ways: they may attack and kill the mature growing trees; they destroy the second growth and thus hinder or prevent natural regeneration; they attack the cut timber and the finished products to a serious extent; in a word, from the seed to the finished product they exact no inconsiderable toll of this important and valuable resource. There are two classes of insects injurious to forests: those which defoliate the trees, and the boring insects which attack both living trees and the cut products. Of the former class we have two examples in Canada to which I may briefly refer. The Larch Sawfly (*Nematus erichsonii*), which destroyed all the mature larch or tamarack in eastern Canada in the outbreak of 1881-1885, is now repeating its depredations. The second is the Spruce Budworm (*Tortrix fumiferana*), which is distributed throughout Quebec, and in many localities has effected serious defoliation of the spruce and balsam during the last two years. In British Columbia it is also attacking the Douglas Fir and has already shown its ability to kill the young second growth. The seriousness of this outbreak of the Spruce Budworm is not only due to the probable effect on the trees of the repeated

defoliation, but also to the fact that this ^{and} defoliation by weakening the vitality of the trees will render them more susceptible to the attacks of the worst forest pests, the bark beetles. These latter insects attack healthy and unhealthy trees and, by the boring of the adult beetles and their larvæ in the growth layer beneath the bark, the trees are girdled and in consequence killed. A species of bark beetle (*Dendroctonus piceaperda*) attacking the spruce has caused considerable destruction among the spruce forests of eastern Canada and the United States. The activities of these bark beetles are inter-related with those of the timber boring beetles, which attack the standing trees which have been killed or are dying as a result of the infestation of the bark beetles, and thus render them useless for timber.

Fire, insects and fungal diseases as I have already stated, are all closely inter-related. Abundant evidence has been gathered to show that trees killed by insects have more readily acted as fuel for forest fires, and also that insects may bring about the final destruction of trees which might otherwise have recovered from the effects of fire. By their borings and tunnellings in the bark and wood, these beetles provide means of entrance for the spores of fungi which by their rapid growth hasten the destruction and decay of the timber. It will be realized, then, that any system of forest conservation and afforestation will fail in its object if it leaves out of consideration the immense losses entailed by the attacks of insects and fungi, the aggregate losses due to which I have no hesitation in affirming, as others who have investigated these matters maintain, exceeds even the total loss due to fires. In most cases these losses can be prevented and the methods to be adopted for the prevention of losses due to insects and plant diseases are almost identical with those to be employed against the prevention of forest fires: constant supervision and prompt action immediately the outbreak is observed, which will be in an early and controllable stage, if the supervision is sufficiently adequate to be effective.

THE PROTECTION OF BIRDS.

The majority of people fail to appreciate the part which birds play in the economy of Nature and the untold benefits resulting from their protection and encouragement. In combatting those factors which are responsible for so great a loss to the agriculture of this country—injurious insects, weeds and small mammals, such as mice and gophers—and to the forests, we shall be compelled to an increasing extent to rely on the natural enemies of these pests, especially the birds which are the most

powerful insecticides which we have. Reference has already been made to the change in the balance of Nature which man makes by interfering with the pre-existing natural conditions through the cultivation of the soil and its products, and this disturbance has a serious effect on bird life by changing their environment. But more serious than this is the effect of the wantonness and inherent barbaric traits of man. One of the most appalling facts in relation to Canadian agriculture and the enjoyment of the people is the wanton destruction of bird life, especially in the West. Small wonder that the visitations of grasshoppers and of other insects proceed uncontrolled when the farmer has killed off his best friends. Is it a matter for surprise that one of the most serious questions affecting the farmer of Canada to-day is the increase in the number of weeds and their spread, when the greatest weed destroyers are not only not encouraged and protected, but are killed, because they have the misfortune to be living creatures and so provide a target? Legislation is not the only remedy to seek; we must employ the greatest of weapons—enlightenment by education, and not rest until we make those who are dependent upon the products of the land understand that they should treat their bird friends as they would their human friends, and in this way increase the pleasures of life and their allies in combatting such foes as destructive insects, mammals and weeds.

A few instances may be mentioned to illustrate the unpaid and usually discouraged assistance of these friends of ours. That large family of our native sparrows—I do not refer to the English sparrow, which does its best to drive away most useful native birds, but to such birds as the tree sparrow, the song sparrow, the junco and the dickcissel, etc.—as weed destroyers they are unrivalled. Dr. Judd, of the Biological Survey of the United States Department of Agriculture, has made a comprehensive study of the food of about twenty species of sparrows, and has examined over 4,000 stomachs of the birds at different periods of the year from different localities. As a result it was found that weed seeds form more than half their food for the entire year, and during the colder half of the year these seeds constituted about four-fifths of the food of many species. A single bird will often be found to have eaten 300 seeds of pigeon grass, or 500 seeds of lamb's quarters or pigweed. As they feed in flocks they are most efficient consumers of these and other weeds. Beal estimated that the tree sparrow may consume one-quarter ounce of weed seed per day, and, on that basis, in a State the size of Iowa, this species would consume 800 tons of seed annually.

McAtee has given the results of an examination of the

stomachs of 1,154 Horned Larks collected in all parts of the United States and southern Canada. It was found that insects constituted 20.6 per cent., and vegetable matter, six-sevenths of which consisted of weeds, was 79.4 per cent. They occasionally eat grain, but this is far outweighed by their destruction of weed seeds and insects, and the destruction of such birds is criminal as affecting conservation.

Everyone appreciates the utility of the titmice and chickadees as insect destroyers, but few regard the hawks and owls in their proper light. Such species as the Sharp-shinned and Cooper Hawks and the Great Horned Owl are certainly inimical to farmers, but the majority of hawks and owls are either wholly or partially beneficial. Of those which are wholly beneficial, common, and destroyed on almost every occasion, one might mention the American Sparrow Hawk (*Falco spawerius* L.) which feeds chiefly upon grasshoppers and also destroys such noxious rodents as gophers and field mice. One of the best gopher and grasshopper destroying hawks is Swainson's Hawk (*Buteo swainsoni*) common on the prairies of the West. Merriam records three whose stomachs were examined and found to contain no other food but grasshoppers; one contained 88, another 96, and the third 156.

These facts, a few of a very large number which might be quoted, indicate the practical value of such birds and the importance of not only protecting them but encouraging them. In forests this is specially desirable, and it will be necessary for us to pay far greater attention to this aspect of forestry in the future than is the case at the present time. We shall be well advised to follow the guidance of those European countries who regard the encouragement of birds by the provision of nest boxes as an essential element in forestry systems. In good forests there is little natural provision for the nesting of birds, and accordingly these must be supplied. Many instances might be quoted of the success of these measures in controlling insect attacks, but a single one must suffice. Baron von Berlepsch, the greatest European advocate of bird encouragement, gives the following example: The Hainich wood, south of Eisenach, which covers several square miles, was stripped entirely bare, in the spring of 1905, by the caterpillars of a little moth (*Tortrix viridana*). His wood, in which there had long been nest boxes, and of which there are now more than 2,000, was untouched. It actually stood out among the remaining woods like a green oasis. At a distance of a little more than a quarter of a mile farther the first traces of the plague were apparent, and at the same distance farther on still it was in full force. It was a plain proof of the distance the tits and their companions had gone during the

winter and after their breeding time. In many of the German states and other parts of Europe bird encouragement by means of nest boxes is undertaken by the State, Hungary being one of the foremost in this respect, at the instigation of Otto Hermann. The value of encouragement in increasing the number of birds is further illustrated by the use made of these means when they are employed. On and near Baron Berlepsch's estate, 90% of 2,000 nest boxes in one wood were occupied and nearly all of 500 and 2,100 in other localities. Of 9,300 boxes hung up by the Government of the State of Hesse 70 to 80% were occupied during the first year, and in 1907 all had occupants.

It will be seen, therefore, that this question of bird protection and encouragement is one in which all lovers of Nature and of our forests, and especially those who are dependent upon forests and agriculture for their subsistence, as we are all indirectly, should be deeply concerned. Our native birds are a resource of inestimable value, practical and æsthetic.

PUBLIC HEALTH.

If the conservation of natural resources is for the benefit of man and of the future generations, it naturally follows that for such benefits, as may accrue from this policy of conservation, to be utilized and enjoyed to their fullest extent, man himself must be conserved. In other words, the public health must be an object of conservation. It is useless to colonize if care is not taken of the people. Of what use are these resources if there is not a healthy nation to enjoy them? I may be accused of wandering beyond the appointed limit in my treatment of this subject and asked how the question of public health comes within the domain of the naturalist. This question could certainly not be asked in any of those countries where such diseases as malaria, yellow fever, sleeping sickness and other insect-borne diseases are prevalent. Fifty thousand deaths from yellow fever was the price paid by the French in cutting a portion of the Panama Canal; the annual mortality in the Indian peninsula from malaria is over a million human beings. The methods adopted for the prevention of these devastating diseases are based upon entomological knowledge. As Lord Robson recently said in London: "It is the man of science who is to decide the fate of the tropics, not the soldier or the statesman with his programmes and perorations, but the quiet entomologist. He is the man of science who of all others strikes the popular imagination the least and gets less of popular prestige; but he has begun a fascinating campaign for the sanitary conquest of those enormous tracts of the earth, and before long he will have added their intensely fertile soil almost a free gift to the productive

resources of the human race." All who have followed the recent progress of the war against those diseases which have kept the tropics closed to civilization will perceive the truth of Lord Robson's statement. In Canada, however, we have not these dread diseases, but we have others serious enough. It is to one only that reference will be made as it is one in which the naturalist is concerned. Next to tuberculosis the most serious of the preventable diseases is infantile diarrhoea. This disease is responsible for a greater mortality among infants than any other preventable disease, and the importance therefore of its prevention is apparent. The high rate of mortality among children in Canada may be realized from the fact that for the four years 1904-7 the average infantile mortality per 1,000 births in Ontario was 149.53, compared with 130.75 in England and Wales, where there is a far greater and more congested population. The greatest factor responsible for the spread of this disease is the house-fly. In my address before this Society twelve months ago I considered at length the relation of house-flies to public health and the means of controlling these insects. In consequence, I shall refer but briefly to this subject which illustrates the bearing entomological knowledge has upon this aspect of public health. Careful investigations by Niven and others have shown that there is a close correspondence between the aggregate number of house-flies in houses and the aggregate number of deaths from diarrhoea week by week and that there is a closer correspondence of diarrhoeal mortality with the number of flies than with any other varying seasonal fact, and that these seasonal facts are capable of interpretation in the number of house-flies. Observations also have shown that flies cluster especially about the noses and mouths of infants suffering from diarrhoea, and their predilection for milk and sugar is well-known. Even though the specific cause of this disease which carries off the lives of thousands of infants in Canada each year is not known, it is enough to know that the house fly is the chief agent in the dissemination of the disease. Milk is also a factor in the spread of the disease and the infection of the milk with the disease germs is largely due to the agency of flies, as it has been shown that the bacterial infection of milk can be reduced about 50% by protecting it from flies. The relation of flies to typhoid fever is now becoming an accepted fact and the house-fly is regarded as one of the most serious menaces to the health of the civilized communities; its abolition and control is rightly coming to be considered a necessary step in the improvement of the sanitary conditions of our cities and towns. Legislation is needed to prevent the exposing of fruit, confectionery and other food supplies to the contact of flies; to ensure that they cannot breed in the usual breeding

places, such as exposed manure and garbage heaps, but that proper care shall be taken of such temporarily necessary nuisances. The medical inspection of school children and their education in the principles of hygiene are measures which will result in a healthier and happier youth of Canada.

An enlightened public is essential for the bringing about of these necessary sanitary reforms, which will result in a decreased death rate especially among children and a healthier environment and the conservation of the people's greatest asset.

WATER.

The question is naturally asked, in what way is the naturalist concerned in the question of conservation as affecting this extensive natural resource? Many replies might be given to this inquiry. There is one aspect in which not only the naturalist but every citizen as a food consumer is concerned, namely, the importance of the inhabitants of the water. As the problem of supplying the people with food becomes increasingly important, the value of fish as food will be generally appreciated to a greater extent than it is at the present time. It is a matter which is receiving and must necessarily receive careful consideration. Our enormous areas of water and great extent of river and stream are capable of providing, with proper care, a large amount of valuable food, and the question is how to provide, conserve and utilize that food in the most judicious manner possible. First we must prevent the pollution of the streams and waters, this is not only a problem which seriously affects the public health, but also the fish supply in the waters. The pollution of streams and rivers is a biological problem, for contamination with sewage renders the water bacteriologically unfit without treatment; and commercial pollution, the emptying of commercial waste products into the water, renders it useless as a sustainer of life and so cuts off this important item of our food supply which is under consideration. The provision of hatcheries where the eggs are carried through those stages in which there is so great a mortality in a state of nature will ensure a larger supply of young fish; but, unless the water is suitable and the young fish can obtain an abundance of food, it will be labour wasted. This leads to a subject the import of which is hardly yet realized, namely, the food available in the water for the fish. For a number of years this problem has been receiving the attention of investigators with regard to the marine fishes, and to a small extent in the United States in reference to fresh water fishes. Recently, however, a real beginning has been made by Prof. Needham, of Cornell University, of the study of

the food of fresh-water fishes and the possibility of its artificial cultivation. This food consists largely of the larvæ of certain insects such as the May Flies or Ephemeroidea, part of whose life-history is spent in water. At first sight this line of work would appear to be somewhat impracticable, but when the importance of utilizing so great a natural resource as our inland waters for the production of a valuable form of food is realized, as will be essential, then the relation which this question, of the scientific provision of suitable food for the fishes, bear to the whole problem of fish-culture will be fully appreciated. You may compare it to the growing of a crop; by the provision of hatcheries good seed is provided, but does any farmer expect his seed to produce a good crop if the available plant food in the soil is insufficient? How then can we expect good fisheries if attention is not paid to the available fish food in the waters devoted to pisciculture? Fish flesh is a highly nutritious food, in fact it is said to be an excellent brain food; we may find that the conservation of this natural resource may influence the clear thinking of the people!

In these few random remarks an attempt has been made to show why the naturalist and the lover of nature should be especially concerned in this great question of the conservation of the natural resources of Canada. Conservation is nothing more than a gospel of unselfishness, a lesson on our duty to future generations of Canadians; no true citizen of this country can fail in that duty by keeping silent if these great sources of natural wealth are plundered, not only injudiciously for the use of the people, but wastefully by those who consider not the present needs and future requirements, but their own personal gain. Conservation, however, does not mean, as many wrongly suppose, the hoarding up of our national resources, such as our forests, and the prevention of their full utilization. It means use without waste, or with as little waste as possible. The significance of this will be understood if you will remember that at present only three-eighths of the timber cut is in the final product; conservation is the saving of the other five-eighths. Cut the forests, but see that for every tree cut another is growing to take its place and fulfil its function. We are fortunate in being able to begin at an early stage and to learn the lessons which other nations have learned too late. Let each so work that Canada may truly say:

“Carry the word to my sisters—

To the Queens of the east and south.

I have proven faith in the heritage,

By more than the word of the mouth.”

THE BIRDS OF OTTAWA.

BY C. W. G. EIFRIG.

(Continued from page 206.)

204. *Dendroica tigrina*, Cape May Warbler. A moderately sometimes fairly common migrant. The first have been noticed May 12th, but they should be looked for between May 20th and 24th. In a clump of fine black spruces west of Blueberry Point they are then to be found, if anywhere; but they also occur in Beaver Meadow, and in gardens, planted with evergreens, in the city. As some were seen as late as June 7th (1885), they may possibly breed in some of the thick evergreen woods in the northern part of the district. Their song is, *wee de de, wee de de, wee de de, wee*.

205. *Dendroica aestiva*, Yellow Warbler. A very common migrant and summer resident. This, like the Least Flycatcher, Warbling Vireo, etc., breeds numerously in the city in trees and shrubs. It begins to arrive May 4th. By June 12th its nest and eggs may be found. The local birds leave before August 17th, but the more northerly contingent passes through till September 21st.

206. *Dendroica caerulescens*, Black-throated Blue Warbler. This fine warbler in its striking livery of blue, black and white is a common migrant and moderately common breeder. In the woods on the east side of Beaver Meadow, or on the waterfront nearby, a pair or two may be seen throughout the summer. Their stay extends from May 6th to October 7th. Its song is a rasping, rapidly ascending, *dill dill dill dill dreer*, or a harsh, *tsreeeeee*.

207. *Dendroica coronata*, Myrtle Warbler. Abundant migrant and rare breeder. This is our hardiest warbler, coming first of all and staying longest. It begins to arrive April 24th, becoming abundant early in May, and thinning out again before the end of that month. In a spruce thicket at Blueberry Point several were found singing lustily in June, 1909, indicating breeding. The migrants from farther north pass through in fall from September 10th to November 3rd. Song, a rapid, *dee dee dee dee dee trrrr*, like the Nashville Warbler.

208. *Dendroica magnolia*, Magnolia Warbler. A moderately common migrant and breeder. In the already mentioned spruce thicket at Blueberry Point; on the waterfront, Hull; in the Mer Bleue, they may be seen and heard throughout the summer. Their presence with us falls in the time between May 7th and September 19th. Their song is much like that of the Redstart, *dewee dewee deweetsi*, or *ree deree di*.

209. *Dendroica pensylvanica*, Chestnut-sided Warbler. A moderately common migrant and breeder. It is found in deciduous second growth, and such spots in evergreen woods. In Dow's Swamp they breed yearly. Extreme dates are: May 6th to October 1st. The highwater mark in their migration is reached May 17th.

210. *Dendroica castanea*, Bay-breasted Warbler. An abundant migrant. It passes through from May 16th to June 7th (1907) and again August 28th to September 26th. This and the next species, and some of the Flycatchers, are our last migrants in spring. Its song is scarcely heard here; it is almost identical with that of the Redstart.

211. *Dendroica striata*, Blackpoll Warbler. An abundant migrant. Its chief travelling companion is the Bay-breasted. It passes through from May 17th to June 12th (1907), and again August 28th to September 26th. Song, a high, dry *tsit tsit*, repeated six to ten times.

212. *Dendroica fusca*, Blackburnian Warbler. A very common migrant and moderately common breeder. In Beaver Meadow, Dow's Swamp, Mer Bleue, Chelsea, etc., they may be seen all summer. In spring they come from the 4th to the 25th of May, reaching their climax on about the 17th; and in fall the last are seen September 9th.

213. *Dendroica virens*, Black-throated Green Warbler. A very common migrant and moderately common breeder. The habitat of this species is in mixed woods, where some hemlock occurs. Its song, *dee dee deeah dee*, announces its presence long before one sees the bird. They begin to come May 1st, attaining their highest numbers about the 17th. In fact they are most common September 10th to 27th. October 2nd marks the latest date. The Beaver Meadow waterfront is the place near Ottawa where one may look for it with the certainty of finding it in summer.

214. *Dendroica vigorsii*, Pine Warbler. A moderately common migrant and rather rare breeder. True to its name it is found in evergreens only, and nine times out of ten in pines. It breeds in the stand of somewhat taller pines along the river-shore of Blueberry Point, and in similar locations, but owing to its habitat, is rarely seen. It is found here from May 7th on.

215. *Dendroica palmarum*, Palm Warbler. The status of this Warbler will have to be revised from that given in the last list. It is a moderately common migrant only. I have taken typical examples of it only on May 10th, 1905, at Blueberry Point Aylmer, and September 20th, 1905, near Hurdman's Bridge. The breeding birds found in our district and reported at various times in THE OTTAWA NATURALIST must go under the following

LABORATORY

sub-species. Song, *che che, che che, che che de de.*

216. *Dendroica palmarum hypochrysea*, Yellow Palm Warbler. This is an abundant summer resident, in the Mer Bleue only so far as is known, but probably also in other similar localities in the district. I have taken them June 3rd, 1904; June 13th, 1909; August 5th, 1910, when the young were full-grown. They probably arrive here before *palmarum*, as a nest with four eggs was found as early as May 23rd (1908). The song is like that of the Chipping Sparrow.

217. *Seiurus auropellus*, Oven-bird. A common migrant and summer resident. In deciduous woods, as Beechwood, Beaver Meadow, etc., one or two may nearly always be heard. Extreme dates of stay: May 6th to September 19th.

218. *Seiurus noveboracensis*, Water-Thrush. A moderately common migrant and summer resident. At the pools in the waterfront, west of Eddy's mills, Hull, several pairs may be seen and heard throughout the summer, as also on the eastern side of Beaver Meadow. Extreme dates: May 8th to September 6th. One of their loud, liquid songs may be represented, *whitla whit-cher, watch watch watch watch.*

219. *Oporornis agilis*, Connecticut Warbler. A rare migrant. I have seen it twice at a range of 5-10 feet, at Rockcliffe Park May 5th, 1906, and at High Falls, Quebec, October 3rd, 1907.

220. *Oporornis philadelphia*, Mourning Warbler. A rather rare migrant and breeder. It is a swamp-loving species; where cedar, spruce and alder bushes, especially the last, are found growing in or near water, it must be looked for. A pair usually breeds in each of the following places: alders near Slattery's slaughter house, Ottawa East; Dow's Swamp; alder fringe in Beaver Meadow, and west of Blueberry Point. Time of stay: May 19th to September 9th.

221. *Geothlypis trichas*, Maryland Yellow-throat. A very common migrant and summer resident. In willow, alder and cat-tail swamps, down to the smallest, it is usually to be seen. Its call, *whitchedy, whitchedy, whitchedy*, announces its presence long before one sees the bird. It has also quite a repertoire of other songs. By June 7th its nest with three eggs has been found. It first arrives May 5th; our locally breeding birds go by August 1st, but their place is soon taken by migrants from farther north, of which the last is seen September 25th.

222. *Wilsonia pusilla*, Wilson's Warbler. A moderately common migrant only, not breeder, although it may yet be found as such. It is one of the later comers in May, not arriving before the 15th. As late as June 2nd, 1907, they were abundant at Ottawa East. The last have been seen September 15th. The song, rarely heard, is, *tsit sit sit dreer idididee.*

223. *Wilsonia canadensis*, Canadian Warbler. A moderately common migrant and breeder. In Dow's Swamp it may be found all summer. Places like that are its characteristic habitat. Extreme dates: May 12th to September 10th.

224. *Setophaga ruticilla*, Redstart. A common migrant and summer resident. It often builds its nest in vines and bushes on and near houses, or *e.g.*, in bushes along "Lovers' Walk," Parliament Hill. They first come May 5th, and the last usually depart before September 10th, but in the extraordinary mild fall of 1909, some were seen as late as October 9th (G. White).

MOTACILLIDÆ—WAGTAILS.

225. *Anthus rubescens*, Pipit. A migrant to and from the Hudson Bay and Arctic regions. It passes through about May 14th, and again from September 28th to about October 7th, and probably later. As it frequents plowed fields, walking leisurely and not flushing readily, it may by reason of its neutral tints easily be overlooked.

MIMIDÆ—THRASHERS, MOCKINGBIRDS, ETC.

226. *Dumetella carolinensis*, Catbird. A common summer resident. It stays from May 3rd to October 7th.

227. *Toxostoma rufum*, Brown Thrasher. A moderately common summer resident, one that is evidently on the increase, as in 1909 pairs of them could be seen in places where formerly none were seen. Formerly one to two pairs nested on the Experimental Farm, now five to six. It arrives about April 27th and is last seen September 13th. It is one of our finest singers.

TROGLODYTIDÆ—WRENS.

228. *Troglodytes aedon*, House Wren. A very common summer resident. Its nests are placed in cavities in posts and trees, and in boxes in yards of houses put out for it, and is prospering and increasing. It arrives about May 1st (earliest April 21st, 1897), and the last are seen October 16th.

229. *Nannus hiemalis*, Winter Wren. A moderately common summer resident. Its habitat is the northern silent, moist coniferous forest. There its song, like a long silver thread entwining the dark green foliage of the trees, may be heard to best advantage, especially early in the morning and in the evening. In certain spots in the Beaver Meadow a few pairs breed, also in the woods east of the Rifle Range. Time: March 26th to October 18th.

230. *Cistothorus stellaris*, Short-billed Marsh Wren. This species, once put on our list, and then removed again, certainly belongs there. It was first found by Mr. F. A. Saunders on June 17th, 1898. On June 16th, 1905, one was taken in the

coarse grass and weeds along a wet meadow adjoining the Mer Bleue at Carlsbad Springs, and on August 8th, 1907, one was seen in a similar place along the railway ditch near Blackburn. Another one was seen in the little swamp hole at the entrance to Beaver Meadow from the Aylmer Road. Its coarse note is unmistakable.

231. *Telmatodytes palustris*, Long-billed Marsh Wren. A common summer resident in larger cat-tail swamps. Along Cranberry Creek near Osgoode, many of its globular nests are to be seen in the cat-tails. On June 23rd, 1905, two out of twelve nests investigated contained six eggs each.

CERTHIIDÆ—CREEPERS.

232. *Certhia familiaris americana*, Brown Creeper. A common migrant and rare breeder. On certain days, as on April 17th, 1908, many may be seen on the trees in the city, laboriously clambering upward. Such days mark the climax in their migration, which in some years starts March 12th. They breed in swampy woods, where there are large trees. The south-bound migration ends about October 18th. Winter records are: December 8th, 1883; February 18th, and December 5th, 1885.

SITTIDÆ—NUTHATCHES.

233. *Sitta carolinensis*, White-breasted Nuthatch. This well known bird, so common in most places, is far from common in our district, although it would be difficult to assign a satisfactory reason for this. It is a resident species, which does not preclude a certain amount of roaming about; they may be commoner for a day or two, even in the city. In summer they must be called rare. At the "Pines," Ottawa East, they were seen 23 times from November 1st, 1908, to March 21st, 1909, whereas only three times in the three summer months of 1907.

234. *Sitta canadensis*, Red-breasted Nuthatch. Of about the same status as its congener. But, whereas *carolinensis* prefers deciduous woods, *canadensis* frequents the evergreen forests, and is therefore more numerous in the northern part of our district. The bulk of the species migrate.

PARIDÆ—TITMICE.

235. *Penthestes atricapillus*, Chickadee. This jolly little bunch of feathers is a common permanent resident with us, although often strangely rare in summer. It is commonest at migration time and in some winters, when it will even come into the city. During the winter of 1907-08 Mrs. Brown saw the Chickadee seventy times, while only nine times in the following winter. During mild winters this and similar species are often strangely absent, and common in severe winters.

236. *Penthestes hudsonicus*, Hudsonian Chickadee. A rare fall migrant. Early fall records for this species are: October 31st, 1883, and October 20th, 1889.

SYLVIIDÆ—KINGLETS, GNATCATCHERS, ETC.

237. *Regulus satrapa*, Golden-crowned Kinglet. A common migrant and undoubted breeder. On June 3rd, 1909, Mr. Kingston and I found it in song in a black spruce thicket in the Mer Bleue. This is a very thin, wiry performance, something like the song of the Blackpoll and Black and White Warblers, becoming higher and more rapid towards the end, as though the bird was rapidly running from the centre of the tree out along a branch to its end. I found it in June and August, also, at Inlet, Quebec. The earliest date for its arrival in spring is March 26th, becoming most plentiful in April; in fall it comes again from September 17th to November 12th.

238. *Regulus calendula*, Ruby-crowned Kinglet. An abundant migrant. Although much like *satrapa* in every way excepting song, it, to a great extent, keeps apart from it in migration. It passes through here from April 15th to May 23rd, which latter date would seem to indicate that some do not breed far north of here. About May 1st their fine sonorous song can be heard on all sides in Rockcliffe Park. They return through here from September 15th to October 23rd.

239. *Polioptila cærulea*, Blue-gray Gnat-catcher. This southerly form has been taken once by Mr. G. R. White previous to 1881. Since there is an unmistakable tendency in some southern birds to extend their range northward, perhaps this will also become more common here in time.

TURDIDÆ—THRUSHES, BLUEBIRDS, ETC.

240. *Hylocichla mustelina*, Wood Thrush. This fine songster is a rare summer resident. The Ottawa River is undoubtedly the northern boundary for it in this part of Canada. On May 10th, 1908, one was singing all day in Mr. A. G. Kingston's garden; on June 13th, 1904, I saw one in the Mer Bleue.

241. *Hylocichla fuscescens*, Veery; Wilson's Thrush. A common summer resident. In Beaver Meadow, at Chelsea, etc., it is usually to be found in summer. Time of stay: May 3rd (earliest April 21st) to September 19th.

242. *Hylocichla alicia*, Gray-cheeked Thrush. A rare migrant. I have seen it in the woods beyond Beechwood, May 16th, 1905, and 23rd, 1907. It is the most elusive of thrushes and will undoubtedly eventually be found to be commoner than supposed.

243. *Hylocichla ustulata swainsoni*, Olive-backed Thrush. A moderately common migrant and undoubted breeder in the northern part of the district. It passes through here from May

13th to June 7th (1907), when they are plentiful on the waterfront, Hull; in fall from October 1st to 12th.

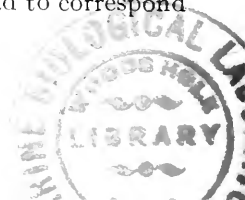
244. *Hylocichla guttata pallasi*, Hermit Thrush. A common summer resident. One is sure to find it at Blueberry Point, Mer Bleue, Chelsea, and similar localities. Extreme dates of stay are: April 10th to October 19th.

245. *Planesticus migratorius*, Robin. This old friend under a new scientific name is an abundant summer resident and is increasing in the city. Almost its only enemy there is the domestic cat, which yearly kills untold thousands of this and other species. Something should be done to limit their numbers in and near the city. The Robin may almost be called a permanent resident, since dates in every month of the year are not rare. A small flock of about four birds stayed in the city from December 21st to March 4th (see THE OTTAWA NATURALIST, vol. XXII., p. 265). The usual date for their appearance in spring is March 23rd, sometimes a week or more before, sometimes one or several days later, according to the season. In fall many linger around throughout October, as if loath to go, but all have usually gone by the end of the month, excepting a few stragglers in November.

246. *Sialia sialis*, Bluebird. A common migrant and moderately common breeder. Late in summer it often becomes strangely rare, where it was common earlier in summer, and later on becomes common once more. It arrives as early as the Robin, about March 23rd (earliest 12th), and is as loath to go as that species. I have seen some as late as November 19th at High Falls, Quebec, where it had to associate with Snow Buntings (*Plectrophenax nivalis*) at that time. North and South in close proximity!

BOOK NOTICE.

THE NATURE PHOTOGRAPHER, January, 1911.—The first number of this quarterly, the official organ of the Nature Photographic Society has been received. Some of the objects of the Society, which has its headquarters in England, are to cultivate the study of Nature Photography in all its branches; to protect the copyright of amateurs and assist them in placing their work to advantage, and to protect wild life. In the journal, favourite photographs will be reproduced, and experiences of popular Nature Photographers given. Apparatus, material and books will be reviewed—from the nature photographic point of view—from time to time. The Hon. Corresponding Secretary for Canada, Mr. C. Macnamara, of Arnprior, Ont., will be glad to correspond with anyone interested in such work.—A.G.



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