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SOIREES.

FIFTH.—On Thursday, 1st March, the fifth Soiree was held. Mr. T. W. E. Sowter read an excellent paper on the Chazy formations at Ottawa, preliminary to a more complete discussion of these measures at a future time. The paper showed that much valuable work had been accomplished, and that important discoveries had been made. Mr. Billings expressed his pleasure in listening to Mr. Sowter's contribution to the palæontology of the Chazy, which very interesting formation had not hitherto received the attention it merited. Mr. Ami also attested the value of the paper, and hoped that might not be very long before further information would be given by the writer.

Mr. J. Ballantyne then read a paper on "Our Squirrels," giving many interesting facts regarding the species of these pretty little rodents which had come under his observation. Through the kindness of Dr. Selwyn, Director of the Geological Survey, the Club was enabled to exhibit beautifully mounted specimens of the different species. Mr. Stewart gave an account of a squirrel taking to the water and swimming across a lake. Prof. Macoun spoke in high terms of the paper and gave some of his own observations on several species. The scarcity of the larger forms about Ottawa was due to the lack of of the nut-bearing trees, from which their food is obtained.

Mr. Fletcher gave an account of a flying-squirrel which he had kept for some time as a pet. He also explained the habit of a British Columbia species hanging up fungi in the branches of the pine trees (*P. ponderosa*) as observed by Prof. Saunders. Prof. Macoun, in connection with the squirrel's custom of storing up food, stated that in the Rocky Mountains there were small rodents which were actual haymakers, cutting grass and herbs in small bundles and leaving it until dried before storing it away. Mr. MacLaughlin described the manner in which he had observed squirrels storing butternuts in angles of the branches and crevices of the bark of the large trees upon which they grew.

SIXTH.—The last Soiree of the winter course of 1887-88 was held on Thursday, the 15th March. Mr. A. O. Wheeler read an exceedingly interesting paper entitled "Autumn on the Ottawa," describing in a

vivid and graphic manner the scenery and incidents of a canoe-trip from Lake Nipissing, by way of the Mattawa, to the Ottawa River, and down that magnificent stream to Ottawa. This paper, with those above mentioned, will duly appear in the OTTAWA NATURALIST. Prof. Macoun moved a vote of thanks to the lecturer, stating that in his opinion the paper had been one of the most interesting read before the Club, and was of a character that should be encouraged, as giving more pleasure to those members who were not specially interested in scientific investigations. The motion was seconded by Rev. Prof. Marsan, who was able to bear testimony to the skill and truthfulness with which the various scenes had been depicted. Remarks were made by other members, and the President, in tendering the thanks of the meeting to Mr. Wheeler, congratulated the Soiree Committee in having been able during the course of lectures just closed to introduce so many new contributors of valuable papers to the Transactions.

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AFTERNOON LECTURES.

SIXTH.—On Monday, the 13th February, Mr. James Fletcher discussed the importance of the study of entomology, and gave an outline of the classification and structure of insects which was readily comprehended by all present. He showed the necessity of the use of scientific terms, constructed from the Latin and Greek, that students in all parts of the world might be able to comprehend the writings of naturalists in other countries. The economic aspect of entomology was then briefly stated, and a few instances were given to show the enormous loss inflicted annually upon man by certain species, many of which by the intelligent use of the proper remedies might be greatly reduced in numbers. Some groups of the Lepidoptera were referred to and their distinguishing features explained. The necessity of studying entomology in a systematic manner was pointed out, and the careful preparation and preservation of specimens urged. A brief but useful discussion followed in which Prof. Macoun, Mr. Whyte, the lecturer and others participated.

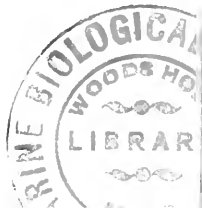
SEVENTH.—On Monday, the 20th February, the subject of entomology was again discussed by Mr. Harrington. After briefly considering the position of insects in the general plan of animal life, he explained why certain common insects, such as a butterfly, grasshopper etc., were placed in certain orders. The habits of certain species, as *Corydalus cornutus*, the ant-lions (Myrmeleon), *Belostoma Americana*, etc., were mentioned, after which an outline was given of the order Hymenoptera, which has been specially studied by Mr. Harrington for several years. The bees, wasps, ants, ichneumons, sawflies and other principal groups received such brief explanation as the limited time permitted. Allusion was made to the great number of species which occur in the neighbourhood of Ottawa, and to the want of a greater number of entomological students to work up the various orders, several of which have been yet untouched. Several diagrams, giving the structure of a bee, the nervous system, etc., were shown. An interesting discussion followed, in which the necessity of the Club having a typical local collection was strongly urged by Prof. Macoun. Among other speakers were Messrs. Ballantyne, Whyte, Ami, Stewart and Fletcher.

EIGHTH.—On Monday, the 27th February, the President, Mr. R. B. Whyte, gave a very interesting address on the growth of plants, and the importance of the functions exercised by them as regards the welfare of mankind. After briefly considering the various parts of the plant essential to its growth, he showed how it was able to subsist on inorganic matter, and to lay up a store of food suitable for the support of animal life. The atmosphere was continually being purified by the decomposition by plants of the carbonic acid gas, and the carbon thus laid up served as fuel for man. Thus man was indebted to plant life for his fuel, his food and much of his clothing, while the plants were useful to him also in a great variety of ways. The reproductive organs, or flowers, were then briefly examined, after which some valuable information was given as to the best methods of studying botany. An interesting discussion followed, in which Prof. Macoun, Mr. Ami, Mr. Ballantyne and others participated.

NINTH—On Monday, the 5th March, Prof. Macoun treated in a very plain and instructive way of mosses, using that term in its wider

sense, as it is popularly understood, so as to include the lichens, etc. To give an idea of the great number of these forms, he mentioned that there were found in Canada, in round numbers, about 1,250 species of mosses, lichens and liverworts. Of fungi and algæ there would be about 1,000 more species, so that of the lower forms of plant life there were as many species as of the higher, or flowering forms. He clearly explained the differences between the modes of growth of the different groups, and then gave an outline of the reproductive organs and of the structural features of which use was made in classifying. The value of certain forms as producers of peat, of food for animals, etc., was illustrated, and in this connection the Professor showed how a little knowledge of botany might often be found very useful. The study of mosses was advocated, as material was everywhere so abundant that no one need be at a loss for objects of investigation. The usual discussion followed the address, and was joined in by Messrs. Whyte, Fletcher, Ballantyne, Stewart and others.

Tenth.—On Monday, the 12th March, the final Afternoon Lecture for the year 1887-88 was given by Prof. Macoun. His subject was the Classification of Plants, which he introduced and discussed in a most attractive and instructive manner. Commencing with the system adopted by Linnæus he showed how modifications had steadily been fond necessary as additional knowledge of plants were obtained. He demonstrated the simplicity of the classification now in use by botanists, and how readily every plant could be placed in its position thereunder. The structural characteristics of well-known species were considered in connection with their places in the various orders, and the reasons for the species being placed therein were most clearly pointed out. This lecture was, in the opinion of those present, the best of a very successful series, and gave a vast amount of valuable information in a concise and interesting manner. It was followed by the usual discussion.



PRELIMINARY NOTES ON THE CHAZY FORMATION AT AYLMER, P. Q.

T. W. EDWIN SOWTER.

(Read 1st March, 1888.)

Until the past season of 1887, comparatively little has been known relative to the palæontology of that part of the Chazy formation occurring along the north shore of the Ottawa River, at and in the vicinity of Aylmer, P. Q. Indeed these interesting exposures have hitherto been regarded, by some members of the Club, as being for the most part only of geological interest. This view, however, will now require to be somewhat modified. During the season already referred to, the writer, together with Mr. W. R. Billings and Mr. John Stewart, visited, examined and collected fossils from some twenty different exposures in that locality. The information thus obtained, although it has been deemed inadequate for the preparation of a final report upon the local stratigraphical features of this formation,—this having been left for the work of another season or seasons—yet,as a contribution to the palæontology of this district, it may be regarded as eminently satisfactory. Although several outlying fossiliferous exposures at Remon's Point, Snake Island Bay, &c., &c., on the Ontario shore were examined and noted as being places of interest for subsequent investigation, still the tract of country to which these notes more particularly relate is embraced by that part of the Township of Hull, which extends along the shore of the Ottawa River, from the site of the old H. B. Co's post at Blueberry Point, north-westward to the town line of Eardley; and from the river shore northward to where Chazy comes in contact with overlying beds of dark limestone, holding in abundance *Tetradium fibratum* and several other forms which would appear to characterize it as the lower part of the Black River formation.

One of the most notable features in the geology of this part of the Township, is the sharp contrast occurring at their junction between the Chazy, and what we will term provisionally the Black River formation. Thus far the evidence in our possession goes to show that the dividing line between the two, and at the same time the uppermost bed of the

first named formation, is represented by a continuous band of light grey calcareous sandstone, holding in great abundance *Orthoceras Antenor*, *Modiolopsis parviuscula* and several undescribed species of *Ctenodonta*. This band has been traced a distance of about five miles, extending from the second milestone on the Aylmer Road, in a westerly direction, to where it outcrops on the Eardley Road opposite the residence of Mr. F. Parker. In descending order, there occurs next to this a considerable thickness of shale, which immediately overlies another heavy dark colored bed of calcareous sandstone, which appears to be composed for the most part of fucoidal remains, no other organic matter having been found therein. These two strata, with their intervening shales, have been identified at about a dozen different exposures, and have been found to preserve invariably the same stratigraphical order. It might here be observed, that beds similar to these occur at Hog's Back, on the Rideau River, with the exception that the upper bed, at that place, contains fewer and more poorly preserved fossils, and is a good deal thicker than its equivalent at Aylmer.

As a general rule the Aylmer shales have yielded very fair specimens of characteristic *Lingula*, together with fragments of *Isotelus canalis* and probably an undescribed species of the same genus; but, where they are deficient in well preserved specimens of the first mentioned forms, they have been found, in many cases, to be crowded with the comminuted remains of these delicate organisms.

While the foregoing remarks, relative to the finding at Aylmer of typical chazy forms, are applicable in a great measure to the shales at Hog's Back, an important exception was met with at the latter place in the discovery of *Lingula Mantelli*, a member of the *Brachiopoda*, the upward range of which has hitherto been limited to the Calciferous formation.

It might here be be observed that, in a paper read before the Club, March 4th, 1885, Mr. H. M. Ami alludes to the occurrence, in one of the fossiliferous beds at Hog's Back, of "numerous black phosphatic nodules, probably coprolites," associated with *Lingula Belli* (Billings) and *Cyrtodonta breviuscula* (Billings). During the past season these "nodules" have been examined and recognized as very diminutive

members of the *Brachiopoda* and *Lamellibranchiata*, as yet unclassified.*

A short distance to the north of Taylor's Point, in a light grey and very coarse grained sandstone, a *Lingula* was obtained, somewhat resembling *L. Lyelli* and *L. Nympha*, but probably distinct specifically from either of them. This will be an interesting form for future study.

In front of the dwelling house of Mr. Baillie, at high water mark, there occurs another band of coarse granular sandstone, which is composed almost altogether of the detached valves of brachiopods. In the majority of cases the specimens show only the internal casts, good ones showing the external markings being difficult to obtain. A sufficiently complete series of these forms has, however, been collected for the identification of *Rhynchonella orientalis, Orthis imperator, O. platys* and a species of *Orthis*, which may eventually turn out to be *O. peiveta*. Mr. Baillie informs us that this bed was met with in the excavation of a well, a short distance from here, and the fossils found to be in an excellent state of preservation.

The most important finds of the season, however, are referable to a very heavy bed of brownish weathering sandstone about 10 feet above the level of the band already indicated as occurring at high water mark. This bed has furnished us with a larger, more varied, and more interesting set of associated forms than any that has hitherto been met with in this district; but, until it can be thoroughly worked up, it would be premature to attempt to give anything more than a rough preliminary sketch of the fossils it contains, some of which are the following :—

Rhynchonella orientalis, Ctenodonta (three species undetermined).

Murchisonia n. sp.—This form is allied to *M. bicincta* or to *M. ventricosa*, and resembles some of the specimens from the Mingan Islands which are referred, in the Geological Survey collection, to the former species.

*These forms, which are probably those referred to in the Geological Survey Report of 1863, have been met with at Aylmer in a bed of very impure shale, associated with *Lingula Belli*. In the same band there also occurs a number of large circular flattened nodules, from 1 to 2½ inches in width, not unlike, in general appearance, *Pascolus globosus*. So far they have yielded no evidence of structure, but it is not at all unlikely that, as additional light is brought to bear upon them, they may ultimately prove to be—like those observed by Mr. Ami—of organic origin.

Euomphalus ——*sp. ?*—This very closely resembles *E. circumliratus* (Whitfield) described from the rocks at Fort Cassin, Lake Champlain.

Pleurotomaria n. sp.—This does not appear to be allied to any known species.

Pleurotomaria (Scalites) n. sp.—In some respects this form is allied to *P. docens* (Billings), but differs from it it in the flatness of the spire and the formation of the upper surfaces of the whorls. So far there appears to be no important relation between the obscurely carinated margin of this species and the peculiarly furrowed spiral band which is so characteristic of *P. docens*. In one instance an interesting feature was observed in this form in the presence of an inner or pillar lip which folds over and completely closes up the umbilicus.

Pleurotomaria supracingulata.—As this form is represented by only one imperfect and very poorly preserved specimen, it is doubtful whether more complete information will confirm its reference to this species.

Metoptoma n. sp.—This has some slight resemblance to *M. instablis*, from the Quebec Group, but differs from it in the form of the anterior margin and the shape and position of the apex.

At the Elm tree, Pointe au Pin, in a bed of magnesian limestone, *Pleurotomaria gregaria* was found associated with some *Crustacea* which have not as yet been fully worked out. This species, described from the Calciferous of St. Annes, P.Q, differs from the characteristic *Pleurotomaria* of the Trenton, being one of the group to which *P. Laurentina*, *P. normani*, etc., etc., belong. The finding of two more undoubted Calciferous species (*P. gregaria* and *Lingula Mantelli*) in the Chazy supplies an additional argument in favor of attaching the Calciferous to the Silurian. The predominance of large *Orthocerata*, *Gasteropoda* (*Murchisonia*, *Ophileta*, *Raphistoma*), etc., together with tribolites resembling those of the Trenton group rather than the Cambrian, are arguments in favor of separating it from the Cambrian.

The above notes must be regarded as merely of a preliminary nature, for as the actual time devoted to field work amounted to only a few days, it is obvious that so short a period must have been altogether

inadequate for exhausting the palæontological possibilities of so large a district as the one under consideration. Added to this, the writer has not had sufficient time at his disposal to thoroughly work out the material in his possession. Such of the species, as may ultimately prove new to science, will be treated in a subsequent paper, in which they will be figured and duly described. The following is a list of the forms collected during the past summer, and, although it is a very imperfect one, it is to be hoped it may be of service as a basis for future work in this part of the Chazy formation :—

BRACHIOPODA.

Lingula Belli.
" Huronensis.
" Mantelli.
" N. sp.
Orthis imperator.
Orthis platys.
" perveta ?
Rhynchonella plena.
" orientalis.
" ——— sp ?

LAMELLIBRANCHIATA.

Modiolopsis parviuscula.
Modiolopsis ——— sp ?
Ctenodonta 3 ——— sp ?

GASTEROPODA.

Pleurotomaria gregaria.
" supracingulata.
" (Scalites) N. sp.
Murchisonia N. sp.
Enomphalus ——— sp ?
Metoptoma N. sp.
Pleurotomaria N. sp.

CEPHALOPODA.

Orthoceras Antenor.
Orthoceras ——— sp ?

CRUSTACEA.

Isotelus canalis.
" (?) N. sp ?
Leperditia Canadensis.
Beyrichia ——— sp ?

ANNELIDA.

Serpulites ——— sp ?

INCERTÆ SEDIS

Scolithus ——— sp ?

In connection with the above, it is but just that mention should be made of the kind and generous manner in which Mr. J. F. Whiteaves, of the Geological Survey, rendered his valuable assistance in the determination of critical species, for which, however, it must be distinctly understood, he is in no way responsible.

ANNUAL MEETING.

The tenth annual meeting of the Club was held on the 20th March, 1888 (the third Tuesday in the month), in the Museum of the Ottawa Literary and Scientific Society, commencing at 4.15 p.m. The President, Mr. R. B. Whyte, occupied the chair, and the following members were present:—Prof. Macoun, Dr. H. B. Small, W. H. Harrington, T. J. MacLaughlin, H. M. Ami, J. Fletcher, Dr. R. W. Ells, W. R. Billings, J. Stewart, E. B. Bell, W. A. D. Lees, S. McLaughlin, H. B. Small, A. A. Bristow, N. Ballantyne, W. L. Scott, Rev. C. F. Marsan, W. P. Anderson, R. H. Campbell, A. J. Forward, H. P. Brumell, S. Jarvis, J. M. Macoun. The minutes of the previous annual meeting having been read and approved, the secretary, Mr. W. H. Harrington, presented the Annual Report of the Council. The members were gratified to learn from this report that the affairs of the Club were in a prosperous condition, and that the membership had been largely increased during the year. The Report was unanimously adopted, after expressions of satisfaction from several of those present. The Treasurer, Mr. James Fletcher, then submitted his Report and Balance Sheet, showing that, notwithstanding the exceptional expenditure consequent on the monthly publication of the OTTAWA NATURALIST, there remained in his hands a of $20.76 surplus over all expenses of the year. This statement was very satisfactory, insomuch that many of the members had been dubious as to the result of increasing the cost of publication. The Librarian reported that many valuable publications had been received during the year.

Prof. Macoun gave notice that at the next general meeting of the Club he will move, that the Executive Committee of the Council shall consist of six members, three of whom shall be ladies.

The election of officers was then proceeded with, Messrs. E. B. Bell and N. Ballantyne being appointed scrutineers, and the following Council was elected:—President, R. B. Whyte; 1st Vice-President, Rev. Prof. C. F. Marsan; 2nd Vice-President, Dr. R. W. Ells; Secretary, T. J. MacLaughlin; Treasurer, J. Fletcher; Librarian, W. H. Harrington; Committee, Dr. H. B. Small, H. M. Ami, J. Ballantyne. The meeting adjourned at 5.45 p.m.

EDITORIAL.

Owing to unforeseen circumstances which necessitate the absence of Mr. Harrington from Ottawa for some months, he has been obliged temporarily to discontinue the editorship of this journal. Until he is again able to resume his duties, the OTTAWA NATURALIST will be edited by the undersigned as Chairman of the Publishing Committee. All communications intended for the editor should therefore, until further notice, be sent to the address given below.

The opening of Spring and with it the beginning of the collecting season make it fitting that members should at once prepare themselves to take up vigorously their studies—and it may not be amiss to suggest that all apparatus should be at once got into order or procured. In this connection I consider it but right to direct the attention of members to those merchants who assist us by advertising in the NATURALIST. I would further remind them that all the apparatus and books necessary for the collection, preservation and study of specimens in all branches, may be procured from the firms whose names appear on our covers.

Beginning with the present number some pages each month will be devoted to the publication of an annotated list of the Flora of the locality. This list will not only be a record of all the species so far observed in the neighbourhood of Ottawa, but the habitat, and, in the case of uncommon species, the exact localities where they have been found will be given, together with the date, approximately, when they may be expected to blossom.

The plan adopted in the past will be continued as heretofore. Notice will be given beforehand of all excursions and sub-excursions of the Club, and short descriptions of such excursions will appear in the following number of the journal.

JAMES FLETCHER,
Editor (*pro tem*),
Central Experimental Farm.

Annual Report of the Council

To the Members of the Ottawa Field-Naturalists' Club:

The Council has much pleasure in reporting that the present condition of the Club is very satisfactory, and that during the year just closed its work was carried on with increased success.

At the commencement of the year there were 170 members, and these have increased to 200; the number of new members elected having been 48.

No additions have been made to the list of corresponding members, of whom there are at present six.

The Excursions held during the summer were very enjoyable and were largely attended. They were five in number, and the following places were visited:—Kingsmere, Aylmer, Buckingham, Britannia and Kirk's Ferry.

Sub-Excursions were held every Saturday afternoon throughout the season and numbered twenty-one. They were well attended, and proved very pleasant and profitable to all present.

The winter course of meetings comprised six Soirées and ten Afternoon Lectures; the former being held on alternate Thursdays and the latter every Monday, commencing 9th January. At the Soirées the following Papers and Reports were read:—Dec. 8th, "President's Inaugural Address," Mr. R. B. Whyte; Jan. 5th, "Testimony of Ottawa Clays and Gravels to the expansion of the Gulf of St. Lawrence and Canadian Lakes within the Human Period," Mr Amos Bowman; Report of the Geological Branch; January 19th, "Our Forest Trees," Prof. Macoun; "Notes on Geological Work during the Summer of 1887," Mr. John Stewart; "On Utica Fossils from Rideau," Mr. H. M. Ami; February 2nd, "Vegetable Parasites," Mr. James Fletcher; Report of the Entomological Branch; March 1st, "Preliminary Notes on the Chazy at Aylmer, Que.," Mr. T. W. E. Sowter; "Our Squirrels," Mr. J. Ballantyne; Report of the Ornithological Branch; March 16th, "Autumn on the Ottawa," Mr. A. O. Wheeler; "On the Sequence of Strata about Ottawa," Mr. H. M. Ami; Report of the Conchological Branch.

The Council here desires to thank the Leaders of the several Branches for their efforts to make the Outings instructive and interesting, and also those members who read Papers at the Soirées or gave Afternoon Lectures, especially Prof. Macoun, who, in addition to the work originally undertaken by him, kindly and ably supplied the place of two members who were unable to deliver their lectures.

The Library has been enriched by many valuable exchanges and donations, lists of which have been published from time to time.

In accordance with the resolution passed at the last Annual Meeting, the Transactions and Proceedings of the Club have been published monthly, under the title of THE OTTAWA NATURALIST, forming a volume of 180 pages, and containing reports of all Excursions and Meetings, as well as the Papers and Reports which formerly were alone published.

As members have been thus kept fully informed as to the work of the Club, it is unnecessary to further enlarge this Report.

Signed on behalf of the Council,

W. H. HARRINGTON,

20th March, 1888. *Secretary.*

———:o:———

ROYAL SOCIETY OF CANADA.

The Seventh Annual Meeting of the Royal Society will be held at Ottawa, commencing on 22nd May next.

There are upon the Programme several papers of interest to the members of this Club, all of whom have been invited to attend the meetings. The Club will be represented by the President, who, as Delegate, will report on the progress we have made during the past year.

TREASURER'S REPORT.

To the Council of the Ottawa Field-Naturalists' Club:

GENTLEMEN,—Herewith I beg to submit a Statement of the Receipts and Expenditure during the past year. It will be observed, with regard to the Excursions, that merely the balances have been extended. This, I think, gives a clearer idea of the results of this important part of the Club's work.

I would suggest to the Council that some means should be adopted to draw the attention of the members of the Club to those firms who assist us by advertising in "The Ottawa Naturalist." They are a great help to us, and I think it only right that the members should do business with them whenever possible.

I am, Gentlemen,

Yours truly,

JAMES FLETCHER,

Treasurer.

TREASURER'S BALANCE SHEET.

Dr. *The Treasurer in account with the Ottawa Field-Naturalists' Club.* *Cr.*

RECEIPTS.		EXPENDITURE.	
To Balance, 1886-87	$ 34 92	By Nos. 1 to 12 "Ottawa Naturalist"	$238 66
Membership Fees	152 00	Miscellaneous printing	3 75
" Arrears	20 00	Postage	6 65
Profit on Excursions	14 60	Stationery	2 40
Sale of Transactions	17 05	Loss on Excursion No. 5	1 05
Advertisements	33 00	Balance	20 16
Soirée Receipts	1 10		
	$272 67		$272 67

REPORT OF THE ENTOMOLOGICAL BRANCH FOR THE YEAR 1887-1888.

To the Council of the Ottawa Field Naturalists' Club :—

The past season has probably been the most active for the Entomological Branch since the organization of the Club. Special efforts were made by the Leaders to bring this important study before the members and to gain their assistance and sympathy, Every exertion was made to have at least one Leader present at each Excursion or Sub-Excursion, so that beginners might always have someone to consult with reference to any insects captured or observed during the outing.

No opportunity was lost on such occasions to give information both by means of conversation during the outing, and by elementary addresses when the party had re-assembled preparatory to the return home. The activity thus forced upon the Leaders in striving to carry out the wishes of the Council helped them materially in building up their collections, and combined with their work at other times, resulted, as in former years, in adding largely to the knowledge of our local insect fauna.

Particular attention was given to the study of gall-forming insects and of the small Hymenoptera belonging to the families Cynipidæ, Chalcididæ and Proctotrupidæ, regarding the Canadian species of which but little was previously known. The results have been very satisfactory, but show that very much work will be yet required before our knowledge of these interesting forms will be in any degree complete.

In last year's report mention was made of the fact that this locality had already yielded 100 new species of Hymenoptera, and it can now be recorded that the number has been raised to fully 200, while undoubtedly many others are still in our collections awaiting study and description. In addition, very many rare species not hitherto recorded from Canada have been captured.

Among injurious insects the only ones demanding special attention were the two species of Clisiocampa, or Tent-caterpillars, which appeared in greater numbers than for many years previously ; forest trees for

many miles being seriously disfigured. *Pieris Rapæ*, the cabbage butterfly, was a most troublesome pest in gardens, but had its numbers greatly reduced towards the end of the season by the fungous disease known under the name of *Jaucherie*. Another butterfly, *Colias Philodice*, the sulphur yellow butterfly mentioned in last year's report as having been extremely scarce, this year appeared in almost unprecedented numbers, and committed considerable depredations upon various leguminous plants. It was found to be parasitized by a small ichneumon named *Apanteles congregatus*, Say.

Among beetles a small brownish species, *Byturus unicolor*, was very troublesome from destroying the flowers of garden raspberries. *Systena frontalis*, an elongate, black "flea-beetle" attacked many plants in gardens.

The larvæ of a saw-fly, *Emphytus pallipes*, Prov., was found to severely attack pansies, while another species of the same genus *Emphytus maculatus*, the strawberry saw-fly, was unusually abundant. The larch saw-flies, *Nematus Erichsonii*, were numerous in the early summer, depositing their eggs, but the larvæ were not correspondingly abundant, and it is probable that the increase of this destructive species has attained its maximum in this locality.

An event of great interest to our students of Entomology was the holding in this city last October of the Annual Meeting of the Entomological Society of Ontario, an account of which was duly published in the OTTAWA NATURALIST.

The object of this Report being merely to show what work this Branch has been accomplishing, it is not deemed necessary to go into further details either of an economic or scientific character.

W. H. HARRINGTON,
J. FLETCHER,
T. J. MacLAUGHLIN,
Leaders.

February, 1888.

REPORT OF THE BOTANICAL BRANCH FOR THE SEASON OF 1887.

To the Council of the Ottawa Field-Naturalists' Club:

The leaders of the Botanical Branch are pleased to report that the interest in their department continues to increase, and that this has been the means of adding several new members to the Club.

A feature of the past year has been the regularity with which the sub-excursions have been kept up during the whole season. The Botanical and Entomological branches have in most cases joined their forces and worked together. The leaders in Botany wish especially to thank the President for the assistance he has given, in enabling them to carry out the plan decided upon at the beginning of the season, of having at each of these sub-excursions a short popular lecture upon the specimens collected during the afternoon. Upon some occasions it was impossible for any of us to be present, when he always undertook this important duty and performed it to the universal satisfaction of the numerous members of the Club and their friends who attended these pleasant open air classes.

During the past season several fresh students have begun to collect and preserve our local plants, and we trust that they may be the means of adding many species, as yet unrecorded, to the "Flora Ottawaensis."

The general excursions of the Club were well attended by Botanical workers. The last of the season to Kirk's Ferry, on the Gatineau River, has introduced us to a new field, on the northern slope of the Laurentian Mountains. This district had been hitherto unworked by us. At the time of our visit (Sept. 17) it was too late in the season for most of the flowering plants; but, from what was then seen of the locality, the leaders are under the impression that it would well repay a visit earlier in the summer.

Notwithstanding that this district has now been worked carefully for nine years, the steady investigation carried on during the past season has resulted, as in every preceding year, in the addition of several new names to the list of plants. These, 24 in number, will be found at the end of this report.

Perhaps the most interesting of these were those found at the Kirk's Ferry excursion, which were of a much more northern character than the rest.

Tilia Americana, L. var. *pubescens*, Loud, was found near the St. Louis Dam as well as *Solidago juncea*, Ait.

Geranium pratense, L., a European garden-escape has been observed by Mr. R. B. Whyte at Aylmer, P.Q., for some years, and is for that reason introduced into the list as an adventitious plant.

A specimen of *Cerastium arvense*, L., sent in by Mrs. Chamberlin, found at New Edinburgh by Miss Lewis, was probably introduced from Europe amongst grass-seed.

A beautiful albino form of *Habenaria psycholes*, Gray, was collected during the past summer near Ironsides by Mr. H. M. Ami. It was growing amongst a number of plants of the ordinary colour and was of vigorous growth.

Pterospora andromedea, a rare ericaceous plant, up to the present year only found in one place in this locality, viz: under the pines over the Gatineau Rapids was found in July, at Rockcliffe, by Mr. A. J. Forward.

The Rev. C. J. Young sent in several specimens of the rare orchid *Corallorhiza striata*, Benth, which he had collected at Renfrew, and he also reports that he has found it at Perth.

It is to be regretted that in our last report "The May-Apple" (*Podophyllum peltatum*, L.) was stated to have been found by Mr. R. B. Whyte at Perth. It should have been "*Claytonia Virginica*." The leaders are responsible for this error, the name having been inserted in the report from memory instead of from Mr. Whyte's note.

On the 15th October a sub-excursion was made to Beechwood with the special object of collecting roots of the rare orchid *Aplectrum hiemale*, Nutt, and a fine patch of seven roots was found by Mr. Fred. Magee, three of which were removed for study under cultivation. The leaders wish especially to direct the attention of the Botanists to the value of studying plants while growing. This can only be done by transplanting them to some convenient place where their gradual development

can be watched. Another subject of vital importance is the growth, development, prolificacy, and time of maturity of introduced plants, especially those which are classed as weeds. Observations upon any of these points are valuable and may be useful in finding a remedy for the extermination of noxious species.

The leaders are pleased to hear that the Council has requested Mr. Fletcher to prepare a new and revised edition of the "Flora Ottawaensis," and they believe that it will be a great assistance to those who wish to study the Botany of the district. They would again suggest the advisability of some of the members of the Club taking up the study of Cryptogamic Botany—a wide field as yet barely touched upon by Canadians. Our respected member, Prof. Macoun, has shown what may be done by one man working alone, and during the past season he has added eight more species to our list of mosses, six of which are new to science and the other two had not before been found in America. He has rendered valuable assistance on several occasions, but the leaders are particularly grateful to him for his two admirable lectures upon the way to study and collect mosses, lichens and liverworts. The first of these orders has received some attention from our members, but the latter interesting subjects are as yet, we regret to say, almost virgin fields of study.

Towards the end of October a curious botanical phenomenon was observed, many of the willows coming into full flower. This was probably due to the excessive drought of the summer by which a season of forced rest was given the plants, and, as will often happen after trees have been defoliated by insects, as soon as rain came they burst into blossom. When the first snow fell some of the willows were covered with flowers.

Fine specimens of the parasitic fungi *Doassansia occulta*, Hoffm., (*D. Farlowii*, Cornu.) and *D. alismatis*, Cornu, were collected on Kettle Island in October. The former on *Potamogeton gramineus*, var. *maximus*, Morong, a new host plant for this parasite.

JAMES FLETCHER,
H. BEAUMONT SMALL, M.D.
GEORGE BAPTIE,

March, 1888. Leaders.

(Additions made in 1887.)

Barbarea vulgaris, R. Br. *var.* stricta Regel	McKay's Woods.	Mr. Fletcher.
Cerastium arvense, L.	New Edinburgh.	Mrs. Chamberlin.
Tilia Americana, L., *var* pubescens, Loudon	St. Louis Dam.	Mr. Fletcher.
Geranium pratense, L.	Aylmer.	Mr. Whyte.
Impatiens fulva, Nutt. (unspotted variety)	St. Louis Dam.	Mr. Fletcher.
Rosa Sayi, Schwein.	Hull, P.Q.	"
Cornus paniculata, L'Her.	Hull and Aylmer.	"
Aster corymbosus, Ait.	Rockcliffe.	"
Solidago arguta, Ait.	Kirk's Ferry.	"
" juncea, Ait.	St. Louis Dam	"
Vaccinium cæspitosum, Mx.	Kirk's Ferry.	"
" corymbosum, L. *var.* pallidum, Gr.	"	"
Spiranthes gracilis, Big.	Aylmer.	"
Juncus pelocarpus, E. Meyer.	Britannia.	Prof. Macoun.
Orizopsis Canadensis, Torr.	Aylmer.	Mr. Fletcher.
Andropogon scoparius, Mx.	Kirk's Ferry.	"
Leskea nigrescens, Kindb	McKay's Woods	Prof. Macoun.
Platygyrium repens, Brid., *var.* orthocladon, Kindb.	"	"
Pylaisia Selwyni, Kindb.	"	"
Homalothecium corticola, Kindb.	"	"
Hypnum adnatum, Sul. *var.* dentatum, Kindb.	"	"
Hypnum brevinerve, Kindb.	"	"
Fissidens adiantoides, Hedw. *var.* inmarginatus, Led.	Dow's Swamp.	"
Fissidens pusillus, Wils	Beechwood.	"

LIBRARIAN'S RECORD.

The following donations have been received since our last issue:

U. S. Geological Survey: Bulletin No. 37; Types of the Laramie Fauna; Annual Report, 1884–5; Geology and Mining Industry of Leadville, Col.; Mineral Resources of the U. S.

American Association for the Advancement of Science: Proceedings, Vol. XXXIV.

Physikalisch-Okonomischen Gesselschaft, Konigsberg: Schriftender, 1886, etc.

Elisha Mitchell Scientific Society: Journal, 1886-7.

North Staffordshire Naturalists' Field Club: Annual Report, 1887.

Entomological Society of Ontario: Canadian Entomologist, Vol. XIX, No. 12, Vol. XX, Nos. 1–3.

Cambridge Entomological Society: Psyche, Vol. V, Nos. 141–2.

Montague Chamberlain: Catalogue of Canadian Birds.

Dr. W. A. Kellerman: Journal of Mycology, Vol. III, Nos. 11 and 12, Vol. IV, No. 1.

Dr. Geo. Vasey: Report of U. S. Botanist, 1886.

Kansas Academy of Sciences: Transactions, Vol. X.

California Academy of Sciences: Bulletin, Vol. II, Nos. 6 and 7.

American Ornithologists' Union: The Auk, Vol. V, No. 1.

F. H. Carpenter: The Ornithologist and Oölogist, Vol. XII, Nos. 7–12, Vol. XIII, No. 1.

Chas. M. Bell: Our Northern Waters.

Montreal Natural History Society: The Canadian Record of Science, Vol; III, No. 1.

Cincinnati Society of Natural History: Journal, Vol. X, No. 4.

Torrey Botanical Club: Bulletin, Vol. XIV, Nos. 11 and 12, Vol. XV, Nos. 1 and 2.

The Editor: Botanical Gazette, Vol. XII, Nos. 7–12, Vol. XIII, Nos. 1 and 2.

Brooklyn Entomological Society: Entomologica Americana, Vol. IV, Nos. 7–12.

New York Microscopical Society: Journal, Vol. IV, No. 1.

FLORA OTTAWAENSIS.

By James Fletcher, F. R. S. C., F. L. S.

It is now eight years since my first list of the plants of this district was prepared for the members of the club. This was merely a bare list of the names of 810 species collected by the writer during the summer of 1879. "This district" was then understood to mean a radius of about twelve miles from the City of Ottawa, and was defined as the country lying between the following points:—Meech's Lake in the Chelsea Mountains on the one side, and the Mer Bleue on the other. Down the Ottawa River, East Templeton and Green's Creek were included, and up the river, Britannia and the islands above Aylmer. Latterly, however, by general consent of the botanists of the club, this radius has been extended to about 30 miles, so as to include Casselman on the one side, and Wakefield on the other; and up the river as far as the Chats Rapids and down to Buckingham.

Previous to the appearance of the above-mentioned list, there had been printed by the Ottawa Natural History Society a "List of plants collected by Mr. B. Billings in the vicinity of the City of Ottawa during the summer of 1866." This contained the names of 404 species, with the dates of their inflorescence, which appear in the present list marked (B).

The following collections had also been made previous to 1879:—By Mr. B. Billings, (1866-7) which is now in the museum of the Ottawa Literary and Scientific Society; by Mr. A. H. Moore, an energetic collector, and one who added largely to our knowledge of the flora of the vicinity (1870-78). Through the generosity of the last named gentleman, this collection now forms part of my own herbarium; by Mr. Robert Whyte and Dr. H. B. Small, who began to collect about 1875, and are still active members of the Botanical Branch of the Club. The present list contains every species up to this time found in the district and identified with certainty; further additions will be published annually, as they are recorded. It has been prepared at the request of the Council, more especially as an aid for those beginning to study our flora.

The 1879 list gave merely the names of all species at that time known to have been found at Ottawa; but gave no information upon some of the most important points the local botanist requires to know about, such as the prevalence of any species in the locality, whether it be indigenous or introduced, plentiful or scarce.

Certain plants common in some localities are rare here, and *vice versa*; again, plants indigenous to Canada, but not to the Ottawa district, have been introduced either by accident or have escaped from cultivation. All of these facts should be made known to students, or they may fall into error. It was therefore thought well, this time, to add short notes under each species, giving the general habitat special localities and approximately the date in the year when collectors may expect to find the different species in flower.

With the exception of two or three species, all have been found by the writer in the localities mentioned, and in every case the actual specimens recorded have been carefully examined by him.

A general habitat is given for each species, and in the case of rarities, exact localities are mentioned. When no special locality is given, it is intended to show that the species is of common occurrence.

When no collector's name is given after a locality, or the initials (J. F.) appear, the writer is responsible for the record. When a plant of interest is recorded from other localities than those where the writer has found it, the name of the collector is given in parentheses. In instances where a person's name is followed by an asterisk, (*) it is to show that this was the first record of the plant having been discovered in the Ottawa district.

In indicating the time of the year when the plant may be looked for in flower, the months have been divided into four quarters, so that when the name of a month is followed by the numbers 1, 2, 3 or 4, it shows that the plant may be expected to flower in the 1st, 2nd, 3rd or 4th quarter of the month.

Synonyms have been, for the most part, omitted, except in cases where plants appear in the list under other names than those given in Dr. Gray's "Manual." These, as well as introduced plants, (whether into this district or into Canada) are printed in Italics.

In compiling this new list, Prof. Macoun's catalogue, issued by the Geological and Natural History Survey of Canada, 1883, *et seq.* has been followed, and as Canadian botanists now arrange their collections by that excellent catalogue, I have thought it well to give before each species Prof. Macoun's number.

———:o:———

POLYPETALOUS EXOGENS.

RANUNCULACEÆ.—Crow-foot Family.

CLEMATIS, L. Traveller's Joy. Virgin's Bower.

1. C. VERTICILLARIS, D C., (Mauve flowered Clematis).
   Atragene Americana. Sims.
   Creeping over rocks and low shrubs. King's and other mountains, Chelsea, P.Q. Not uncommon. May—4.
2. C. VIRGINIANA. (Common Virgin's-Bower).
   Borders of streams. Aug.—1.

ANEMONE, L. Wind Flower.

12. A. CYLINDRICA, Gray, (Long-fruited Anemone). Dry pastures. Ju.—2.
13. VIRGINIANA, L.
    Rocky, open woods. There are two forms of this plant, (i) with greenish flowers like the preceding, but always with much shorter heads of fruit; and (ii) with white flowers almost as large as those of No. 15. From this latter, however, it is easily distinguished by the woolly seeds. (i) Common, (ii) on the rocks round Lake Flora, Hull, P. Q. Ju.—2. (B).
15. A. DICHOTOMA, L., (Round-headed Anemone).
    A. Pennsylvanica, L.
    Along river margins and in low meadows. Ju.—2. (B).
17. A. HEPATICA, L. (Liverwort. Blue May-flower).
    Hepatica triloba, Chaix.
    Dry, rocky, woods. One of our earliest flowers; not quite as common as No. 18. Ap.—3. (B).

18. A. ACUTILOBA, Lawson, ("May-flower.")

Dry, shady, woods. Ap.—3. (B).

THALICTRUM. Tourn, (Meadow-rue).

20. T. DIOICUM, L. (Early Meadow rue).

River banks and low woods. Ju.—1. (B).

21. T. PURPURASCENS. (Purplish Meadow-rue).

Templeton and along the Ottawa below the city, (H. M. Ami*), Hull, (J. F). This species is distinguishable from *T. Cornuti* by having the anthers drooping on capillary filaments, and the flowers greenish purple. On the other hand, *T. Cornuti* has white flowers, short filaments and anthers not drooping.

22. T. CORNUTI, L. (White-flowered Meadow-rue).

Islands and wet meadows and swamps; a tall handsome plant. July—1. (B).

RANUNCULUS, L. (Crow-foot. Buttercup).

28. R. AQUATILIS, L. *v.* TRICHOPHYLLUS, Chaix, (White Water-Crow-foot).

Stagnant and slow-flowing waters. Ju.—1.

29. R. MULTIFIDUS, Pursh. (Yellow Water-Crow-foot).

In shallow water, and creeping over mud, Mallock's Bay, Dow's Swamp and Kettle Island, (J. F.) Billing's Bridge. (R. B. Whyte). Ju.—2.

Var. *y.* REPENS, Watson.

Leaves all round-reniform, palmately, 3—8 cleft; stems creeping in mud, Casselman and Gatineau Point, (Prof. Macoun). Ju.—2.

31. R. FLAMMULA, L. *var.* REPTANS, Meyer, (Smaller Creeping Crow-foot).

Mud-flats and river margins. July—1.

32. R. CYMBALARIA, Pursh, (Salt-water Crowfoot).

In a low wet meadow, at Thurso, P. Q. Ju.—2.

37. R. ABORTIVUS, L. *var.* MICRANTHUS, Gray, (Small-flowered Buttercup).

Woods and Meadows. From Macoun's Catalogue, Part III., p. 480. It would appear that our Ottawa plant is not the type of *R. abortivus*, L. May—2. (B).

30. R. RECURVATUS, Poir, (Downy Wood-Buttercup)

Woods. An attractive species with large leaves and small flowers. May—2. (B).

45. *R. acris*, L. Meadow Buttercup.

Introduced from Europe. Very abundant in meadows. June. (B).

47. R. PENNSYLVANICUS, L. (Bristly Buttercup).

River flats and swampy woods. July—2. (B).

48. *R. Repens*, *L.* (Creeping Crowfoot).

Introduced from Europe. Governor-General's Bay, New Edinburgh. I have not succeeded in finding the native form of this species at Ottawa.

CALTHA, L. Marsh Marigold.

54. C. PALUSTRIS, L. (Water Cowslip).

Margins of streams and in swamps. May—2. (B).

COPTIS. Salisb. Gold-thread.

57. C. TRIFOLIA, Salisb, (Three-leaved Gold-thread).

Low woods and on hummocks in swamps. A lovely little plant with shining leaves and white starry flowers. May—1. (B).

AQUILEGIA, Tourn, Columbine.

59. A. CANADENSIS, L. (Wild Columbine "Honey-suckle.")

Rocky woods. A beautiful plant well worth cultivation for its red and yellow flowers. May—3. (B).

DELPHINIUM, Tourn, Larkspur.

65. *D. Consolida*, L. (Blue Field Larkspur).

Introduced from Europe in seed grain, and escaped from gardens. Flowers sometimes pink or white. June—4.

ACTÆA, L. Baneberry.

73. A. ALBA, Bigelow, (White-berried Cohosh).

Woods and river banks. The spikes of flowers longer and blooming a week later than those of No. 74. The conspicuous waxy white berries on their thick red pedicels, render this one of the most notable berry-bearing plants. May—4. (B).

74. A. SPICATA, L. *var.* rubra, Ait. (Red-berried Cohosh).

Rich woods. The flowers in a more compact head than the preceding, on longer pedicels and of a clearer white. A white-berried variety of this species frequently occurs; but it may be

OUR SQUIRRELS.

By J. Ballantyne.

(*Read 1st March, 1888.*)

As has already been announced, I have undertaken to read a short paper concerning the squirrels which are to be seen, more or less frequently, in the neighborhood of Ottawa. When I undertook to do so I was well aware of the fact that the Ottawa Field Naturalists' Club held in its membership a number of persons who were, perhaps, better acquainted with the subject than I was myself, and were consequently better fitted to speak about it. From an anatomical point of view, I know very little about them. My observations have been of a verd casual kind, and have been restricted to their outward appearance and some of their habits. As, however, what I have to say is from personal observation, it may possibly be of some interest to those persons who, for want of opportunities or from other causes, have paid even less attention to the study of the wild animals existing round about us than I have myself. From my own experience I am sure that much can be added to the enjoyment of life by cultivating the acquaintance and getting ourselves on a friendly footing with many of our wild neighbors. Most of them quickly respond to kind treatment and manifest their confidence and trust in various ways; among some of our birds this pleasing trait is very marked. As an instance, I may say that we have had three different kinds of wild birds build their nests and bring out their young, at the same time, within a few feet of each other all under our verandah, and almost within reach from a door which we were constantly using. Some of them came into the house quite frequently, and showed very little fear. We took a great deal of pleasure in watching them in their nest-building and rearing of their young. The birds were not the only animals whose company we enjoyed. We derived no little pleasure from seeing about, the clean, active and graceful little rodents which are the subject of this paper.

Before attempting to describe the different Squirrels seen in this vicinity, it may be well in the first place to outline, in a general way

and in as few words as I can, how we may know a Squirrel when we see it, and in what respects it differs from other animals.

* * * * * * * * *

A concise sketch was here given of the classification of the animal kingdom, and the Squirrels were traced down step by step to the Rodentia.

* * * * * * * * *

By an examination of the little animal in question we learn at once that it belongs to the order of rodents. The animals of this order are easily distinguished by the arrangement of their teeth. They have no canine teeth, the incisors or cutting teeth being for the most part only two in each jaw, large and strong, and a vacant space between them and the molars or grinders. The front teeth have a plate of hard enamel on the outside which wears more slowly than the substance of which the rest of the teeth is composed, for this reason the teeth always remain sharp, acquiring a chisel like form, well adapted for cutting or gnawing; and unlike the teeth of most other animals, they are always growing from a fleshy pulp at the base so that compensation is made for wear at the cutting ends. Something over six hundred different kinds of rodents have been described and are to be found in nearly every part of the globe; about one hundred species have been described as belonging to North America.

Having located our little friend among the *Rodentia*, it is necessary to follow him just a little further in order to find out who he is. The divisions in the order are called families, each family having some peculiarity common to itself. Among the first of the family names we find that of *Sciuridæ*, deriving their name from a corruption of two Greek words, *skia*, a shade, and *oura*, a tail, from a habit they have of curling their tails over and along their backs so as to form a kind of shade. They are described as animals of rather small size with great variation in color, their bodies being longish, eyes large and bright, ears erect, upper lip always divided, the posterior limbs longer than the anterior, the former have five toes and the latter only four with a tubercle covered with an obtuse nail in place of a thumb, tail long with bushy hair and generally distichous or divided laterally, having somewhat the appearance of a thick feather. All the species of

this family live mostly on trees, their long flexible toes with acute nails enabling them to leap from tree to tree, and they very rarely miss their hold. They feed principally on vegetable productions, such as nuts, seed, grain, etc. We cannot but know from the above description that our little rodent is a member of the *Sciuridæ* or Squirrel family.

The family of Squirrels is widely disseminated, Australia, Madagascar, New Zealand and the West India Islands being almost the only places where they are not found. According to Bachman about forty different species have been described, eighteen of which are natives of North America. Other Naturalists put the number of species at a much higher figure. Jordan, in his "Vertebrates of North America," states that the number of species is not so great as was at first supposed, many of the so called species being simply varieties. The Black and Gray Squirrels are now considered to be the same species.

In the neighborhood of Ottawa five different kinds of Squirrels have been seen; only two of these are very common, namely, the Common Red Squirrel (*Sciurus Hudsonius*) and the Chipmunk or Ground Squirrel (*Tamias striatus*).

The Red Squirrel is of a dark brownish red along the back gradually turning lighter as we approach the sides; the cheeks are grey and all beneath is white. In some individuals a black line runs from the shoulders along the flank immediately above the white, the tail is of a rusty brown with black hairs on the borders, on the under side it is lighter in color along the middle and grows darker on the outer edges. The length of the head and body is about eight inches and the bony part of the tail about five inches, and including the fur it is between six and seven inches.

The Red Squirrel is a noisy little animal, and makes several distinct sounds expressive of its likes and dislikes. When hunted, so long as it feels that there is danger, it keeps very quiet, but the moment it feels that a place of safety has been reached it makes a quick, short and squeaky bark as much as to say the danger is past. If the supposed place of safety should be a tree it will ascend high enough to be fairly out of the reach of its pursuers, and perching itself upon a branch with its tail

turned up along its back with the point turned outwards, will open out upon its pursuers with a continuous volley of barking defiance.

> "Ascends the neighboring beech, then whisks his brush and perks
> His ears, and stamps and scolds aloud, with all the prettiness
> Of feign'd alarm, and anger insignificantly fierce."

Its note of call or endearment is a kind of prolonged "chirr." When this sound is made it is immediately answered by its mate, if within hearing distance. Squirrels choose their mates early in life, and so far as known remain faithful to their first love. The mother gives birth to three or four young ones about the beginning of June, and watches over them with great solicitude. The first nest of young squirrels which came under my notice was in a hollow stump at the edge of a pine woodland. The mother would not leave the nest at my approach, nor could I make her do so without resorting to forcible means which I never did. If often disturbed, the mother will remove her young carrying them in her mouth, after the manner of a cat, to another place of safety or concealment. A family of four squirrels took up their residence at our place in the early part of the summer of 1886, and remained with us nearly a year. The young ones were at the time rather more than half grown and were very playful, often playing a game which resembled a popular one with young children called "tag." From the time the apples in our garden were fit to eat until late in the fall they seemed to live on them almost exclusively. They not only pulled what they wanted for present use, but they stored away a great many in a pile of wood which we had near the house. They also carried off hundreds of crab apples depositing them on trees wherever they could find a forked branch which would hold one securely. They were very particular in selecting such places, and would not leave an apple until they were fully satisfied that it would remain where they put it. They also gathered up a great many plum stones depositing them in hollows made in the ground, and covering them over with an inch or so of leaves or earth; they had dozens of these little hoards scattered about with no great quantity in any of them. As the cold weather approached they began house building; selecting a place between the wall plate and the roof of an outbuilding. The nest consisted principally of cedar bark torn into fine shreds; it was completely covered

over, there being only a small hole at one side for getting in and out. There was no appearance of their having eaten or stored any food in the nest. In the late fall and early winter months when the ordinary supply of food had failed they had recourse to their elevated accumulations, and could be seen every day going from branch to branch or from tree to tree eating up the withered and decayed fruit. They may have eaten only the seeds. In the cold and stormy time of winter they sometimes would not be seen for several days, but on sunshiny days they always came out and would sit for hours on our wood pile basking in the sun. We fed them frequently and they became so tame that they would come at our call and take food from our hands, of course it took some time to gain their confidence. After their supply of apples had failed they began eating the terminal buds on the balsam spruce trees, of which we have several in our garden. They next began eating flower buds of the red maple. The buds on those trees swell out very early in spring and are sometimes in full flower early in April. We have one tree of the American Larch in our garden, more commonly known hereabouts by the name of Tamarac; when the Squirrels found it they seemed to prefer it to any of the other trees, and made sad havoc among the small branches. When eating the buds of the balsam and maple they did so without cutting off any of the small branches, but when they began at the tamarac they first cut off the little branches, varying in length from a few inches up to one or two feet, and sitting upon their haunches and holding the little branches with their fore-paws, moved them along, eating off the buds as they did so, much in the same way as we have seen some members of the *genus homo* do in eating green corn from the cob. In the spring, when the snow began to go away, the remains of numerous runways were to be seen made by the Squirrels under the snow in search of the deposits made by them the previous autumn. Later in the season dense clumps of young plum trees came up in places where the Squirrels had previously buried the plum stones and had failed to find them in winter. It is highly probable that our fruit and nut bearing trees are often taken into new localities in this way. The food of Squirrels, as already mentioned, consists principally of vegetable productions, but they can live and thrive on animal food. A gentleman living in this vicinity informed me lately that

he kept a Red Squirrel in confinement for upwards of two years and fed it exclusively on animal food, and that it became quite fat and glossy in its coat, and showed every sign of perfect health. I have frequently seen them eating the eggs of birds in my own place. This habit is a serious one, as no nests are safe if Squirrels are about. I must say that I like the feathered songsters of the spring so well that if it comes to a matter of choice between them and the Squirrels, I think the latter will have to go. My attention has been called to an article in "Science Gossip" for the year 1873, where it is stated that in one of the large parks in the City of Philadelphia the Squirrels became so destructive of the eggs of the wild birds (there nesting) that, in order to save the birds, it was found necessary to destroy the Squirrels.

Many people suppose that Squirrels are very much averse to water and will never voluntarily take to it. It is not uncommon to read of them—when compelled to cross a stream—making rafts of chips or pieces of bark and getting on board, hoist their tails so that they will catch the wind, and so manage to secure a dry passage across; of course they select a time when the wind is blowing from the right direction. These are pretty stories and quite complimentary to the intelligence of the little navigators. I am afraid, however, that the important element of truth is a missing factor. At one of the Club excursions to Meech's Lake as I was sitting on a rock near its outlet, about fifty or sixty feet from where a bridge spans it, a Red Squirrel came jumping along, and, without a moment's hesitation, plunged into the water and swam across. It was evidently a matter of choice as it could easily have crossed by the bridge.

The Chipmunk or Ground Squirrel is not of the same genus as the Red Squirrel, but as it is far more common in the Ottawa district than the others which are to follow, I will take it up before them. The Chipmunk is smaller in size than the Red Squirrel, a full grown one being about seven inches long, including the head and body; the tail, without the fur, is about four inches long. It is easily distinguished from the other Squirrels inhabiting this part of Canada by the markings along its body, there being always five dark longitudinal and parallel stripes extending from the head to the rump, the spaces between being of a lightish grey. The rump is of a bright tawny color; all the under

parts are white. The tail is not so long nor bushy as in the last named species, the part or dividing line of the fur is well marked. The Chipmunk rarely ascends trees. If its retreat is cut off from its hiding place it will do so, but it will not remain for any length of time on a tree, even if it has to face its enemy in coming down, particularly if the tree is shaken or beaten with a stick or other weapon. It is usually seen running along fences, and, if there are piles of stones about, will invariably become attached to such places as affording him a ready retreat. Under these he makes his burrow, in which he lays up his store of food. Its food is the same as that of the other Squirrels. A Chipmunk took up its abode at our place four years ago and remained with us for upwards of two years. It had apparently lost its mate; it became quite tame, and would come at our call, expecting to get something to eat, nor was it often disappointed. When working about the garden or sitting down on the grass, Dick (we called him by that name) would frequently come and make quite familiar with us, investigating our hands and pockets to ascertain if anything eatable was to be had. Dick had always an eye to business, and displayed much intelligence in his line. One Sunday morning as we were sitting on our verandah, Dick came along on his usual mission, one of the boys brought out a box with a sliding cover containing beech nuts, and set it down for him, with the cover just far enough back to allow him to get into it. In a moment he was in the box filling his cheeks with the nuts. When he had done so, he immediately hurried off to his storehouse, which was in a burrow under the verandah. Knowing that he would be back in a minute or two, we nearly closed the box, leaving a space of less than one-fourth of an inch. When he came he jumped on the box and putting one of his paws in the small opening pushed the cover back as easily and as quickly as if he understood the thing exactly. When he was away the second time we closed the box tight, on coming back he jumped on the box, and, finding it closed, tried to push the cover back from one end, but finding that it would not work, being the wrong end, he quickly went to the opposite end, and, taking hold of the cover with his paws, pulled it back without any difficulty, and in a trice was at the beech nuts again. It is well known that Chipmunks lay up large stores of food in the fall to serve

as a winter's supply, and it has very generally been supposed that they remained active during the cold and stormy season, consuming the food previously gathered. In a book entitled "A Naturalist's Rambles about Home," by Charles C. Abbott, we learn from his personal observations that they become quite torpid in cold weather. Speaking of a pair which he watched, he says: "Until the weather became fairly settled and really spring-like in character, these little Chipmunks did not often show themselves, and when they did it was only in the middle of the day. They appeared to foresee the occurrence of a cold rain storm twenty-four hours in advance and resumed their hibernating slumbers, becoming lethargic and very difficult to arouse. A pair that I had dug out in March, having two days before re-entered their winter quarters and become quite torpid, were apparently lifeless when first taken into the hands, and it was not until after several hours' warming that they became lively and altogether like themselves. This seemed to me the more curious, in that they can respond to a favorable change in the weather in a short time, even when the thermometric change is really but a few degrees." In another place he says: "The food gathered, usually nuts and corn, is, I believe, partly consumed when they go into winter quarters, and before they begin their hibernating sleep, which may not be for some time. This impression is based on the result of digging out a nest as late as the 3rd of November, I found four Chipmunks very cozily fixed for winter in a roomy compartment and all of them thoroughly wide awake. Their store of provisions was in a smaller room or storehouse immediately adjoining. How long this underground life lasts before hibernation really commences it is difficult to determine; but as the torpid state does not continue until their food supply is again obtainable outdoors, the Chipmunks, no doubt, store away sufficient food for their needs throughout the early spring."

I well remember my first sight of a Chipmunk. I had then reached the inquisitive age of five years. Our family had just arrived at Smith's Falls direct from Scotland, and were on their way to the house of a relative who had come to this country some years before. The little animal was seen running along a fence, and some of my brothers who were older than myself immediately gave chase with the intention of capturing it, being under the impression that it was an

American mouse. We had heard so many wonderful things about the new country that we were quite prepared to believe that even mice might have taken the form and appearance of Chipmunks. Our paternal grandfather, to whom we owed allegiance at the time, being a Presbyterian of the old school, stern and strict, with a high sense of duty and the maintenance of law and order, and not being fully conversant with the game laws of America, immediately ordered a cessation of hostilities, which was reluctantly obeyed, and our American mouse was allowed to pursue its way in peace and quietness.

The Black Squirrel (*Sciurus niger*) is seldom seen in the vicinity of Ottawa and they do not appear to have established themselves hereabouts. I have only seen two or three individuals altogther and they were in the neighborhood of Beechwood Cemetery. I have been informed that they are never seen in the Provinces of Nova Scotia and New Brunswick and very rarely in the adjoining Province of Quebec. A few years ago they were very plentiful around Smith's Falls, which is about 40 miles from here. As the country became cleared of its forests they gradually disappeared until at the present time they are seldom seen at all. The Black Squirrel is the largest in size of any of our Canadian Squirrels, the head and body being about 13 inches long and the tail, without the fur, about 10 inches. The color on the back and sides is of a glossy black ; on the under parts it is not so glossy and is often dark brown rather than black. Its habits and ways of life are much the same as those of the Red Squirrel. It is not so active in its movements and is more afraid of the presence of man, probably owing to the fact that it has been more presistently hunted on account of its greater value. In common with the Red Squirrel it has the habit of dodging around a tree when approached and keeping on the side, so that it is not easy for the hunter who is alone to get a shot at it. They will, if no other way of escape presents itself, stretch themselves along the upper side of a branch, pressing their bodies so closely to the bark that they can scarcely be seen, and then remain absolutely motionless.

I well remember when I was a boy having a race with a Black Squirrel which ended with results which remain in the form of a scar to this day. The Squirrel was first seen on a small hickory tree gathering nuts. The tree stood by itself, and was, perhaps, one

hundred and fifty yards away from a neighboring forest. Another boy, who was with me, and I, immediately made an attack upon it; the Squirrel seeing that its only safety lay in reaching the other larger trees jumped to the ground and set off at full speed in that direction, we pursued and after a hard race overtook it; I then threw my hat over it and then held it fast, and taking hold of its tail, which protruded beyond the rim of my hat, held it out at arm's length by its tip, thinking it could not bite me when held in that position. I was, however, deceived, for in less time than it takes to say it, the teeth of the Squirrel had met in the fleshy part of my hand; you may well believe I did not hang on to the tail very much longer.

The Grey Squirrel, which for a long time was held to be a distinct species, is now generally classed as the same species as the Black Squirrel. Jordan, in his "Vertebrates of North America," states that the color of this species varies from almost pure white through various shades to jet black; the lighter colors prevailing north and westward and the darker ones southward. The grey variety is certainly a rare visitor in Central Canada. The late Mr. Billings states in the Canadian Naturalist that it had never been seen in the Ottawa district at all. I have seen one individual of this color which I shot a few years ago on a small tributary stream of the Rideau which empties some miles this side of Smith Falls. I have been informed by Mr. Lees (a member of this Club) that he saw one a very short distance from where he lives—about one mile from this place. In size the Grey Squirrel is about the same as his black kinsman. It is said that they do not lay up a hoard of winter provisions. They are known to feed on the *larvæ* of various species of insects, but their principal food consists of grain, nuts, etc.

The Flying Squirrel (*Sciuropterus volucella*) is the fifth and last which I have seen in this part of the country. While occupying a place in the family of squirrels, having some of the common characteristics, it differs in some important points, and is in consequence placed in another genus *Sciuropterus*, which simply means winged squirrels. It is particularly marked by an expansion of the skin extending between the fore and hind legs which, when spread out, forms a sort of parachute which enables it to make

short flights from place to place. Nine or ten different species have been named, only two of which are found in North America, one in Northern Europe and the remainder in Java. The small American flying squirrel being the only one I have seen in this neighborhood. It is smaller in size than any of our other squirrels. The extreme length of a full grown one being about ten inches, the head and body being a little more than five inches. The head and body are often of a mouse grey color, sides of the nose and all beneath white. On the upper side of the flying membrane the predominating color is brown which on the edge is bordered with white. Its fur is very dense, short and smooth, much finer in texture than the other squirrels. I have seen it stated that these squirrels could fly as far as fifty yards at a time; perhaps they might do so if their starting point were high enough. I never saw them fly more than half that distance, their ordinary flights being twenty or thirty feet. Owing to the fact that flying squirrels are largely nocturnal in their habits they are less frequently seen than they otherwise might be, as they are not so scarce as many people suppose. They are easily tamed and become very amusing little pets. A member of the club informed me lately that he had a tame one for sometime which showed some strange peculiarities, one was, that only at certain hours of the night did it show any activity, namely from about two to four o'clock, a.m. Another, was its simulation of death when it thought itself in danger or when suddenly cornered, keeping at the same time a sharp look out for a way to escape, and the moment the way appeared to be clear it would suddenly come to life again and dart away as quick as thought. Mr. Abbott, whom I have already quoted, states that years of familiar acquaintance with these squirrels have not enabled him to detect much in their habits indicative of intelligence, he continues, "I feel sorry to have so poor an account to give of the beautiful creatures, but I am compelled to say it of them, they are not "smart." Notwithstanding all their vivacity in their native haunts and their eminently gregarious habits, they do not suggest by any of their movements so far as I was able to detect any decided indication of that sociability characteristic of some of the other squirrels. Each on the contrary jumps, runs and flies solely on his own account, associated together indeed but never acting in concert."

The order *Rodentia* as a whole does not stand high in point of intelligence from an anatomical aspect, the brain being proportionally small in size and with few convolutions. Some notable exceptions to this ruling will occur to most of us. As an instance, our common rat displays a wonderful amount of ingenuity in applying means to an end. A case illustrative of its resources came to my knowledge a short time ago. The occurrence took place this winter. One of my neighbors having placed a basket containing eggs on a shelf at the head of a stair-way leading down to a cellar, went the following morning to get some of them; to her astonishment they had all disappeared without a trace of the remover. Knowing that there were a few rats about, suspicion fell on them and justly so. An investigation having been made the eggs were all found sound and whole under the cellar floor fifteen or twenty feet away. How the rats managed with the resources at their command to take the eggs out of a basket and carry them down a stair-way without breaking even one, certainly points to the fact that their reasoning faculties were exercised to some purpose. Another illustration and I am done. I am indebted to a friend for it. He does not vouch for its authenticity as he did not see it himself. One Mr. Cobb, a respectable gentleman of Lusty Mills, Kentucky, says he saw a Squirrel acting in a very peculiar manner on the top of a tree, and it caused him to stop and watch its actions. Pretty soon it came down the tree bearing a bunch of something in its mouth and went directly to the creek. When it got to the edge of the water it turned around and backed into the creek until the water covered it entirely except the tip of its nose, when it let go the bunch which floated off down the creek. In gratifying his curiosity Mr. Cobb went down and got the bunch and found, he says, a million fleas on it.

It is very doubtful if we, who claim to be the lords of creation, with all our boasted intelligence, could devise a better plan for persuading undesirable and unwelcome visitors to so quietly take their departure.

ON THE OCCURRENCE OF "PHOSPHATIC NODULES" IN THE CHAZY FORMATION ABOUT OTTAWA, CANADA.

By Henry M. Ami, M.A., F.G.S.

In the April number of the OTTAWA NATURALIST Mr. Sowter has an interesting article on the Chazy formation at Aylmer, Que., in which he records some valuable discoveries made respecting its stratigraphy and palæontology. One statement made in this paper, however (p. 21), requires a few words of explanation, and that is, regarding the occurrence of those "phosphatic nodules" at Hog's Back, in Nepean, Ont., which I had observed in the summer of 1884, and described March 4th, 1885, at one of the Club's winter Soirées.

Mr. Sowter remarks that "during the past season these 'nodules' have been examined and recognized as very diminutive members of the Brachiopoda and Lamellibranchiate, as yet unclassified," adding a foot-note regarding certain organic-like forms which he compares with *Pasceolus globosus* of the Trenton.

I am quite astonished indeed at Mr. Sowter's conclusions resulting from an examination made of the nodules which I discovered in 1884, at Hog's Back, in the Chazy formation. To begin, I am not aware that Mr. Sowter has ever even seen a single one of the "phosphatic nodules" which I described, and had that gentleman desired or asked to see them, he would never have arrived at his conclusion. Moreover, in order to ascertain definitely the minute structure and characters of these "nodules," which were in the cabinets of the Geological Museum, Mr. Weston very kindly prepared careful microscopic slides of them, and the sections soon revealed that they were truly "phosphatic nodules," and very akin to those described and figured in the "Report of Progress of the Geological Survey of Canada" for 1876 (page 433). Mr. Weston recognised them as such immediately, having already prepared a great number of such from different formations.

As to the occurrence of "diminutive Brachiopoda and Lamellibranchiata," these have been observed at several localities before.

In further corroboration of the fact that "phosphatic nodules" are met with in the Chazy formation, the following extracts from the

"Report of Progress" of the Geological Survey of Canada for 1851-52, by Sir Wm. Logan, are here given .—

On page 28, this eminent authority says: "Small black phosphatic nodules are mentioned by Mr. Murray as occurring at the base of the Chazy limestone. On the 33rd lot of the 7th concession of Lochiel, where they are sparingly disseminated in they rock, they occur in precisely the same stratigraphical place, on the rear of the 10th lot of the 1st concession of West Hawkesbury, where they are rather larger, but still in sparing quantity. As the nodules, however, when separated from the rock, hold, according the analysis of Dr. Hunt, a large amount of the phosphate, they would probably render the limestone beds in which they occur of more than ordinary value, to be burnt for agricultural application when lime is required, as the phosphate can scarcely fail to be of additional service. Small black phosphatic nodules exist also in thin sandstone beds interstratifying green slates at Grenville. * * * * * * *

"Brown nodules of the same description, but larger in size, occur in a conglomerate, supposed to be of the same age as the Grenville beds, at Allumette Falls on the Ottawa."

It will be clearly seen, then, that *phosphatic nodules* are eminently characteristic of the Chazy throughout the entire length of the Ottawa Valley. I have observed them, not only in the calcareo-argillaceous and partly arenaceous shales of Hog's Back, in Nepean, to the west, but also in strata of the age at the lower Gatineau ferry's wharf.

The most practical question now seems to be the use to which the shales might be put in affording a fertilizer. Perhaps the Central Experimental Farm authorities might be induced to take the matter up and ascertain the practical value of the beds which hold these phosphatic nodules along with Lingulæ. A fair trial on a small scale would be of considerable interest, and the result on the crops would be looked forward to with much interest. An analysis of the Hawkesbury nodules gave Dr. Hunt the following result :—

Phosphate of lime (bone earth)	44·70
Carb. of lime	6·60
" magnesia	4·76
Per ox. of iron and trace of alumina	8·60
Insoluble silicious residue	27·90
Volatile matter	5·00
	97·56

For further information respecting the minute descriptions given by Dr. Hunt, the reader is referred to the same "Report of Progress," pages 110, &c.

Ottawa, June 21st, 1888.

SUB-EXCURSIONS.

No. 1.—The first Sub-Excursion of the season was held on Saturday, 5th May, and was under the direction of the President. The lateness of the present spring affected the attendance, scarcely a dozen members appearing at the appointed hour.

The place chosen for investigation was Beechwood, always one of the first localities to reward those seeking for early spring flowers. Eleven species only were collected, which were named and described by Mr. Whyte. The *Liliaceæ* being specially examined and explained.

No. 2 was held to the Beaver Meadow, Hull, on 12th May. It was a lovely warm afternoon, and the botanists turned out well. When the party reassembled to hear the addresses of the leaders 23 were found to be present. The baskets were well filled and provided ample material for the leaders' addresses.

Mr. Robert Whyte gave an interesting address upon the plants collected and drew particular attention to the *Cruciferæ* or Cress family, all of which might be easily recognized. These plants are all characterized by their cross-shaped flowers, and many of them have a pungent taste. All are edible and wholesome. Prof. Macoun also spoke at request of the leaders upon the best way to study the willows. The different divisions and groups of the *Salices* were explained, and the best way to collect and study these different plants was explained in a simple and attractive manner. The Mosses and Liverworts were also referred to, and the members were urged to collect them.

Mr. Fletcher then followed as Entomological Leader, and spoke at some length upon some of the malformations found upon plants known as Galls. These, he explained, were formed by an interesting group of insects, of which Mr. Harrington and he had made a special study. He also advised the members to decide at once what line of study they were going to take up, and get their apparatus in order. Frequently valuable specimens in all branches of natural history were lost or destroyed from the collector not having at hand the proper apparatus for preserving them. Speaking of the branches in which he was a leader, he said that bottles, boxes and cyanide bottles could be procured, by those wishing to study insects, of Mr. Henry Watters, Sparks St.; gauze for nets from Messrs. Crawford Ross & Co., and

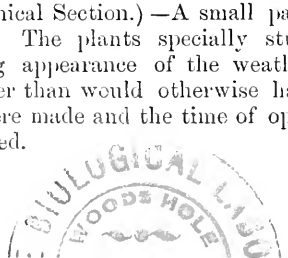
botanical collecting cases and Trowels of Messrs. H. Meadows & Co.

Before leaving for home the President requested Prof. Macoun to speak about some of the spring birds. This he did, making this always interesting topic more charming by the manner in which he described the habits of some of the specimens he had collected. He urged the members never to kill one they did not actually require for study, and pointed out how much pleasure and knowledge might be acquired without this destruction, although occasionally it was essentially necessary for scientific accuracy.

No. 3 (19th May).—Only a few members appeared at the Post Office on this occasion, as the weather was excessively hot. The botanists, led by Mr. Whyte, and entomologists, led by Mr. MacLaughlin, visited the north shore of the Ottawa west of Hull, Que., and obtained some interesting specimens. The geological party, led by Mr. Ami, went to the "Siphonotreta bed," opposite the Rideau Rifle Range, and interesting forms were obtained.

No. 4, May 26th (Geological Section).—The geological measures which crop out at and below the mouth of the Rideau River along the Ottawa River front, forming so conspicuous a physical feature in the delineation of the shores of that river were examined as far as the Lower Gatineau ferry. Two great dislocations were noticed; the first and westerly one affecting the measures of the Trenton, bringing what appear to be the lower beds of that formation in contact with the uppermost strata of the same. The second and more easterly, a fault of more importance, which causes the Chazy formation to abut against the lower Trenton beds last mentioned. The district visited was particularly interesting, and fossils were collected at all the localities. Specimens of *Rusichnites* (Dawson) were detected in the lower measures of the Chazy near the ferry wharf, and fine specimens of *Modiolopsis parviuscula* (Billings) obtained in a calcareous band in the upper beds exposed along with *Rhynchonella plena* (Hall), &c. Notes on the leading stratigraphical and palæontological features observed were taken for future use and reference by one of the leaders.

(Botanical Section.)—A small party led by the President visited Rockcliffe. The plants specially studied were the Liliaceæ. The threatening appearance of the weather made it advisable to return home sooner than would otherwise have been the case; but some collections were made and the time of opening of many kinds of flowers was recorded.



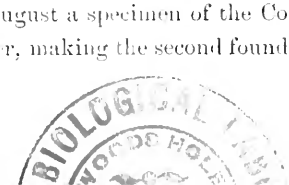
REPORT OF THE ORNITHOLOGICAL AND OOLOGICAL BRANCH FOR 1887.

GENTLEMEN,—In presenting the Annual Report of the Ornithological and Oological Branch for the season of 1887, the undersigned beg leave to state that during the past season a considerable amount of work has been done but with very little result in the way of obtaining new specimens, only two having been procured. One a specimen of the Common Brant, *Branta bernicla*, which was shot by Mr. P. Thompson (of this city) last fall on a sand bar some 30 miles down the Ottawa River. This bird, Mr. Thompson informs us, he compared with the colored plate in Audubon's great work on Birds and found it to agree in every particular. The other was a fine female specimen of Swainson's Hawk, *Buteo Swainsoni*, shot by Mr. G. White flying over a swamp some three miles from the city. A pair of "Cacuwees" (*Harelda glacialis*) in the breeding or summer plumage was obtained last spring for a slight consideration by Mr. E. White from a person who had just shot them in the Rideau River. We might say, for the information of those who are unacquainted with the bird, that in the winter plumage the head and neck are white and the long narrowly lanceolated scapulars pearl gray; in the summer plumage these parts are black. As this species breeds in the north and is seldom found here except in the fall and early spring, it is very unusual to see the birds in the breeding plumage. On the 1st of November a small flock of White-wing Crossbills was observed feeding on some pine cones near the city.

On the 4th August several of the Common or Red Crossbills were noticed. As these are supposed to be winter birds it is rather surprising that they should be found here during the summer months, and the question naturally arises what are they doing here, and why do they leave the delightful climate of the North Pole?

Several specimens of the beautiful and rare "Cape May Warbler" have been obtained and also of the Mourning Warbler, which leads us to believe that they are not so rare here as had been supposed.

On the 27th August a specimen of the Common Tern was obtained on the Ottawa River, making the second found here within two years.



The following is a list showing the date on which the birds were first seen in the spring and the date when last observed in the fall.

JOHN MACOUN.
GEO. WHITE.

March 18th, 1888.

March 3—Crow, *Corvus americanus.*
" 3—Winter Duck, *Glaucionetta clangula americana.*
" 5—Horned Lark, *Otocoris alpestris.*
" 19—Mealey Red-Poll, *Acanthis hornemannii exilipes.*
" 20—Sharp-Shinned Hawk, *Accipiter velox,*
" 21—Redbellied Nuthatch, *Sitta canadensis.*
" 21—Cedar Bird, *Ampelis cedrorum.*
April 2—Common Red-Poll, *Acanthis linaria.*
" 4—Blue Heron, *Ardea herodias.*
" 6—Song Sparrow, *Melospiza fasciata.*
" 6—Wilson's Snowbird, *Junco hyemalis.*
" 6—Pigeon Falcon, *Falco columbarius.*
" 7—Sparrow Falcon, *Falco sparverius.*
" 8—Robin, *Merula migratoria.*
" 9—Marsh Hawk, *Circus hudsonius.*
" 9—Purple Grackle, *Quiscalus quiscula aeneus.*
" 9—Peewee, *Sayornis phœbe.*
" 10—Baywing Bunting, *Poocætes gramineus.*
" 10—Whitebreasted Martin, *Tachycineta bicolor.*
" 10—Bluebird, *Sialia sialis.*
" 11—Golden Crested Kinglet, *Regulus satrapa.*
" 11—Cowbird, *Molothrus ater.*
" 11—Broadwing Buzzard, *Buteo latissimus.*
" 11—Herring Gull, *Larus argentatus smithsonianus.*
" 14—Yellow-bellied Woodpecker, *Sphyrapicus varius.*
" 14—Purple Martin, *Progne subis.*
" 16—Hermit Thrush, *Turdus aonalaschkæ pallasii.*
" 16—Redwing Blackbird, *Agelaius phœniceus.*
" 16—Meadow Lark, *Sturnella magna.*
" 16—Rusty Grackle, *Scolecophagus carolinus.*
" 18—Goldenwing Woodpecker, *Colaptes auratus.*
" 19—Swamp Sparrow, *Melospiza georgiana.*
" 19—Purple Finch, *Carpodacus purpureus.*
" 20—Downy Woodpecker, *Dryobates pubescens.*
" 20—Kingfisher, *Ceryle alcyon.*
" 20—Whitethroated Sparrow, *Zonotrichia albicollis.*
" 21—Hooded Merganser, *Lophodytes cucullatus.*

April 21—Goosander, *Merganser americanus.*
" 21—Greater Yellow Legs, *Totanus melanoleucus*
" 22—House Wren, *Troglodytes aedon.*
" 23—Tree Sparrow, *Spizella monticola.*
" 26—Wood Duck, *Aix sponsa.*
" 26—Fox Sparrow, *Passerella iliaca.*
" 28—Dusky Duck, *anas obscura.*
" 28—Chipping Sparrow, *Spizella socialis.*
" 30—Fish Hawk, *Pandion haliaetus carolinensis.*
May 1—Bittern, *Botaurus lentigi iosus.*
" 2—Black and White Creeper, *Mniotilta varia.*
" 2—Chimney Swift, *Chætura pelagica.*
" 2—Rough-legged Buzzard, *Archibuteo lagopus sancti-johannis.*
" 3—Redstart, *Setophaga ruticilla.*
" 3—Summer Warbler, *Dendroica æstiva.*
" 3—Spotted Sandpiper, *Actitis macularia.*
" 3—Barn Swallow, *Chelidon erythrogaster*
" 3—Canada Goose, *Branta canadensis.*
" 3—Ruby Crowned Kinglet, *Regulus calendula.*
" 3—Golden Crowned Thrush, *Seiurus aurocapillus.*
" 4—Yellowrump Warbler, *Dendroica coronata.*
" 5—Great-Crested Flycatcher, *Myiarchus crinitus.*
" 5—Least Flycatcher, *Empidonax minimus.*
" 5—Red Headed Woodpecker, *Melanerpes erythrocephalus.*
" 8—Blue Yellow-back Warbler, *Compsothlypis americana.*
" 8—Black-throated Green Warbler, *Dendroica virens.*
" 8—Black-throated Blue Warbler, *Dendroica cærulescens.*
" 8—Night Hawk, *Chordeiles virginianus.*
" 9—King-bird, *Tyrannus tyrannus.*
" 10—Cat-bird, *Galeoscoptes carolinensis.*
" 11—Cape May Warbler, *Dendroica tigrina.*
" 11—Blackburnian Warbler, *Dendroica blackburnia.*
" 13—Goldfinch, *Spinus tristis.*
" 13—Baltimore Oriole, *Icterus galbula.*
" 15—Baybreasted Warbler, *Dendroica castanea.*
" 16—Surf Duck, *Oidemia perspicillata.*
" 16—Long-tailed Duck, *Clangula hyemalis.*
" 16—Pied Grebe, *Podilymbus podiceps.*
" 16—Least Sandpiper, *Tringa minutilla.*
" 16—Chestnut Sided Warbler, *Dendroica pennsylvanica.*
" 16—White-headed Sparrow, *Zonotrichia leucophrys.*
" 17—Ruby Hummingbird, *Trochilus colubris.*
" 17—Maryland Yellow-throat, *Geothlypis trichas.*
" 18—Black and Yellow Warbler, *Dendroica maculosa.*
" 18—Red-eyed Vireo, *Vireo olivaceus.*
" 18—Sand Martin, *Clivicola riparia.*

May 18—Bobolink, *Dolichonyx oryzivorus.*
" 20—Canadian Fly-catching Warbler, *Sylvania canadensis.*
" 24—Black-cap Warbler, *Sylvania pusilla.*
" 24—Mourning Warbler, *Geothlypis philadelphia.*
" 24—Black Poll Warbler, *Dendroica striata.*
" 24—Scarlet Tanager, *Piranga erythromelas.*
" 24—Blue Jay, *Cyanocitta cristata.*
" 24—Rose breasted Grosbeak, *Habia ludoviciana.*
August 4—Red Crossbill, *Loxia curvirostra minor.*
" 9—Ruby-throated Hummingbird, *Trochilus colubris.*
" 10—Chestnut-sided Warbler, *Dendroica pennsylvanica.*
" 12—Swift, *Chætura pelagica.*
" 15—Wilson's Thrush, *Turdus fuscescens.*
" 18—Solitary Sandpiper, *Totanus solitarius.*
" 18—Least " *Tringa minutilla.*
" 18—Night Hawk, *Chordeiles virginianus.*
" 21—Water Thrush, *Seiurus noveboracensis.*
" 22—Fish Hawk, *Pandion haliætus carolinensis.*
" 22—Baltimore Oriole, *Icterus galbula.*
" 23—Purple Martin, *Progne subis* (Linn).
" 23—Sand Martin, *Cliricola riparia.*
" 24—Brown Thrush, *Harporhynchus rufus.*
" 24—Bonaparte's Gull, *Larus philadelphia.*
Septemb'r 1—Bobolink, *Dolichonyx oryzivorus.*
" 1—Barn Swallow, *Chelidon erythrogaster.*
" 2—Sparrow Hawk, *Falco sparverius.*
" 2—Killdeer Plover, *Ægialitis vocifera.*
" 3—Wild Pigeon, *Ectopistes migratorius.*
" 5—Red-headed Woodpecker, *Melanerpes erythrocephalus.*
" 6—Meadow Lark, *Sturnella magna.*
" 6—White-breasted Martin, *Tachycineta bicolor.*
" 7—Savannah Sparrow, *Ammodramus sandwichensis savanna.*
" 7—Bay Wing Bunting, *Poœcetes gramineus.*
" 8—Yellow-bellied Flycatcher, *Empidonax flaviventris.*
" 10—Blue Bird, *Sialia sialis.*
" 10—Whip-poor-will, *Antrostomus vociferus.*
" 11—Pewee, *Sayornis phabe.*
" 12—Indigo Bird, *Passerina cyanea.*
" 12—Rose-breasted Grosbeak, *Habia ludoviciana.*
" 12—Scarlet Tanager, *Piranga erythromelas.*
" 12—Cedar-bird, *Ampelis cedrorum.*
" 13—Black-poll Warbler, *Dendroica striata.*
" 14—Golden crowned Thrush, *Seiurus aurocapillus.*
" 17—Yellow bellied Woodpecker, *Sphyrapicus varius.*
" 20—Broad-wing Hawk, *Buteo latissimus.*
" 21—Black and White Creeper, *Mniotilta varia.*

Sept'mb'r 21—Bittern, *Botaurus lentiginosus.*
" 21—Scoter Duck, *Oidemia americana.*
" 21—Semi-palmated Sandpiper, *Ereunetes pusillus.*
" 23—Pine Warbler, *Dendroica vigorsii.*
" 26—Red-eye Vireo, *Vireo olivaceus.*
" 27—Common Tern, *Sterna hirundo.*
" 27—Redstart, *Setophaga ruticilla.*
" 27—Olive-back Thrush, *Turdus ustulatus swainsonii.*
" 29—Catbird, *Galeoscoptes carolinensis.*
" 30—Black-throated Blue Warbler, *Dendroica cærulescens.*
" 30—Surf Duck, *Oidemia perspicillata.*
October 3—Spotted Sandpiper, *Actitis macularia.*
" 6—Sora Rail, *Porzana carolina.*
" 8—Common Buzzard, *Buteo swainsoni.*
" 8—Black-throated Green Warbler, *Dendroica virens.*
" 10—Chipping Sparrow, *Spizella socialis.*
" 11—Pectoral Sandpiper, *Tringa maculata.*
" 14—Ruby-crowned Kinglet, *Regulus calendula.*
" 15—Purple Finch, *Carpodacus purpureus.*
" 16—Kingfisher, *Ceryle alcyon.*
" 18—Great Northern Shrike, *Lanius borealis.*
" 20—Song Sparrow, *Melospiza fasciata.*
" 20—Yellow-rump Warbler, *Dendroica coronata.*
" 21—Blue Heron, *Ardea herodias.*
" 21—Night Heron, *Nycticorax nævius.*
" 21—Shoveller Duck, *Spatula clypeata.*
" 21—Titlark, *Anthus pennsylvanicus.*
" 22—Sanderling, *Calidris arenaria.*
" 22—Golden Plover, *Charadrius dominicus.*
" 22—Marsh Hawk, *Circus hudsonius.*
" 22—Red-tailed Hawk, *Buteo borealis.*
" 23—Acadian Owl, *Nyctala acadica.*
" 23—Fox Sparrow, *Passerella iliaca.*
" 23—Sharp-Shinned Hawk, *Accipiter velox.*
" 27—White-throated Sparrow, *Zonotrichia albicollis.*
" 31—Common Red-Poll, *Acanthis linaria.*
Novemb'r 1—Hermit Thrush, *Turdus aonalaschkæ pallasii.*
" 1—Whitewing Crossbill, *Loxia leucoptera.*
" 1—Cowbird, *Molothrus ater.*
" 2—Goldenwing Woodpecker, *Colaptes auratus.*
" 3—Greater Yellow-legs, *Totanus melanoleucus.*
" 3—Wood Duck, *Aix sponsa.*
" 3—Rusty Grackle, *Scolecophagus carolinus.*
" 4—White-headed Sparrow, *Zonotrichia leucophrys.*
" 5—Red-breasted Nuthatch, *Sitta canadensis.*
" 7—Goldfinch, *Spinus tristis.*

Novem'r 10—Junco, *Junco hyemalis.*
" 12—Pigeon Falcon, *Falco columbarius.*
" 12—Golden-crown Kinglet, *Regulus satrapa.*
" 12—Purple Grackle, *Quiscalus quiscula æneus.*
" 17—Tree Sparrow, *Spizella monticola.*
" 17—Pine Finch, *Spinus pinus.*
" 17—Blue Jay, *Cyanocitta cristata.*
" 17—White-bellied Nuthatch, *Sitta carolinensis.*
" 25—Robin, *Merula migratoria.*

REPORT OF THE ORNITHOLOGICAL BRANCH FOR SPRING OF 1888.

In making up the Report of the proceedings and researches of this branch during the past spring, the leaders have decided to adopt the example set by the Department of Agriculture at Washington, D.C., that is, to make a report of the spring work in time to be published in the July number of the OTTAWA NATURALIST, and to make a separate report for the work done in the fall. The leaders are able to report the capture of several specimens of the "*Hydrochelidon nigra surinamensis,*" a species that has not yet been reported in this vicinity. Among the rarer birds captured are several "White Wing Crossbills," a species which is becoming rather scarce near the city; also a fine specimen of the "Tennesee warbler." On the 21st of March a Bald Eagle was seen flying low over the Rifle Range, the white head and tail giving it a very conspicuous appearance in the bright sun light.

JOHN MACOUN.
Ottawa, June 30th 1888. GEO. WHITE.

January 28—Pine Siskin, *Spinus pinus.*
February 7—Goshawk, *Accipiter atricapillus.*
" 18—Pine Grosbeak, *Pinicola enucleator.*
" 18—White-wing Crossbill, *Loxia leucoptera.*
" 21—Sharp-shinned Hawk, *Accipiter velox.*
" 22—Crow, *Corvus americanus.*
" 22—Horned Lark, *Otocaris alpestris.*
March 6—Common Red-poll, *Acanthis linaria.*
" 8—Hoary Red-poll, *Acanthis hornemannii exilipes.*
" 10—Purple Finch, *Carpodacus purpureus.*
" 11—Red Crossbill, *Loxia curvirostra minor.*

March 21—Bald Eagle, *Haliaetus leucocephalus.*
" 28—Junco, *Junco hyemalis.*
April 4—Robin, *Merula migratoria.*
" 5—Bronzed Grackle, *Quiscalus quiscula aeneus.*
" 5—Song Sparrow, *Melospiza fasciata.*
" 5—Bluebird, *Sialia sialis.*
" 8—Golden-eye Duck, *Glaucionetta clangula americana.*
" 10—Kingfisher, *Ceryle alcyon.*
" 10—Tree Sparrow, *Spizella monticola.*
" 10—Fish Hawk, *Pandion haliaetus carolinensis.*
" 10—Vesper Sparrow, *Poocætes gramineus.*
" 10—Golden-crowned Kinglet, *Regulus satrapa.*
" 11—Redwing Blackbird, *Agelaius phœniceus.*
" 11—Cowbird, *Molothrus ater.*
" 12—Wood Duck, *Aix sponsa.*
" 12—Pewee Flycatcher, *Sayornis phœbe.*
" 13—Rusty Grackle, *Scolecophagus carolinus.*
" 13—White-breasted Martin, *Tachycineta bicolor.*
" 14—Pigeon Falcon, *Falco columbarius.*
" 14—Chipping Sparrow, *Spizella socialis.*
" 16—Sparrow Hawk, *Falco sparverius.*
" 18—Meadow Lark, *Sturnella magna.*
" 18—Goldenwing Woodpecker, *Colaptes auratus.*
" 18—Yellowbellied Woodpecker, *Sphyrapicus varius.*
" 20—Herring Gull, *Larus argentatus smithsonianus.*
" 21—Purple Martin, *Progne subis.*
" 21—Cliff Swallow, *Petrochelidon lunifrons.*
" 25—Hermit Thrush, *Turdus aonalaschkae pallasii.*
" 26—Ruby-crowned Kinglet, *Regulus calendula.*
" 26—American Bittern, *Botaurus lentiginosus.*
" 27—White-throated Sparrow, *Zonotrichia albicollis.*
" 28—Chimney Swift, *Chætura pelagica.*
" 28—Broadwing Buzzard, *Buteo latissimus.*
" 29—Blue Heron, *Ardea herodias.*
May 1—Bluebill Duck, *Aythya marila nearctica.*
" 1—Spotted Sandpiper, *Actitis macularia.*
" 1—Barn Swallow, *Chelidon erythrogaster.*
" 1—Bank Swallow, *Clivicola riparia.*
" 1—Yellow Palm Warbler, *Dendroica palmarum hypochrysea.*
" 2—Pintail Duck, *Dafila acuta.*
" 2—Black Duck, *Anas obscura.*
" 2—Mallard Duck, *Anas boschas.*
" 3—Summer Warbler, *Dendroica æstiva.*
" 3—Fox Sparrow, *Passerella iliaca.*
" 4—Lesser Yellow-leg Plover, *Totanus flavipes.*
" 4—Goosander, *Merganser americanus.*

May 5—Buffle-headed Duck, *Charitonetta albeola.*
" 7—House Wren, *Troglodytes ædon.*
" 7—Black and White Creeper, *Mniotilta varia.*
" 7—Black-throated Green Warbler, *Dendroica virens.*
" 7—Wilson's Snipe, *Gallinago delicata.*
" 7—Solitary Sandpiper, *Totanus solitarius.*
" 7—Tyrant Flycatcher, *Tyrannus tyrannus.*
" 10—Least Sandpiper, *Tringa minutilla.*
" 10—Goldfinch, *Spinus tristis.*
" 10—White-headed Sparrow, *Zonotrichia leucophrys.*
" 10—Baltimore Oriole, *Icterus galbula.*
" 10—Great Northern Diver, *Urinator imber.*
" 10—Rose-breasted Grosbeak, *Habia ludoviciana.*
" 11—Black-billed Cuckoo, *Coccyzus erythrophthalmus.*
" 11—Catbird, *Galeoscoptes carolinensis.*
" 11—Wood Thrush, *Turdus mustelinus.*
" 11—Golden-crowned Thrush, *Seiurus aurocapillus.*
" 11—Wilson's Thrush, *Turdus fuscescens.*
" 11—Redeyed Vireo, *Vireo olivaceus.*
" 11—Black and Yellow Warbler, *Dendroica maculosa.*
" 11—Wilson's Warbler, *Sylvania pusilla.*
" 12—Brotherly-love Vireo, *Vireo philadelphicus.*
" 13—Chestnut-sided Warbler, *Dendroica pennsylvanica.*
" 13—Solitary Vireo, *Vireo solitarius.*
" 14—Redstart, *Setophaga ruticilla.*
" 14—Blackburnian Warbler, *Dendroica blackburniae.*
" 15—Cape May Warbler, *Dendroica tigrina.*
" 15—Black-poll Warbler, *Dendroica striata.*
" 15—Black-throated Blue Warbler, *Dendroica cærulescens.*
" 15—Great Crested Flycatcher, *Myiarchus crinitus.*
" 15—Canadian Warbler, *Sylvania canadensis.*
" 15—Maryland Yellow-throat, *Geothlypis trichas.*
" 16—Tennessee Warbler, *Helminthophila peregrina.*
" 16—Least Flycatcher, *Empidonax minimus.*
" 18—Night Hawk, *Chordeiles virginianus.*
" 18—Whip-poor-will, *Antrostomus vociferus.*
" 19—Bobolink, *Dolichonyx oryzivorus.*
" 20—Marsh Hawk, *Circus hudsonius.*
" 27—Ruby-throated Hummingbird, *Trochilus colubris.*
" 28—Black Tern, *Hydrochelidon nigra surinamensis.*

EXCURSION NO. 1 TO KIRK'S FERRY

What might have proved to be the most successful excursion ever held under the auspices of the Ottawa Field Naturalists' Club since

it was organized, proved to be rather disappointing; it was held on June 2nd. This excursion was to have been held on 19th of May but was postponed on account of the weather. No less than one hundred and thirty-one members and friends of the Club left the city in six vans, and went via Hull and Chelsea to Kirk's ferry, one of the prettiest and most enchanting spots on the Gatineau River. The weather bulletin gave as probabilities for the day, higher temperture with bright and clear weather for the Lakes and Lower St. Lawrence districts. But this report was entirely out and the day was characterized by a series of showers finally culminating in a steady downpour. The excursionists determined despite the weather to make the best of it. The country traversed was really enchanting and on all sides the sights were charming, as the tender green foliage of the forest and of the farm crops covered the ground everywhere with a verdure of the purest hue. The different terraces were ascended in order and when the last plateau was reached there followed the picturesque scenery peculiar to the Laurentide hills, the line of demarcation between the two being very sharply defined and marking clearly the boundary of cultivated land. Many beautiful flowering plants were observed and collected on the way and a number of geological specimens was obtained from a small opening or mine for phosphate of lime on the west side of the road, about ten miles from the city.

The vans reached Kirk's ferry about 12.30 p.m. and from that time until the return, rain fell steadily, much to the disappointment of all. This did not deter the Naturalists however from enjoying the mid-day meal and the various parties sought shelter in different quarters of the woods near the river bank and falls, whilst others remained in the vans, where perfect covering could be found. It was impracticable to organize the accustomed working parties of botanists, geologists, and entomologists, etc., and accordingly not much scientific work was done. One or two new species of plants and several insects said by the Entomologists to be of value were collected. The party reached the city again at 7 o'clock in remarkably good spirits, the tedium of the drive home having been relieved, as was attested by the frequent peals of merry laughter, by good stories and stirring songs.

EXCURSION No. 2 TO AYLMER.

The second general excursion of the Club was held on Saturday June 23rd, and Aylmer was the place visited. Nearly fifty members and others attended. The afternoon was spent in examining the botanical, entomological and geological wealth of the district lying north-east of the steamboat wharf. Immediately upon arriving at the pine grove near Mr. Richard Haycock's residence, the President announced that Messrs Fletcher and McLaughlin would be leaders in entomology, Mr. Ami in geology, and that he himself would guide the botanical section in the absence of some of the leaders. After nearly two hours' search the party reassembled at the rendezvous and addresses were then made by the leaders in the different sections of the club's work.

Mr. James Fletcher addressed the members present, and spoke more particularly regarding the *Ichneumons* describing carefully and systematically the various organs peculiar to these insects and mentioning the function which each had to perform. Mr. Fletcher also called the attention of his hearers to a large specimen of a grub which proved very destructive to pine trees especially when they were cut and left over one season in the bush. The depredations caused by a number of insects and the remedies to be applied were next given.

Mr. Henry M. Ami was then called upon to address the audience on behalf of geology. Taking a specimen of the calcareo-arenaceous shales of the *Chazy* formation which was before him, he sketched in a few words the history of the origin, mode of deposition and structure of such a specimen and referred to the remote period in geological history when it was formed. It was a portion of the Chazy formation of which three distinct series occured in the vicinity and had been observed during the day, each of which yielded organic remains. *Cyrtodonta breviuscula*, Billings; *Leperditia Canadensis*, Jones; *Pleurotomaria paupera*, Billings and *Orthis platys*, Billings were found in the uppermost or limestone series in an exposure on the North side of the Aylmer road east of the town.

In the middle series of the Chazy which consists chiefly of purplish coloured chocolate brown arenaceous shales often purely argillaceous, there were observed a large number of fossil shells most of which were

referable to the genus *Lingula*, a class of shells containing a large percentage of phospate of lime in their composition, *Lingula Huronensis*, B. a new species of *Lingula* and *Rhynchonella plena*, Hall, were found in these shales along the railroad track, about 250 yards north of Mr. R. Haycock's residence. Along the lake shore, the lower series is met with and specimens of a *Scolitus* resembling *S. Canadensis* was found close to Mr. Haycock's boat-house in a stratum some two inches in thickness. The relations of the Ontario and Quebec shores were also discussed and reference was made to the formations crossed over along the route taken.

Mr. R. B. Whyte then spoke on behalf of Botany and drew the attention of the audience especially to the order *Rosaceæ*; the Rose family. There were several representatives of this most interesting and useful order that were met with during the day and these were briefly described and the most salient characteristics delineated. Reference was also made to several rare forms observed during the afternoon amongst which may be ranked foremost *Lilium Philadelphicum* which was found only in bud as the season was still very backward. Numerous specimens of this beautiful lily had been collected on a previous occasion, and at the same time of the year in full flower.

MONTREAL NATURAL HISTORY SOCIETY'S EXCURSION TO MONTEBELLO.

The annual excursion of the above Society was held on 16th June. In answer to an invitation, Mr. and Miss Whiteaves and Mr. Ami attended the meeting. The Hon. J. L. Papineau, with his characteristic courtesy, threw open his beautiful grounds and museum, and gave the excursionists a hearty welcome.

The meeting was largely attended and very successful in every way. Good collections were made in all branches. The following is a list of the prize winners :—

NAMED COLLECTIONS.

In Botany.

First Prize.....Miss Baylis, with 67 Species.
Second " .....Mrs. E. Day, " 61 "

In Geology.

First Prize.....Miss Blanche Evans, B.A.
Second " .....Miss A. Van Horne.

In Entomology.

First Prize.....Mr. A. F. Winn, with 37 Species.
Second " .....Mr. J. F. Hausen, " 32 "

UNNAMED COLLECTIONS.

First Prize.....Mr. E. F. Baynes, with 41 Species.
Second " .....Mr. W. C. Adams, " 40 "
Honorable Mention Mr. E. C. Trenholme, " 34 "

In the above competitions Messrs. Whiteaves and Ami, of our Club, were requested to act as judges in entomology and botany respectively.

OTTAWA FIELD-NATURALISTS' CLUB.

SUB-EXCURSION No. 5, June 9th, 1888.

The geological section on this occasion visited the lower measures of the Utica formation as they are exposed along the right bank of the Rideau River, where the " Siphonotreta band " crops out at the head of the rapids, opposite the Rifle Range.

Several interesting finds were made :—Three specimens of the Canadian variety of *Siphonotreta Scotica*, a new *Leperditia (Prinietia)*, *Platystrophia biforata* var *lynx*, Eichw, besides a fine example of *Conularia Trentonensis*, now in the museum of the Geological Survey, and specimens of *Zygospira Headi*, Billings.

On the same date the Botanical Branch paid a visit to woods lying to the south of the railway track at Hull. Large collections of spring flowers were secured, and a most enjoyable afternoon was spent, but no species of special rarity were discovered.

(FLORA OTTAWAENSIS.—*Continued from page 33.*)

readily distinguished from the preceding not only by the shape of the raceme, but by the slender pedicels. May—3.

MENISPERMACEÆ.—Moonseed Family.

MENISPERMUM, L. Moonseed.

81. M. CANADENSE, L. (Canada Moonseed.)

River banks and along streams, generally in woods or thickets. July—2. (B).

BERBERIDACEÆ.—Barberry Family.

BERBERIS, L. Barberry.

82. B. VULGARIS, L. (Common Barberry.)

Introduced from Europe. Occasionally found in woods, as at New Edinburgh, where the seeds were probably dropped by birds.

CAULOPHYLLUM, Michx. Blue Cohosh.

86. C. THALICTROIDES, Michx. (Papoose Root.)

Rich woods. An interesting plant with the parts of the flowers in sixes and of the same colour as the purplish foliage. These are followed by large dry berries with a beautiful blue bloom upon them. May—1. (B).

All our plants are of a dull purple, not yellowish green, as they are stated to be west of Lake Erie.

NYMPHÆACEÆ.—Water-lily Family.

BRASENIA, Schreber.

91. B. PELTATA, Pursh, (Water-shield).

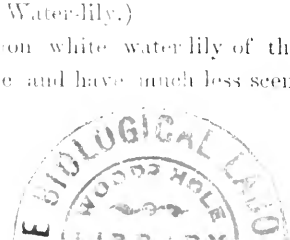
In lakes and rocky pools.

Rideau River at Black Rapids and McLaurin's Bay, East Templeton (J. F.), Lake Windeago, (*Dr. H. B. Small.*)

NYMPHÆA, Tourn. Water-lily.

93. N. TUBEROSA, Paine, (Tuber-bearing Water-lily.)

Rivers and Lakes. This is the common white water lily of this locality. The flowers are less double and have much less scent than the next. July.



94. N. ODORATA, Ait. (Sweet-scented Water-lily.)

Slow streams and lakes. Rideau River. Meech's Lake.

Flowers generally smaller than in No. 93. Rare. July (B).

NUPHAR, Smith. Yellow Pond-lily.

95. N. ADVENA, Ait. (Common Yellow Pond-lily.)

Streams and lakes. Ju.—1. (B).

97. N. ADVENA + KALMIANA, Caspary.

N. rubrodiscum, Morong.

This is a very beautiful hybrid between *N. advena* and *N. Kalmiana*. It is intermediate in size and appearance between *advena* and *Kalmiana*. The floating leaves are purple beneath with slender petioles. The submerged membranaceous leaves very freely produced and like those of *N. Kalmiana*. The flowers expand 1½ inches, have 6 sepals and a bright velvety crimson—10-15 rayed stigmatic disk. The perfect fruit, which is seldom produced, bears a closer resemblance to that of *N. Kalmiana* than to that of *N. advena*, being almost globose with a constriction beneath the stigma.

Leamy's Lake and Gilmour's Piling-grounds. July—1.

98. N. KALMIANA, Ait. (Least Yellow Pond-lily.)

N. luteum, var *pumilum*. Gray's Manual, 57.

Streams and lakes. Leamy's Lake, Gilmour's Piling-grounds (J.F.), Green's Creek. (*B. Billings.*) July—1. (B).

A charming little species. Quite distinct, I believe, from the European *N. luteum*, var *pumilum*.

SARRACENIACEÆ.—Pitcher-Plants

SARRACENIA, Tourn.

99. S. PURPUREA, L. (Side-saddle Flower.)

Peat bogs. Lake Flora, Hull, and Mer Bleue, abundant. A few plants in the Race-course Swamp, Bank Street Road. One of our most interesting Canadian plants. Ju.—2.

Used in Lower Canada as a remedy for small-pox.

——— var HETEROPHYLLA, Torrey.

This, I think, is merely an albino form of *S. purpurea*. I have

found three plants at Lake Flora, Hull. The leaves are pale green without red veins and the flowers yellowish white Ju.—2.

PAPAVERACEÆ.—Poppy Family.

PAPAVER, L. Poppy.

100. P. *somniferum*, L. Opium Poppy.

An escape from cultivation occasionally found in wheat-fields and upon rubbish heaps. July—2.

101. P. *Rhœas*, L.

Introduced with seed wheat at Billings Bridge. Occasionally found by roadsides, but nowhere permanently introduced. July.

SANGUINARIA, L. Blood-root.

104. S. CANADENSIS, L. (Blood-root.)

Roads and clearings. One of our earliest and most beautiful spring flowers. Largely used by the Indians both as a dye-plant and medicinally. April—4.

CHELIDONIUM, L. Celandine.

105. C. *majus*, L. Celandine.

Introduced. Occasionally found by way-sides as at Stewarton and New Edinburgh. June.

FUMARIACEÆ.—Fumitory Family.

ADLUMIA, Raf. Climbing Fumitory.

106. A. CIRRHOSA, Raf. (Cypress Vine.)

Rocky woods. Common. A most beautiful creeper with delicate foliage and a profusion of pink pendent blossoms, flowering all the summer. Sometimes creeping over bushes 10 or 12 feet high. Ju.—2.

DICENTRA, Bork.

107. D. CUCULLARIA, DC. (Dutchman's Breeches.)

Rich woods. May—1. (B.)

108. D. CANADENSIS, DC. (Squirrel Corn, "Wood Hyacinth.")

Rich woods. May—2. (B.)

CORYDALIS, Vent.

110. C. GLAUCA, Pursh. (Pale Corydalis.)

Hill sides and amongst rocks. May—2. Flowering all the summer. (B.)

111. C. AUREA, Willd. (Golden Corydalis.)
Hill sides and rocky woods. May—2. (B.)

CRUCIFERÆ.—Mustard Family.

NASTURTIUM, R. Br. Cress.

114. *N. officinale*, R. Br. (Water-cress.)
Springs and brooks. Billings Bridge, Chelsea, New Edinburgh &c. June. (B.)

115. N. PALUSTRE, DC. (Marsh-cress.)
Low ground. A smooth species with pods more than twice as long as broad. Ju.—2. (B.)

——— var. HISPIDUM, Fisch. & Mey.
Low ground. A rougher plant than the above with round pods. Ju.—2.

116. N. AMPHIBIUM, R. Br.
Low ground. A coarser and larger plant than the above, the stem generally decumbent and rooting at the base, Biennial or perennial with pods shaped like those of *N. palustre*. Ju.—2

119. N. LACUSTRE, Gray. (River-cress.)
Margins of rivers. Malloch's Bay, Ottawa, and abundant in the Nation river at Casselman. An interesting plant with the submerged leaves much laciniated. The flowers and fruit are not very freely produced; but when mature the leaves fall off, throw out roots and become new plants. Ju.—2.

120. N. *Armoracia*, Fries. (Horse Radish.)
An escape from cultivation. Occasionally found on waste places in the suburbs of the city.

DENTARIA, L. Tooth-wort.

121. D. DIPHYLLA, Michx. (Crinkle-root.)
Rich woods. May—2. (B.)

122. D. LACINIATA, Muhl. (Cut-leaved Tooth-wort.)
Rich woods. A very local species, so far only found at Beechwood, near the S.W. corner of the cemetery. May—1. (B.)

CARDAMINE, L. Bitter Cress.

124. C. RHOMBOIDEA, DC.
River bank, Hull, P.Q. May—2. The plant I have referred here is an erect species with almost sessile leaves up the stem.

SUB-EXCURSION NO. 7, 14TH JULY.

A VISIT TO THE GOVERNMENT EXPERIMENTAL FARM.

Undoubtedly one of the most successful sub-excursions which has ever been held under the auspices of the Ottawa Field Naturalists' Club took place on Saturday afternoon, when, through the kindness of Prof. Wm. Saunders, director, the Central Experimental Farm, in connection with the Department of Agriculture, was visited and examined. A large gathering of members of the club and their friends met at the city Post-office, and taking the busses provided by the excursion committee, soon reached the place of interest which was to form the rendezvous for the afternoon. On their arrival the naturalists were cordially greeted by the genial professor, who, on invitation by the president of the club, Mr. R. B. Whyte, addressed the members, and in a clear manner sketched a general outline of the work performed, and gave interesting details regarding the distribution of the crops, etc., on the farm. Professor Saunders, in company with Mr. Fletcher, the Entomologist and Botanist, and Mr. Hilborn, the Horticulturist, then most courteously piloted the party through the more interesting parts of the farm, pointing out some of the manifold species of plants of especial interest which are being grown and tested. With eagerness and pleasure the various groups of naturalists listened to every word which fell from the lips of these gentlemen. Seed crops from various countries were seen growing in great abundance, and boreal species were particularly noted, as such forms are likely to be best adapted for cultivation in the more northerly regions of Canada. The different varieties of beans, potatoes (seedlings and otherwise), wheat, barley, oats, peas and many other agricultural products, were pointed out and noted, as were also the various kinds of apple, cherry and plum trees. The "shade" or "covering" for pine and other coniferous seedlings was also examined, and the tiny "monarchs of the forest" seen growing in great profusion and doing splendidly. In the garden proper many varieties of small fruits and flowers were seen, as well as many kinds of shrubs and trees. With the kind permission of the director and horticulturist, the excursionists had an opportunity of testing some of the new varieties

and seedlings of small fruits, which were greatly enjoyed, and many pronounced "excellent" by everyone.

This done, the party re-assembled at Professor Saunders's house, where refreshments had been generously prepared by Mrs. Saunders. A very pleasant and social hour was then spent by all, after which a series of addresses was given, in the course of which the aims and purposes of the farm, its horticultural, botanical and entomological, as well as geological aspects were considered.

Professor Saunders being called upon, said that it was not a difficult task for him to speak about the farm when he was surrounded on every hand by so many interesting objects. He referred to the progress made in every department of the work, and indicated many ways in which the Experimental Farms were being made practically useful to agriculture in Canada. Referring to the club's visit last year and the warm reception which greeted them at the hands of the mosquitoes on that occasion, Mr. Saunders recalled to mind the ignominious retreat of some of the naturalists, caused by the violent onslaught of vast multitudes of those fearless, winged creatures. There was then a thirty-eight acre swamp in the southwestern portion of the farm where no drainage system existed, and where from one to two feet of water lay over the greater part of the surface of that area all the year round—a perfect paradise and breeding ground for mosquitoes. On the farm to-day there are already six miles of main drains through the swamp, and now we can sit in peace without being disturbed by the melody of these swamp-dwellers. The work on the farm is many-sided. The old snake fences with the boulders alongside have been done away with ; the large boulders which strewed the fields and covered a large area of land have been blown up with dynamite and the fragments utilized as road-metal ; many of them contained rare and interesting fossils. Several roads have been built, consisting of the large boulders at the bottom, smaller ones above, broken macadam above that, and the Leda clays found on the farm capping all. These roads are dry and substantially built, and will be a permanent benefit to the farm. Several buildings have been built since last year, including a large barn, probably the finest barn in the Dominion, and five houses for the staff. Besides this work there were 150 acres of stumpy land, covered with

second growth poplar and birch, which have been cleared. The second growth trees have been pulled up bodily with chains, and dynamite used for removing the stumps, and the land thus cleared is now yielding grain, ploughing having been done early in the season. Last season's work might be styled the period of foundation, and it is hoped rapid improvements will follow. The newly cleared land referred to will afford excellent opportunities of experimenting with fertilizers. In the use and application of fertilizers many errors have been made. In this virgin soil the Professor hoped to elucidate this important question, eliminating as much as possible the errors which have crept in on account of applying the fertilizers to partially or wholly exhausted lands, or to lands already highly manured. We shall be able, he added, to test the different fertilizers and combinations of fertilizers, by continuous experiment year after year on the same soil and with the same crops until some definite conclusions are reached regarding their relative merits in bringing about an increased yield. Fertilizers will necessarily be much more used in the future than in the past, especially on the more or less exhausted lands in the older Provinces where the three important elements required, viz., phosphoric acid, nitrogen and potash are becoming rapidly exhausted. Those portions of Canada which had been under cultivation for a long period needed fertilizers most, while such lands as those of Manitoba and the great North-West had little need of fertilizers at present. Professor Saunders then briefly referred to the able work performed by Mr. Fletcher, the Entomologist and Botanist, and by Mr. Hilborn, the Horticulturist to the farm. These gentlemen would speak each on his particular branch. He continued, and said that if they succeeded in introducing from time to time such new varieties of wheat, barley and oats as would be useful to the country, the good resulting from this alone would be found of inestimable value. Much had been done in procuring trees, shrubs and fruit trees from various parts of the world. Directors of botanical gardens in various countries had given handsome donations and had promised to send more. Perhaps the most interesting received were those which came from the Agricultural College in Japan, where they grow many varieties of grain, shrubs, trees and vines peculiar to that country. He had received a letter from Japan this week in which the Canadian Experi-

mental Farm authorities received the thanks of the Japanese Government for exchanges sent from Canada. Many varieties had been sent, which, it was expected, would be of much use in the northern provinces of that country. Hitherto the Japanese had done very little in the way of cattle-raising, but were now devoting more attention to this important branch of industry. Prof. Sargent, of the Arnold Arboretum, Boston, had been kind in sending seeds to the Experimental Farm, and more had been received from Kew and St. Petersburg, so that quite a large number of useful trees and shrubs had been added to the stock on the Central Experimental Farm. Collections of these and other useful trees and shrubs are being sent to the different Experimental Farms of Canada, in Nova Scotia, Manitoba, the North-West Territories and in British Columbia, so that these would soon be stocked in this way with valuable material for experimental work. Prof. Saunders then thanked the members present, said he was glad to see them all, and hoped they would meet there again at some future time. Mr. Hilborn, the next speaker, was introduced by Mr. Whyte, who, in doing so, described the various parts of a flower, and the functions which each was called upon to perform. On rising, Mr. Hilborn said that he was highly pleased to meet with the club on this occasion, it being the first excursion at which he had been present, although he had been a member for some time past. He dwelt at length upon the various methods and devices used in cross-fertilization so as to produce hybrids, and therefrom obtain hardy varieties. In his department of the farm work, considerable attention had been given to fruit trees, etc., and the following would serve to illustrate the work done. There had been planted 300 varieties of apples, 110 varieties of pears, 80 varieties of cherries, 90 varieties of plums, 150 varieties of grapes, 110 of strawberries, 50 or 60 of raspberries, and 50 varieties of currants and gooseberries. There were some very fine fruits amongst these which were well adapted to the climate of this country. There were experiments being made to test which of these varieties would stand best, and a careful selection of such would be employed in cross-fertilizing; thus he hoped to get useful and hardy fruits. It was done in this way: Select a hardy variety for the female parent and get stamens from another—the male

parent—which are ready to open, and dust the pollen over the pistils. Cover the flower with a close fitting paper bag, which is left on four or five days so as to leave no chance for fertilization by wind or insects. Gauze bags are then placed over the young fruit, and retained there until the fruit ripens. The seed is then carefully washed out and planted, and every seedling produces some fruit, possibly each one different. Perhaps only one in a thousand will produce a good hardy variety, but one such occasionally amply repays for the trouble, and no limit can be definitely placed in this line of research, time alone can tell what can be done in that direction. The past and present seasons were both very dry, and the fruit trees and vines did not present so good an appearance as he would have desired.

Mr. James Fletcher was then called upon to say a few words He was particularly engaged, in connection with his office at the farm, in entomological and botanical researches. Whilst, for accuracy's sake, the scientific aspect of the question was never lost sight of, he hoped to be able to show that the work done was pre-eminently of an economic nature. Besides the numerous problems of great interest to the student of nature, the practical requirements of a great country with agricultural capabilities such as Canada possessed, were the first to engage the attention. Science now-a-days no longer meant theory and speculation, but that word should be taken in its true sense as synonymous with knowledge. Whilst his researches in plant and insect life were closely related to each other in many respects, in some points they were quite different. An area of 65 acres had been appropriated on the farm for the purpose of laying out a Botanical Garden. This would be an object of special interest to the members of the club. He hoped by next year to have some work done on it to show scientific visitors. The land was being prepared and material was being gathered together. Large collections of seeds and plants had been sent to the Experimental Farm from all parts of the world, including many excellent things which would be of use in many parts of this country. Collections of young forest trees had been received and planted, France and Russia having contributed a large number, last autumn he had collected and had planted vast numbers of seeds of our most useful native trees. It was already necessary to replace

the wood removed by the farmer or lumberman, so as to produce not only new timber, but also to preserve important and beneficial results affecting the climatic conditions of a district. Fodder plants were receiving special attention and collections of our native Canadian grasses were being tested with a view of obtaining such a mixture as would make a good and "permanent pasture." This was greatly needed in Canada. Farmers in this country were in the habit of importing their grass seed from Europe, but this did not always prove satisfactory. Seeds of certain plants grown in northern countries were better and produced more vigorous plants than when grown in more southerly regions. Clover seed grown in Canada realized a much higher figure and was sought for more eagerly in the American markets than that grown in the United States. During his visit to the North-West last summer Prof. Saunders had obtained seeds of several species of grasses, and others had been obtained from correspondents. Experiments were now being tried with them, and it was hoped that good results would follow the testing of some of the more promising sorts. It was strange that there should be so few of our native grasses known to farmers and utilized by them. Many meadows needed to be replenished, as they were quite worn out. Regarding his duties as entomologist, Mr. Fletcher said everybody will see that they are a necessity this year. Ravages by insects are reported in all quarters, from the Atlantic to the Pacific. In Europe the same troubles are felt this year as we feel in Canada. In Canada farmers had applied readily for remedies, and it had been a great pleasure to him on many occasions to be able to advise them how to cope successfully with their enemies. There were two leading modes of treatment, depending upon the nature of the insect injury. Injurious insects might be divided into two classes. (1). Those which took their nourishment by means of masticating jaws, or (2) by sucking with a tube—for the first a poisonous substance had to be applied over the surface of the plant likely to be destroyed—whilst for the other, a substance which gives off volatile matter (like pyrethrum) was applied. Pyrethrum or "Insect Powder" was a most useful substance, and its properties were graphically illustrated from an experience he had recently had in the Nepigon district—a place

noted (1) for its trout, (2) for the abundance and variety of representatives of the mosquito tribe. "Insect powder," or pyrethrum, was used with great advantage, and the simple act of burning a small pile of this substance in the room quieted every mosquito and afforded an excellent opportunity of enjoying a good sleep, which it would otherwise have been impossible to obtain. He had just returned from an expedition to the locality mentioned with the eminent American entomologist, Mr. S. H. Scudder. They had gone to collect the eggs of some rare butterflies and had been very successful, having secured eggs of no less than 14 species. An important investigation now being carried on was with reference to the timber-boring beetles. The life-history of these insect enemies, which destroy annually a large quantity of timber, especially that which has to remain in the woods after being cut for a season or two, was not yet fully known, and a link was necessary to complete the chain of our knowledge regarding them. He was of the opinion that if the time and manner in which the beetles laid their eggs, whether on the surface or in crevices and holes of the bark, or in other ways, as had been variously stated, were accurately determined, a remedy might then be found. If the beetle as is supposed by some, gnaws a hole in the bark in which she lays her eggs, it is possible that the old reliable poison, Paris green, as had been suggested to him by Mr. J. M. Irwin, of Peterboro, might be useful in poisoning or deterring the insects from depositing eggs on logs protected by this substance. In a knowledge of the life history of an insect lies the secret of success in the work of an economic entomologist.

At the request of Professor Saunders, Mr. Henry M. Ami, of the Geological Survey staff, and leader in geology of the O.F.N.C., was called upon to give an account of the geological features which characterized the farm, a subject which had engaged his attention for some time past. Mr. Ami began by stating that the rocks which were found on the farm belonged to two great periods or systems in geology, widely separated in time and differing in many characters. The older and underlying series had been deposited in palæozoic times, a period long anterior to the advent of man or even of mammalia upon the earth. The limestones which were seen to crop out in various places contained many remains of fossils entombed in them, such as trilobites, encrinites

and numerous varieties of shells. These served to tell the age of the rocks in which they were found. There were fossils found which belonged to the Trenton formation, and many rocks, especially those around Prof. Saunders's house, showed evidence of the Black River age. The outcrop last referred to, had been puzzling for a long time, as the dips in the strata exposed, varied very much and went in every direction. A large shell belonging to the genus Maclura had been observed that afternoon and other genera which showed that Black River limestone occurred there. Reference was then made to the newer series of rocks, namely, those belonging to the latest periods in the history of this continent. Overlying the old Trenton and Black River rocks could be seen large accumulations of boulders of all sizes, rounded, smooth and polished pebbles, which show indubitable evidence of the action of glaciers, which were prevalent at that period in the world's history. The "great ice age" then prevailed over this part of the continent, and was followed by a great submergence of the continent on account of the superincumbent weight of the great ice sheet. The sea encroached upon the land, and marine deposits were made. Several species of marine shells had been found by the speaker on the farm, which were easily recognized as being quite similar to others now found living in the Gulf of St. Lawrence, along the Labrador, Newfoundland and Greenland coasts, as well as elsewhere. This period of submergence, or flood, was followed by another of elevation, and the marine condition of affairs, which at one time prevailed on the farm, were changed and dry land appeared—the deposits of this post-tertiary sea—forming the soil, which is now under cultivation. The continent was still rising, as far as could be judged, along the shores of the St. Lawrence. The presence of raised beaches was a good proof of it. The most recently formed beds were caused by the wind and overlaid all the others. These were still going on. The light sandy soil or loam so widely distributed on the farm seemed to contain a good deal of vegetable matter, whilst the underlying clays afforded heavier soil. The geology of the farm was interesting and many points were well worthy of careful study. Mr. Ami thanked the members for listening to him so attentively, after which Mr. Boardman arose and proposed a hearty vote of thanks to Prof. and Mrs. Saunders for their hospitality and kindness.

which was ably seconded by Mr. T. J. MacLaughlin. The first speaker bore testimony to and spoke in very flattering terms of the grand work which it was apparent to all was being accomplished by this institution —the Central Experimental Farm—and anticipated illimitable benefits to such members of the farming profession as availed themselves of its advantages.

Mr. T. J. MacLaughlin, the secretary of the club, in seconding the vote of thanks, said he was sure that all present had enjoyed themselves very much. That new and comparatively unfinished as the Experimental Farm was, compared with what it would be in the near future, and immature as its aims and objects must yet necessarily be, all present must have been surprised at what they had seen and heard in connection with it. The vast improvement wrought in so short a time was astonishing, and the director and his assistants had every reason to be gratified at the results of their labours. In pointing to the benefits to be derived from such an enterprise, he said that the farmers readily admitted that they were sorely in need of scientific knowledge as to the best methods of cultivating and preserving their crops. Such information this institution would be the means of disseminating amongst them, and he hoped, when the time came for them to do so, they would show their keen appreciation of the Hon. Mr. Carling and the Government he represented, for propounding and carrying into effect this important system, which was, as he understood it, designed to raise the standard of the agricultural profession, the most important of all our industries, from a state of ignorance and drudgery to one of enlightenment and ease. From what they had seen and heard at this excursion, and from what they knew of the energy and ability of Prof. Saunders and his able assistants, he had the utmost confidence that under his supervision and with their assistance the designs of the Experimental Farm system would be fully carried out, and the benefits anticipated by the country at large fully realized.

The vote of thanks was presented by Mr. Whyte, the President of the Club, and passed unanimously.

The party then took the vans and returned to the city delighted with all the interesting objects witnessed as well as grateful for the opportunity which had been afforded them of seeing the farm under such favourable auspices.

SUB-EXCURSION NO. 7, 30TH JUNE.

In answer to an invitation received from Mr. G. C. Holland, a member of the club, a visit was paid to a tract of country not previously examined, lying near Hintonburgh.

Upon arriving at the Holland Farm, the party struck down towards the Ottawa River, where there is a piece of marshy land. Here many marsh plants and aquatics were collected.

The Geological Branch, under the able guidance of Mr. H. M. Ami, turned up the river towards Skead's Mills to examine an outcrop of the Chazy formation, which there occurs. Specimens of *Stromatocerium rugosum*, Hall, were obtained from the calcareous strata.

At 4.30 the whole party re-assembled at Mr. Holland's residence, "The Elms," where they were made heartily welcome and hospitably entertained by Mrs. Holland.

The usual addresses were then delivered. Mr. Ami was the first speaker. He gave a concise account of the geology of the locality, and illustrated his remarks with specimens collected during the afternoon. The President, Mr. R. B. Whyte, then spoke for the botanical leaders, and drew attention to the most interesting species of plants collected and especially explained the structure, character and uses of the "Cruciferæ," or Cress family.

The hearty welcome accorded the naturalists, the rich locality, the fine weather, and the good addresses, all combined to make a successful and enjoyable outing. The vans reached the city again a few minutes after six o'clock.

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EXCURSION NO. 3—TO THE "MER BLEUE."

The third regular excursion of the season took place on Saturday, July 21st, when Eastman's Springs and the Mer Bleue were visited. Through the kindness of Mr. Ebbs, of the Canada Atlantic Railway, arrangements were made by which a special car was placed at the disposal of the club. This car was attached to the Boston express, and dropped at Eastman's. The run down was soon and very comfortably made, the naturalists enjoying fully the pleasure of travelling over a

road in splendid condition, in a beautifully clean car, and with polite officials who seemed to do everything in their power to make the journey agreeable.

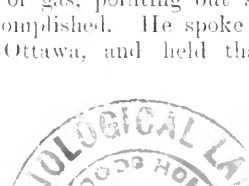
On arriving, the President, Mr. R. B. Whyte, addressed the members, giving out the programme to be followed during the afternoon. First of all the various springs of mineral water and gas were examined. The proprietor had kindly thrown open the springs and the picturesque grounds surrounding them, so that those who desired to taste the medicinal waters or to rest in the shade, were enabled to do so. A party was then formed to visit the Mer Bleue, a very extensive and interesting peat bog. This lies about a mile distant. Owing to the excessive drought, which has now lasted for nearly two years, the ladies and children were all able to go anywhere over the bog without wetting their feet. The gas spring was first visited, where *Utricularia cornuta*, Mx., *Triglochin maritimum*, L. var. *elatum*, Nutt., and the two beautiful little sundews (*D. rotundifolia*, L., and *D. longifolia*, Mx.), as well as several grasses and sedges, were collected by the eager botanists. After investigating thoroughly the treasures of the gas spring, small parties branched off in different directions over the swamp. One party visited the gravel ridge or island running down the middle of the bog, a few even going beyond.

The soft, elastic covering of Sphagnum moss, with which the whole surface of the Mer Bleue is covered, made walking pleasant for a short way, but it soon became very tiring, and at 4.30, the time for returning to the Springs, all were ready to start.

At 5 p.m. the party re-assembled at the Springs, and having partaken of the contents of their baskets, met together for the usual addresses.

The President first called upon Mr. James Fletcher, the leader in Entomology, to address the meeting. Mr. Fletcher spoke of the interest which attaches itself to the study of the science with which he was particularly connected, and showed what great advantages might be derived from these investigations. He described the captures which had been made during the day in such a manner as to interest those who were present. Some of the most convenient forms of collecting apparatus were described, and taking from his bottle some specimens they were exhibited and their habits given. Beneficial predaceous beetles, protective mimicry amongst spiders, and wood-boring beetles were treated of.

Dr. Baptie was then invited by the President to speak on "Natural Gas," a subject occupying the public mind at Ottawa very much just now. The speaker entered into the origin, formation, composition and mode of occurrence of gas, pointing out some of the results which had already been accomplished. He spoke also of the possibility of finding gas about Ottawa, and held that the fact could only be ascertained by boring.



Mr. Henry M. Ami then followed, giving a general sketch of the geological formations which would be likely to be met with by boring at this locality, as also along the line of the Canada Atlantic Railway. The approximate thickness of various formations was given, and valuable data for those who might wish to bore for gas. Mr. Ami pointed out that in strata of precisely the same age as along the line of this railway between Ottawa and Eastman's, gas had been struck with a considerable pressure, such as would be of great value for manufacturing and other purposes.

As the time for the train was approaching, after the above addresses, it was thought best to move to the station and have Mr. Robert Whyte's address on the botanical treasures there. Accordingly, upon reaching the station the party re-assembled around the President and listened to an eloquent address upon the plants collected. Mr. Whyte spoke of his subject only as those can who love it and understand it thoroughly. All listened intently as he took each plant in its turn and explained its points of interest. Amongst the plants specially treated of were some rare and local orchids. *Habenaria blepharioglottis*, Hook, the beautiful White Fringed Orchis, which had been found in some profusion, was shown, as well as *Calopogon pulchellus*, the Beautiful Bearded Orchis. All too soon the whistle of the train put a stop to his agreeable disquisition.

The city was reached in good time after a most enjoyable and profitable day's outing, the naturalists bringing home with them many treasures.

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ANNOUNCEMENTS.

Excursion No. 4 for August.—The next excursion will be to the Victoria Sulphur Spring, Montreal Road, on Saturday, the 18th. The vans will leave the Post Office at 1.30 p.m., and it is hoped to reach the city again by 7 o'clock. Tickets, members, 25c.; non-members, 30c.; children, 15c.

Sub-Excursions.—It has been decided to hold no sub-excursions during the month of August.

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CENTRAL CANADA EXHIBITION ASSOCIATION.

The attention of the members is called to the prize list issued by the above association. Every effort is being made to render the exhibition, which is to be held here from Sept. 24th to 29th, a success. The club has been particularly requested to make exhibits of natural history objects. It is to be hoped that exhibits may be made by us in all the classes, as this will show better than anything else the activity of our members. A liberal appropriation has been made for prizes in this department.

(FLORA OTTAWAENSIS.—*Continued from page 64.*)

125. C. ROTUNDIFOLIA, Michx.

Springy wood. Billings Bridge. This is a weak-stemmed few-flowered plant with angular root leaves upon long petioles. Stem fleshy at the base. May—3.

129. C. PRATENSIS, L. (Ladies' smock. "Cuckoo-pint.")

Peat-bogs and wet meadows. Dow's swamp, Billings Bridge, Beechwood, Lake Flora, (J. F.); Janeville, (R. B. Whyte). The Canadian plant, as noticed in Macoun's catalogue is more slender than the European, and always white-flowered. Young plants are produced in great abundance from the leaflets which fall off and float on the top of the water. May—2. (B.)

130. C. HIRSUTA, L. (Small Bitter-cress.)

Low ground and springy woods. An inconspicuous plant with a very inappropriate name, being almost glabrous. June—2.

ARABIS, L. Rock-Cress.

135. A. HIRSUTA, Scot. (Hairy Rock-cress.)

Rocky open woods and pastures. Little Chaudiere, Britannia, Hull, Aylmer, Chelsea, &c. May—4.

138. A. DRUMMONDII, Gray. (Tower-mustard.)

Rocky pastures. A large distinct species. May—4. (B.)

140. A. PERFOLIATA, Law. (Smooth Tower-mustard.)

Sandy woods and pastures. A tall slender plant with yellowish flowers and leaves only apparently, not really, perfoliate. June —2.

141. A. LÆVIGATA, Poir.

Mountain side. King's Mountain, Chelsea, P.Q. June.

BARBARÆA, R. Br. Winter-cress.

145. B. VULGARIS, R. Br. (Yellow Rocket).

On rocks and by waysides. Lovers' Walk, New Edinburgh, Billings Bridge. Ju.—3.

——— var. STRICTA, Regel (Native winter-cress).

Swampy woods. Beechwood. A much less conspicuous plant than the type, with slender stem and small flowers. Ju.—2.

ERYSIMUM. L. Treacle Mustard.

146. E. CHEIRANTHOIDES, L. (Worm-seed Mustard.)

Everywhere. June (B).

SISYMBRIUM, L. Hedge Mustard.

150. *S. officinale*, Scop.

Roadsides. July—1. (B.)

BRASSICA. Tourn. Cabbage. Mustard.

159. *B. Sinapistrum*, Boiss. (Wild Mustard, "Charlock.")

Cultivated ground. A most troublesome and persistent weed in many parts of Canada. Pods knotty, smooth, one-third consisting of a stout two-edged and one-seeded beak. Seeds reddish black. June. (B).

160. *B. alba*, Gray. (Garden Mustard.)

A garden escape. Easily known by its bristly pods, more than half of which consist of the one-seeded beak. Seeds yellow. July—1.

161. *B. nigra*, Koch. (Black Mustard.)

Roadsides. Scarce at Ottawa. Pods smooth, four-cornered, erect on appressed pedicels. Seeds dark brown. June.

CAMELINA, Crantz. False Flax.

191. *C. sativa*, Crantz.

An occasional weed in fields of grain. Ju.—2.

NESLIA, L.

2107. *N. paniculata*, L.

Rarely introduced with bird-seed. A small plant with sparse stellate-pubescence, small bright yellow flowers and round pods. Ju.—3.

CAPSELLA, Vent. Shepherd's Purse.

197. *C. Bursa-pastoris*, Mœnch.

Everywhere around inhabited localities. May. (B.)

THLASPI, Tourn. Penny-cress.

199. *T. arvense*, L. (Mithridate Mustard.)

Waste places. Ju—1.

LEPIDIUM, L. Pepper-wort.

202. *L. sativum*, L. (Garden-cress.)

A garden escape frequently found in waste places. Ju—2.

207. L. VIRGINICUM, L.

Rocky pastures. Ju—1. (B.)

RAPHANUS, L. Radish.

213. *R. sativus*, L. Garden Radish.

Introduced borders of fields and way-sides. Ju—1.

VIOLACEÆ—Violet Family.

VIOLA, L. Heart's-Ease. Pansy.

229. V. BLANDA, Willd. (Small Sweet White Violet.)

Damp woods. May—1. (B.)

230. V. RENIFOLIA, Gray. (Kidney-leaved Violet.)

Damp woods and swamps. Sometimes confounded with the above. The leaves, however, are pubescent and more or less kidney-shaped one always decidedly so, and the flowers are scentless. May—2.

234. V. SELKIRKII, Pursh. Large-spurred Violet.

Damp shaded rocks. Our earliest Blue Violet. A very distinct species, easily recognized by the leaves being smooth beneath and sparsely hairy above, and by the large blunt spur. Hemlock Lake, Beechwood, Chelsea. May—1.

235. V. CUCULLATA, Ait. Hooded Violet.

Damp woods or meadows. A most variable species both as to flowers and foliage. There are, however, two very distinct forms. (1.) A large plant with blue flowers and very pubescent leaves, and (2.) a smaller plant growing in meadows or beside water with larger violet flowers, and almost smooth leaves. May—3. (B.)

240. V. CANINA, L., var. SYLVESTRIS, Regel. (Dog Violet.)

Woods and pastures. May—2. (B.)

241. V. ROSTRATA, Muhl. (Long-spurred Violet.)

Governor-General's Bay, New Edinburgh. Ju.—1.

242. V. CANADENSIS, L. (Canada Violet.)

Rich woods. A charming species, flowering in May and November. (B.)

243. V. PUBESCENS, Ait. (Downy Yellow Violet.)

Rich woods. A lovely plant, with golden yellow flowers and fine foliage. There are two forms.

Var. *eriocarpa*, Nutt, has the pods covered with woolly white pubescence. This is probably the type of the species. May —3. (B.)

———————— var. SCABRIUSCULA, T. & G.

In this the pods are perfectly smooth and the leaves almost so. Some forms of this variety resemble closely the western *V. glabella*, Nutt. May—3.

247. V. *tricolor*, L., var., *arvensis*, Ging. (Wild Pansy.)
Cultivated ground. Billings Bridge, Hintonburgh. Ju.—1.

POLYGALACEÆ.—Milk-wort Family.

POLYGALA. Milk-wort.

251. P. SENEGA, L. (Seneca Snake-root.)
Rocky banks. Not uncommon. Ju.—1. (B.)

253. P. PAUCIFOLIA, Willd. (Fringed Polygala.)
Dry open woods. A lovely little flower. Ironsides *(J. F.)* Near St. Louis Dam. *(H. M. Ami.)* May—3. (B.)

CARYOPHYLLACEÆ.—Pink Family.

SILENE, L. Catchfly. Campion.

255. *S. inflata*, Smith. (Bladder Campion.)
Introduced. Waysides and grain-fields. July—2. (B.)

258. S. ANTIRRHINA, L. (Sleepy Catchfly.)
Sandy and rocky banks. Ju.—1.

260. *S. Armeria*, L. (Sweet-William Catchfly.)
A garden escape. Billings Bridge, and occasional in waste places. July. (B.)

261. *S. noctiflora*, L. (Night-flowering Catchfly.)
Introduced. An abundant weed in fields and gardens. Ju.—3. (B.)

LYCHNIS, Tourn. Lychnis, Cockle.

268. *L. Githago*, Lam. Corn-cockle.
Introduced. Grain fields. July—2.

269. *L. vespertina*, Sibth. Evening Lychnis.
Introduced with grass seed. July.

AUTUMN ON THE UPPER OTTAWA.

By A. O. Wheeler.

(Read April, 1888.)

The following is an account of a canoe trip taken by myself and three friends last autumn. And now as to how we came to make this especial trip. Did you ever on a bright warm day go up to the summer-house on Parliament Hill and see the sun glistening on the river away beyond the Chaudiere Falls in a broad band of gold, lighting up the dark green of the cedars and balsams until they became a bright yellow, and giving to the distance a far away and enticing look that makes you wish you were there.

The result of thoughts such as these was a determination to make the trip between Ottawa and Nipissing by canoe, and the fact that some years ago I had been over a large portion of Champlain's route, viz., the Georgian Bay, the French River and Lake Nipissing, as far as South East Bay, only increased the desire and added to the determination to travel this other part of his journey.

In the Canoe Club I happened on a kindred spirit who had had similar longings and come to a similar determination. We soon found two others who were easily inspired with the desire for the delights and experiences of such a trip, and on the evening of the 10th of September last we left Ottawa for North Bay by the night train with two basswood canoes, the best part of three weeks' provisions, ammunition, fishing tackle, and all the rest of a sportsman's paraphernalia. As we had only three weeks' holiday we decided to make the trip down stream and our starting point Lake Nipissing.

We arrived at North Bay the next morning, and on stepping out of the car we stood spell bound for a few minutes and tried to take in the view. A vast sheet of water stretched away before us, all dotted with islands and indented with bays, and shaded blue, brown or slate colour according as the lake was deep or shoal, or as the clouds cast their reflection upon it; while away to the north could be seen the line where sky and water met. Truly Lake Nipissing is a beautiful sheet. It is surrounded at this end by gentle slopes covered in many places with large tracts of hardwood.

But time was precious and we could not stay to enjoy the beauties of Lake Nipissing.

It had been decided that the canoes should be launched at the head of Trout Lake or Turtle Lake as it is sometimes called, and in a short time they were packed on a waggon with the rest of the outfit and *en route* for that point. The usual course taken from Lake Nipissing by voyageurs is by way of the Vase River, but this distance is five miles with three portages—one round a fall of twenty feet—while by the waggon road from North Bay the distance is not much over three miles.

Arrived at the head of Trout Lake, Camp No. 1 was soon pitched and we proceeded to take in the surroundings.

Upper Trout Lake looked a charming little sheet of glass, eight and a half miles long, with an average breadth of about one mile, dotted with heavily timbered islands. It is hidden away among hills covered with semi-hardwood bush, chiefly maple, birch and hemlock, the light and dark shades of which patched here and there with the bright crimson of autumn's paint brush looked very pretty. The lake has three peculiar features—about two miles from its head a narrow peninsula juts out from the north shore and practically divides it into two parts. This peninsula is four miles long, and is so narrow in places that you can see either sheet of water from the other.

The second feature that I allude to, is situated at the lower extremity of the lake near its exit. Here the width is about a quarter of a mile and at regular intervals across this space, with the exception of about forty or fifty yards near the south shore, nature has placed large boulders, whose tops jutting out above the water create the impression that in olden days they were used by giants for the purpose of crossing from one side to the other with, as is generally the case, a big jump at the last, and this appearance has no doubt suggested the name they bear—"The Stepping Stones." The third peculiarity is the exit of the lake, or rather the channel that connects it with Lower Trout Lake. This channel is at the highest water no wider than twenty-five or thirty feet, but at the time we passed through was only three feet in width, and so shallow that it was found necessary to remove some stones to let the canoes pass. To return to camp. The first afternoon

was spent in getting weapons offensive and defensive in order, getting grub into handy and easily got at packages, and sundry other details. After a while the genius of the place—one Jessup—appeared. He looks after the greenhorns who occasionally frequent Trout Lake; this lake having very undeservedly a great name among nimrods and fishermen; he rows them around and shows them where good sport is *not* to be found. The genius of course began after his kind to spin yarns and tell about the big fish to be found in the lake and the difficulties of hauling them in when hooked, etc., etc., and soon made us regret having left our landing nets and gaffs at home. "But," said he patronizingly, "Of course you have a revolver." "Well! *when* you catch your big fish just fire a shot or two close to his head, and the concussion will stun and enable you to lift him in without trouble." This idea was stored away for future use, and it was not necessary to wait very long for a trial of its value, for that very evening two of our party hooked a twenty pound maskinongé and found that concussion was very useless, but that pistol bullets used in the ordinary manner were very effective, for the first big fish was landed, but not until he had had three shots put into him.

While camped here we received a visit from Mr. Gilbert, an American geologist, who lives in Washington, D.C. Mr. Gilbert said that his object, in this part of the world, was to trace a connection between the waters of Trout Lake and Lake Nipissing, and to find proof that in days gone by the flow of water had not been separated by a height of land as now, but had all passed out towards the south-west through the channel of the French River. He stated that as far as he could judge the waters of Trout Lake are twenty-five feet higher than those of Lake Nipissing, also that he had found an old water line twenty-five feet above the then head of Trout Lake, and another old water line fifty feet above the waters of Lake Nipissing, showing that at one time they were united.

Our next camp ground was in the prettiest spot on the whole lake, viz.: in a grove of pines on "Big Island." I mention this camp ground on account of an incident that occurred, and was recalled to my mind by reading in the December number of the OTTAWA NATURALIST a most interesting paper by W. P. Lett. During the night I was awakened

by one of the most blood curdling screams I ever heard, and as it seemed quite close to the tent I sprang into a sitting posture my hair standing on end and every nerve strained to hear more, but, as no further sound followed I came to the conclusion that our big maskinongé must have been too much for me, and was soon again asleep.

Next morning the scream was brought to my mind by one of the party asking if anyone knew what sort of a noise a panther made, and a little conversation developed the fact that all had heard the hideous yell of the night before. There can be no doubt as to its having been a panther and as we were camped on an island, the brute was probably on the mainland, for I don't think they take kindly to the water, although their smaller brethern, catamounts, swim very well and have been known to cross a river two miles in width. Probably the quiet of night made the sound seem closer than it really was. I had heard this cry once before south of Lake Nipissing and was then told by indians what it was. It is difficult to describe it and I think the nearest approach is the shriek of a locomotive as it enters a tunnel and scares you from your first nap. There was little attraction to remain long on Trout Lake for sport was poor. Our only fishing apparatus was the ordinary trolling line and spoon bait, and for some reason the fish would not take it readily. Old residents along the route said that the water was too cold and that it was too late in the year. I am not much of an authority on matters relating to angling nor am I aware of the thoughts and imaginations of the fish tribe, but have been told that the spoon bait spinning at the end of a trolling line resembles an injured fish of small size making its uncertain way through the water, and hence the voracity with which it is gobbled by members of the pike family, bass and other fish that prey upon their weaker brethren. If this be the case I fail to see why the lateness of the season should affect the appetite, or why the unlucky one should not be just as acceptable to the palate of a hungry gourmand of the finny tribe, in the fall as in the spring.

Major W. Ross King the author of "Campaigning in Kaffirland," says that the spoon bait resembles nothing in nature and is devoid of taste or smell, but appears, for some reason difficult to imagine, to be perfectly irresistible to pike as to many other fish.

On the afternoon of Tuesday, 13th September, it was "Eastward Ho!"

again, and we had just passed the stepping stones when with a familiar whir-r-r a partridge flew across followed by another and another and another to the number of nine. A couple of these birds was secured for supper, and while preparing them for the pan I found in the crop of one, four fresh clover leaves. This, I think, shows why partridge are to be found most plentifully along the roads leading to the shanties of lumbermen, for experience has proved that you can always get a better day's sport by keeping on these roads than by going into the thick bush. The reason is clear as it is only along these roads, over which the hay for the horses of the lumbermen is drawn during the winter, that clover is to be found. Speaking about shanties I would like to know why almost invariably an old shanty is surrounded by a raspberry patch? Why should raspberries grow on these open spots to the exclusion of hazel, dogroses and other und rgrowth? To return to the partridge. There are two kinds very common in our woods. The ordinary wood partridge or ruffed grouse and the spruce partridge or Canadian grouse. They are especially noted for two attributes, both truly feminine; their affectionate care of their young and their great curiosity. When a stranger approaches a brood the old ones with discordant cries flutter along through the bush only just out of reach, as though wounded, in order to draw attention from the young ones, and then when you have followed them some distance and they consider their young safe, they throw off the wounded appearance and fly away. A story is told of a brood of little partridge being attacked by a carrion crow and the old birds made such a good fight that they not only beat the crow but held him there until he was taken from them by a spectator. As to their curiosity, if you come upon them in the woods and imitate the barking of a dog, or whistle, they will strut along the log or remain quiet on the branch, moving their heads from side to side until you approach quite close or throw something at them.

On passing through the narrow exit I have before spoken of and entering Lower Trout Lake we found ourselves in quite a different country. All the rounded hills of hardwood with their autumnal tints were gone and in their place the jagged and rocky heights were covered with the light green of second growth poplar and birch, turned in many places to bright yellow, while here and there the tall stems of red and

white pine, rose like so many giants, swaying to and fro and wagging their heads mournfully over the rising generation. This was the country of the rampikes. What are rampikes? Well, I'll tell you. A good many years ago, but well within the present century, tremendous bush fires raged all along the country on both sides of the Ottawa, and thousands and thousands of acres of the best pine country on this continent were totally destroyed, and now the former monarchs of the forest raise their scarred and bleached limbs towards the sky —a mute protest against a cruel and undeserved fate— mute did I say; not altogether so, for on a windy night they may be seen waving their ghostly limbs and heard mourning to each other with many a dismal groan.

Lower Trout Lake is four miles long and very narrow. Its greatest width not being over half a mile. It is surrounded by bold and rocky shores clad with second growth poplar and birch and the ghastly and skeleton rampikes I have just spoken of. While paddling down this stretch we caught another large maskinongé, twenty-five pounds in weight. This one also was despatched by pistol bullets, not concussion. There is a considerable difference among authors as to the correct name for this fish. I have seen no less than eight different methods of spelling it. Among them may be mentioned "Masqu' allongé," "Maskinonge," "Muskellunge," "Muscalinga," "Masquinongy," and "Muscanonga," the most likely one is Masqu' allongé, meaning long face, it is a French translation of the Indian words Masca-nonga, long snout. Masqu' allongé (*Esox estor*) of twenty pounds weight are common and they have been known to attain a weight of seventy pounds with a length of six feet. They prey upon other fish and it is not uncommon to find one of several pounds weight inside them. In fact in the first one we caught was found a brook trout about twelve inches long and $\frac{3}{4}$ of a pound weight.

Lower Trout Lake makes its exit into Lake Talon by way of the "Lost River" but as this road is four miles long with five rapids in the first two miles, it is easier and shorter to get into Pine Lake by way of the Portage de la Mauvaise Musique and from Pine Lake to Lake Talon by Portage des Pins. Lake Talon (or Tallow, as the natives call it) is 31 feet below Lower Trout Lake, and is an uninteresting lake some seven miles long with an average breadth of a little over half a mile. With the exception of parts of the northern shore where slopes of semi-hardwood are to be found, it is surrounded on all sides by bold rocky shores, covered with second growth poplar and birch and the everlasting rampike. Along the south shore the blueberry grows in the greatest profusion and to a very large size. Champlain in his voyage of 1615 makes mention of this profusion of blueberries. The chief feature of the Lake, however, as far as we were concerned, was the homestead of an English gentleman named Grasswell who has settled on a narrow strip of land about the centre of the north side, and who gave us a kind invitation to visit his establishment.

Mr. Grasswell gave us some kind information about the Mattawa

River, over which he had travelled a couple of times. His information was Job-like and comforting. He said that the Portage du Talon, the first portage we should come to, was the very worst he had ever encountered, and that Le Grand Parreseux, further on was not quite so good.

It had rained in the morning, but about noon the sky cleared, the sun came out and all nature seemed to smile as we glided between the steep banks of the Mattawa River, the outlet of Lake Talon. The scene had changed with a vengence. We were now slowly moving between high rocky bluffs 150 to 200 feet high. The warm color of the cliffs, the dark green of the pines, the bright green and yellow of the birch and poplar mingled with autumnal tints, formed a picture all light and colour, while the bold jagged rocks and complete silence all around made the scene very grand.

Half a mile brought us to Talon Chute, the largest fall on the river, which drops at this point forty-two feet. Here all was life and activity for a large gang of men was at work building a timber slide—not a small affair like you see by the side of the Gatineau, but one large enough to accommodate whole logs of any size.

With fear and trembling the canoes were unloaded and this terrible portage commenced, but as is usually the case the old proverb "The Devil is not so black as he is painted" held good, for though rough and rocky and up and down hill, an hour saw us safely on the other side. Crossing Pimisee Lake, a sunny expansion, we descended without trouble the Pimisee Rapids, being merely shoals, the water rippling between the stones with no more force than in a brook. That night we camped at the head of the Boileaux Rapids. On the portage here is a grave with a rude cross at its head, carved roughly, with the inscription "Antoine Joli, drowned 1870." We afterwards learned that he was foreman of a gang of river-drivers, and that similar graves might be found on almost all the other portages along the Mattawa River.

To proceed, passing the Boileaux and Petit Paresseux Rapids you arrive at the Grand Paresseux, where, according to Mr. Grasswell, the portage was not quite so good as the worst he had ever met in his life. It was all our friend had described it, but by this time no obstacle could stop us, and soon we were across with all our goods and chattels. Le Grand Paresseux is a very pretty fall of some thirty-four feet, almost perpendicular. The Mille Roches Rapids and mouth of the Amable du Fons River were next passed and the stream began to get wider and the rapids wicked.

In the Rose Rapids we escaped with a few pails of water and the breakage of a paddle, and in the next—the Epines Rapids—sad to relate one of the canoes came to grief entirely. These rapids are shallow and the boulders and rocks in them very close together. In order to get down with loaded canoes it is necessary to get out into the water and pilot your canoe between the boulders. Sometimes you are up to your knees in water, sometimes you are up to you neck ; you stub your

toes ; you skin your knuckles and almost break your neck as you stumble along—all the while the roar is sounding in your ears and confusing your senses. and the rush of water is doing its best to carry you off your feet, and finally if you do ,'t look out you are into a hole and then you have to swim for it. This was just what happened, the man in front took a header, the man behind lost control, the water caught the canoe, turned it sideways, poured in and then——chaos. Next morning's sun shone serenely on articles of clothing, tea, fish-hooks, rice, matches, sugar, ammunition, oatmeal, blankets, pepper, books, salt, etc., etc., with which the surrounding rocks and bushes in all directions were covered. Memo. of loss—1 boat, 1 stocking, 1 surveyor's compass, 1 pipe, 1 sponge, 1 paddle, 1 set of maps and 2 letters from Mr. Grasswell to his daughter at Mattawa.

The balance of the river between the the Epines Rapids and its junction with the Ottawa, some seven miles, lies for the most part beween high rocky banks and is very pretty, especially in the neighbourhood of Boom Lake, a small expansion a mile long. Well ; anyway, one fine afternoon about five o'clock, we ran the rapids beneath the little wooden bridge that spans the Mattawa at its mouth, much to the amusement of a crowd of loafers on the bridge, who had seldom, if ever before, seen such dainty little craft on their waters—for our blue and green Peterboroughs, with their flags gaily flying, showed to considerable advantage over the dull coloured and squat birch-barks of those regions, and almost before we were aware of the fact we were swiftly flying down the Flat and the first dip of the Burritt's Rapids, and had camped on the right bank of the "Grand River" just below the little village of Mattawa.

How changed everything was now, and into what insignificance the little Mattawa had shrunk ! Looking ahead the shining water might be seen for a mile or two, lying in a deep valley that ended abruptly in a towering hill, as the river bed turned south, and was lost to sight. Everything was on a grander and more magnificent scale than anything we had yet seen, while about half a mile away a streak of white foam showed where the second dip of the Burritt's Rapids stretched across the river.

Did you ever run a rapid ? No ? Then you have never experienced the most intense excitement and keenest enjoyment that can be obtained in this ordinary every-day world. To prove my statement, you know what a stolid unmoveable being the North American Indian is ; how phegmatic, how indifferent under the most unusual and trying circumstances. Now in a rapid I have seen Indians' eyes dance with excitement, and heard them shout like very children ; and these were men whom no other circumstance could move in the slightest degree. Nor is it to be wondered at, for there is always an uncertainty about it that makes the run exciting. You see ahead the white foam extending in a line across the river, marking the beginning of the fall. If you don't know the rapid and are wise you will go ashore and

take a look at it, picking out a course and impressing it well upon your memory. At the place you have chosen for your entrance the smooth water runs into the broken in the shape of a V, and you point the bow of the canoe for its apex. Very little steering is required; the slightest turn of the paddle in the swiftly rushing water and the canoe answers the demand. All is motionless; not a breath is stirring; you seem to be standing still. But take a glance at the shore. See how the trees and rocks and ground are flying by in one continuous streak.

And now you have reached the apex. One moment all is steady as a rock; the next, wild confusion reigns supreme. Currents here; eddies there; disorder everywhere. And see! you are rushing right on a boulder—you strike! But no! A quick turn of the paddle, a long drawn breadth, and it flies by—a narrow shave; but in a rapid a miss is as good as a mile. And now you are in the surges near the foot, the water is boiling and bubbling on every side—spray is flying in the air like myriads of diamonds as it glitters in the sunlight; the roar is sounding in your ears, you feel like a hero, ready to do or dare anything, only for one moment, the next you are quietly floating up the eddy below, waiting to see your comrades take the run, and feeling that it is over, but that in the last few moments you have had a lifetime of pleasure.

Passing without difficulty Timmon's Current and the Rocky Farm Rapids, a stretch of ten miles lays between the last mentioned and the Levier Rapids. Certainly at no other season of the year could we have made the trip to such advantage from a picturesque point of view. The banks on either hand were high, rising on the north side to an elevation of between three and four hundred feet. Not a ripple stirred the glassy sheet of water between them. The whole scene represented a most wondrous wealth of colouring. The bright yellow of the poplars, the dark red and green of the scrub oak and tall pine, the bright crimson of the bush maple, the light green of the untouched poplar, the dull brown of the ground, and slaty grey of the rocks, streaked with the white stems of the silver birch—above a blue sky fleeced with white—below an almost identical reflection of it—presented such a brilliant and many-coloured picture as to be almost bewildering, and yet the whole was blended in such perfect harmony that one could not help crying mentally, "Oh, nature, where is the artist who can compare unto thee?"

Often while paddling along I have striven to remember where I had ever seen any resemblance to it, and my mind has gone back to old times in the Wicklow Mountains, where on a bright hazy day almost every shade of blue might be seen, from the darkest slate to the brightest azure, tinged here and there with pink from the thick growth of heather; and yet, though I am truly loyal to my native land, and maintain that Ireland can hold its own with any country in the world for scenery, I am fain to confess that autumn on the Upper Ottawa has been a great blow to my pride in that respect.

The Levier, Trou and Deux Rivières Rapids are all within a short distance of one another but by means of tracking and portaging were safely passed. Tracking in this case means lowering the canoe down along the edge of the rapid by means of a rope

The Trou Rapids, so named because here part of the river rushes with tremendous volocity through a narrow cleft in the rock resembling a trough, gives a splendid idea of the gigantic power of water. You have doubtless seen the Chelsea Rapids at flood tide on the Gatineau. The Deux Rivières Rapids at low water bear a striking resemblance to these. I asked a river driver if they ever ran them in their big buns, "No" he replied "not unless they get into them and can't help it."

At the head and foot of all the Ottawa rapids the waters are perfectly alive with fish—a species of whitefish, I believ . Up there they call them shiners. They rise at flies in all directions but cannot be caught by bait or spoon. You see a faint ripple on the water, a fin and tail appear for an instant and disappear without the slightest noise or splash. They make one think of sharks with their smooth, noiseless movements. A few yards of fine netting and the larder could be stocked in a few minutes.

Between the Deux Rivières Rapids and the Roche Capitaine the most gloriously coloured scenery was passed through—seen in a painting it would be called extravagant, ridiculous, absurd.

It was marvellous. All around was one panorama of red of every conceivable shade, from deep maroon to delicate salmon—yellow, from deep orange to pale chrome, and green from dark myrtle to bright emerald. It was like being in fairy land, and each turn of the river brought it before us more vividly.

The Roche Capitaine is the ugliest rapid between Mattawa and Ottawa and took an entire day to traverse. To quote from Sir William Logan's report: "The river with a strong current above presents in middle distance and lower down, a fierce, violent and crooked rapid which obstructing ledges at the elbow split into several narrow channels, driving the main body round a great cauldron-shaped space where the rocks on the right are swept clean of nearly all loose material." At the elbow spoken of by Sir Wm. Logan is a great rock called the Captain's Rock. Lower down these rapids are known as the Maribou Rapids. There are eight dips in all and the distance covered between three and four miles.

As we advanced the scenery became still more worthy of rapture, and we were fairly struck dumb with admiration and wonder that anything could be so lovely. I cannot begin to describe it. Every bend of the river seemed more beautiful and the colour brighter and more varied than the last, and the view behind still more worthy of ecstasy than the one in front.

Three miles beyond the Village of Rockcliff the Riviere du Moins joins the Ottawa from the north. The entrance looked very grand. On the right hand side is an immense hill, four or five hunderd feet high.

The Joachim Rapids passed, chiefly by portaging, we found ourselves in the part of the Ottawa known as the Deep River. While paddling down this stretch an animal of some sort was seen swimming ahead, and at first was taken to be an otter; closer inspection, however, showed it to be a squirrel boldly striking out for the north shore: there was quite choppy water on the river at the time, and what must have been to him great waves. The little chap showed great judgment, for instead of striking directly across, by far the shortest road, he was swimming diagonally with the wind and waves.

The river here is fully a quarter of a mile wide, and the course taken by the squirrel much longer. It was the first time I had seen a squirrel swim, and was much surprised. Some years ago, at Collingwood, on the Georgian Bay of Lake Huron, we had an inundation of squirrels. There is a good deal of lumbering done in that part of the country, and with certain winds the Bay is covered with edgings and pine chips, which are, in the general order of things, thrown on the shore. At the time I allude to, every edging and chip had its occupant and some times two or three. The whole place was overrun with them, and you could not pass a bush or a stump without startling two or three. But though they proved such fearless little voyageurs, I never saw one of them swimming before.

Misfortune again; another boom, and on the wrong side, of course. In this case, however, misfortune was good fortune, for a good natured boom-keeper not only opened a gap to let the canoes through, but also presented us with a couple of fish—a pike and a sturgeon, caught the night before with a jack lantern and spear. The average weight of pike (*Esox lucius*) is from five to ten pounds, but in the big lakes this fish reaches a much larger size. It is not a good fish to eat, as it frequently has an earthy flavor. It is most easily caught with the troll. The pike is noted for its voracity. It will gulp down almost anything it can.

The sturgeons are inhabitants of the ocean, Mediterranean, Red, Black and Caspian seas. The species found in the Canadian Lakes, and in the spring time in the larger rivers flowing into these lakes is *Acipenser rubicundus*. The Mouth is situated beneath the snout, is small, retractile and without teeth. There are several fleshy barbels beneath the snout. The body is defended by hard, bony plates. I have been told by Indians on the Mississaga River, north of Lake Huron, that they have been caught there with the spear as much as five and six feet in length. In the Black and Caspian seas sturgeon attain the length of twenty-five feet, and a weight of over two thousand pounds. The roe constitutes the caviar of commerce. The flesh is strong tasting unless the fish are quite young, when it is very palatable. In former days it was considered a great delicacy at any time.

After a while the deep river opened out into Allumette Lake, and a beautiful sheet of water it is. Near the Upper end is situated the old Hudson Bay Post of Fort William, at the present time a small

collection of white houses, with the deep, old-fashioned Hudson Bay Company roof, showing up in a most striking manner against the dark back-ground of a pine grove.

The largest portion of Allumette Lake is taken up by Allumette Island—the island of the Algonquins, for it was here that in olden days Champlain found several tribes of that nation, who had come there to be safe from their enemies, as here they were protected by the dangers and difficulties of the Calumet rapids further on. This island was the furthest point reached by Champlain in his first voyage up the Ottawa in 1613. He was induced to make the trip by the representations of one Nicholas de Vignau, who had spent the winter of 1611 with the tribes on Allumette Island. At the foot of Allumette Lake are the Allumette Rapids.

The Pauquette Rapids, at the foot of Allumette Island and the entrance to Lake Coulonge, are over a very curious formation. The river here rushes over an immense limestone slab full of deep holes and crevices. The surface of the rock has been worn by erosion to a state very much resembling brain coral, and is very uncomfortable to walk on in bare feet as we found to our cost. I should say that this was a very paradise for fossil hunters, but Messrs. Stewart and Sowter can tell you more about that than I can, as I understand they were in that neighbourhood last summer.

Coulonge Lake, in fact, I may say the remaining distance to Chats Rapids, was made in a thick shroud of fog and wood smoke combined, and the greater part of the way, as far as scenery was concerned, was a blank, progress being made by groping along the shores.

The Chats Rapids, or rather Falls, divide Chats Lake from Lake Deschenes. They are so called on account of the abundance of wild cats that in days gone by frequented the Falls and vicinity.

To my mind, with the exception of the "Big Kettle," the Chats is the grandest fall on the river. The main body of water pours into Deschenes Lake with a drop of some 37 feet, which may be seen from a distance of several miles down the lake like a white wall.

The most interesting part of the fall, however, is the left near the portage. Here the Ottawa River Improvement Company have blasted out a channel sixty feet in width, through which the water rushes with tremendous force. The whole is a seething, boiling, bubbling mass, and woe betide the unlucky one who should ever get into it. It is very grand to look at, and as the surroundings are jagged rocks, capped with cedar and spruce, the whole has a wildly picturesque look that is very fascinating. Looking at this raging torrent one can quite realize how the big logs seen on the quiet river below the Chaudiere come by their bruises.

As the tract between Deschenes Falls and Ottawa lies within the jurisdiction of the Field Naturalist Club, I do not intend to speak of it. Suffice it to say that, having combated rain, wind, and rough weather for two days, we found ourselves at last camped in the Grove at Britannia.

At the conclusion of his most interesting paper, Mr. Wheeler was loudly applauded. As given above, it is much curtailed from the original, many historical references having to be omitted for want of space.

ON THE SEQUENCE OF THE GEOLOGICAL FORMATIONS ABOUT OTTAWA, WITH REFERENCE TO THE NATURAL GAS QUESTION.

By Henry M. Ami, M.A., F.G.S.

(Read February 2nd, 1888.)

In geology, as well as in other branches of physical research, it is often advisable and useful to look back for a moment and sum up the evidence and facts which naturally accumulate in the work of investigation carried on in a particular district.

Much has already been published respecting the leading geological features of Ottawa. As far back as 1851 we find that Mr. Alex. Murray, assistant-geologist to Sir Wm. Logan, at that time carried on his geological explorations in this very district.

The results which were obtained by Mr. Murray, and in subsequent years by Sir William himself, as well as by others on his staff, were embodied in the admirable Report for 1863, entitled "Geology of Canada," and the various geological formations noted were indicated on the "Geological Map of Canada" for 1866. This map gave the geographical distribution of the geological formations of the Ottawa district, with their boundaries, and with such accuracy of detail as the facts at their disposal then allowed.

In the "Canadian Naturalist and Geologist," first published and edited in Ottawa by the famous late Mr. E. Billings, that eminent writer described in classic language the various features which his hammer and mind revealed to the scientific world. His researches in palæontology are eminently well known in every portion of the globe, and are a lasting monument to the progress of science in Canada during that part of this century in which he flourished. The "Decades of the Canadian Geological Survey," and the "Palæozoic Fossils," contain innumerable descriptions of fossil species which Mr. Billings had dis-

covered in this very district and elsewhere, from which an exact idea of the fauna which characterized the old Silurian seas about Ottawa could be had. The researches about Ottawa have, since the demise of that excellent palæontologist, been followed up with marked success by his nephew, Mr. Walter R. Billings, of our Club, and from that time, when the O. F. N. C. was organized, new and interesting results have been obtained regarding the completion of the geologic history of this district, a number of active workers having arisen, in whose hands there is a large store of work to be done as yet.

One of the first contributions to the geology of Ottawa, in the transactions of the Club, was the timely and interesting address delivered by Dr. A. R. C. Selwyn, the able director of the Geological Survey, on the "Geology of the Ottawa Palæozoic Basin" (see Trans. O.F.N.C., Vol. III., page 34, *et seq*). There is there given a graphic and instructive account of the various formations existing in the basin in question, which were deposited under such favourable circumstances on the shores and in the greater depths of those old palæozoic seas.

During the past nine years, the writer has had many opportunities, both as a member and leader in the geological section of the Club's work, to examine the geological formations of the district and enter into numerous details of structure, more interesting and instructive perhaps, than remunerative, nevertheless of considerable value in working out the geological history of Ottawa. With a view of giving in a concise and practical manner the result already obtained, it has been thought that a table or schedule might better illustrate the same than a detailed description.

The question of natural gas occurring or not occurring in the strata of the Ottawa district has been and is still being freely discussed—a question of considerable import from an economic standpoint and one which has given rise to this paper, written with a view of giving those interested in the matter a general idea of the succession of the rock formations as they are known in this vicinity. There are many problems involved in discussing the likelihood of gas occurring in a certain district. The characters of the strata, its thickness, composition, mode of occurrence and its distribution have everything to do with the occurrence of gas. The result of experiments made in other parts of the world, and especially in the United States, show that gas occurs in rocks of almost any age in the history of the earth, and in comparing the rocks of the Ottawa district with those of similar age

and origin in the States which are known to afford natural gas, even there do we find questions of detail and structure coming in which prevent anyone from making the rash statement that it does or does not occur here. For example, whilst it is well known that the Trenton formation in several places yields natural gas—nevertheless, it does so when the limestones of that rock-formation are dolomitic (Prof. Orton), which character we know does not apply to the Trenton as it is developed about Ottawa. It is also a remarkable fact that, besides the three great faults or dislocations indicated by Sir Wm. Logan ("Geology of Canada, 1863") which affect the geological structure of the rocks here, there are large numbers of smaller ones which constitute a more or less parallel series of breaks of great importance in working out the geological structure of the country, and which act as so many chimneys or openings whence natural gas may have been escaping for ages past, had the strata ever been impregnated with this substance. Whilst the writer would be pleased to see natural gas occurring in large quantity and easy of access for manufacturing and other purposes, and whilst there are many points occurring in the geology of Ottawa which make it desirable that borings be made to ascertain if gas really does occur in paying quantities; nevertheless, the result of his researches lead him to conclude that there are undeniable evidences which point to the likelihood of gas not occurring in quantity about Ottawa. A bore sunk through the Hudson River, Utica and Trenton formations would soon reveal the fact of its occurrence, yes or no.

Should natural gas be struck however, the formations which would, from their peculiar composition, be most likely to afford that useful material—are the Utica and Trenton formations. These two are highly bituminous. (See table.)

The following table has been prepared with a view of giving at a glance and in chronological order the different rock formations met with. It does not by any means profess to be exactly accurate, still it has been drawn up from the evidence obtained in the field at the excursions and sub-excursions of this Club.

These rock-formations divide themselves into three grand natural divisions as they may be seen in the field, belonging to three different ages or epochs of the earth's history:

I. Post-Tertiary or Post-Pliocene.
II. Cambro-Silurian or Ordovician.
III. Laurentian or Archæan.

The local development of the second division, viz., Cambro-Silurian system include a series of formations which succeed one another in perfect unbroken sequence from the Hudson River formation above to the Potsdam sandstone below. For reasons, palæontological and stratigraphical, which it is not within the province of this paper here to discuss, the writer has placed the Potsdam and Calciferous formations along with the other overlying series into the Cambro-Silurian System, rather than class them along with the Cambrian System.

TABLE SHEWING THE ROCK-FORMATIONS ABOUT OTTAWA CITY, IN THEIR NATURAL ORDER.

System.	Formation.	Character of Strata.	Fossils.	Thickness.
	Alluvium, shell-marl, fresh water sands, lake and river gravels.	River and lake alluvium, sands and clays, shell-marl (white clays), ancient low beaches, stratified gravels	Recent fresh water shells, plants and other organic forms. Pre-historic remains of Aborigines, along with *Castor fiber, Ariaeus Virginianus, Limnæa galbana*, &c., &c.	Varies from 0 to 50 feet in different places.
POST-TERTIARY	Saxicava Sand (marine)	Marine sands.....	*Saxicava rugsa* L *Natica affinis*, Gmel, &c.	Varies from 0 to 6 feet and more.
	Leda clay (marine)....	Chiefly stiff, blue clay, with occasional nodules, boulders and sandy portions	*Leda* (Portlandia) *arctica*, Gray. *Phoca Groenlandica and Mallotus villosus*.C., insects, star-fishes, foraminifera, &c.	Varies from 0 to 120 feet and more.
	Boulder clay.....	'Till,' *moraine profonde*, glacial deposits.	No fossils discovered.....	Varies from 0 to 30 feet.
	Hudson River.....	Buff-weathering calcareo-arenaceous shales and limestones	*Zygospira Headi*, B. *Ambonychia radiata*, H. *Crytolites ornatus, Con. Modiolopsis pholadiformis*, H.	About 20 feet (known), probably thicker.
	Utica.	Black and brittle bituminous shales and limestones	Leptograptus flacoidus, H. Orthogr quadrimucronatus. Siphonotreta Scotica. Dav. Triarthrus spinosus, B. Asaphus Canadensis. C., &c., &c.	From 60 to 75 feet.
	Trenton.....	Nodular and evenly bedded for the most part light-coloured limestones, with occasional shaly measures, in part bituminous.	Prasopora Selwyni. N. Glyptocrinus ramulosus, B. Pleurocystites squamosus, B., Anazyga recurvirostra, H ; Murchisonia bellicincta, H.; Asaphus platycephalus, &c., &c.	Between 400 and 500 feet.
CAMBRO-SILURIAN or ORDOVICIAN.	Bird's Eye and Black River.	Hard, compact, impure fossiliferous limestones.	Tetradium fibratum, S.; Columnaria Halli, N.; Maclurea Logani, Salter Gonioceras anceps, H.; Bathyurus extans, H., &c., &c.	About 200 feet.
	Chazy.....	Limestones (cement-rock).....	Leperditia Canadensis, Jones, Cryptozoon (?); Orthocerus, sp.	20
	Shales.....		Lingula Belli, B ; Modiolopsis parviuscula, B.....	30 } 200 feet.
	Calciferous.....	Sandstones and sandy shales.	Orthisimperator, B.; Asaphus canalis, B.	150
	Potsdam.....	Magnesian limestones, quartziferous, passing downwards into arenaceous rock.	Ophileta compacta, S. Murchisonia Anna, B Lituites Apollo, B. Orthoceras Lamarcki, B.	250 to 400 feet.
		Sandstones and sandstone conglomerates	Ophileta compacta, S.; Orthoceras sp. Scolithus Canadensis, B. Climactichnites, &c., &c.	About 200 feet.
LAURENTIAN or ARCHÆAN.	Laurentian (Lower) of Logan.	Granitoid gneisses, pegmatite, diorites, crystalline limestones (newer), &c., with apatite, graphite, iron ores, garnet, jasper, galena, barytes, gold, &c.	*Eozoon Canadense.* (Dawson.) (In limestones)	16,000 feet, according to Logan.

EXCURSION No. 4.

The fourth general Excursion was held on Saturday, 15th September, to King's Mountain, Chelsea, P.Q.

The weather was exceedingly favourable, being bright and warm: consequently a large number of members and their friends turned up in good time at the usual rendezvous, the corner of Sparks and Bank streets. A start would have been made at the appointed hour, 9 o'clock, had it not been that one of the vans, previously engaged, failed to put in an appearance, and considerable time was lost in procuring another conveyance to take its place.

Soon after 10 o'clock, the party, consisting of about seventy, in four well filled vans, moved quickly out of the city, and the drivers being apparently as anxious as the excursionists to get to their journey's end, much of the time lost in starting was made up on the way out—the foot of the mountain was reached at 1.15 p.m. The road chosen on this occasion was the "lower road" past the Hon. R. W. Scott's house. This road is far more picturesque than the one usually taken through Chelsea. The van drivers, however, seem to have a great objection to go this way, and for the last two or three years have succeeded in persuading the Council to take the other road. For this occasion, however, the President was determined that the excursionists should enjoy the full beauty of the lovely drive. As the mountains were approached the glorious autumn tints of the forest elicited frequent expressions of surprise and delight. The Stag's-horn Sumach was a conspicuous object in the landscape, the sombre colours of the Laurentian rocks being rendered magnificent by its gorgeous livery of crimson and gold. Not less marvellous were the hues of the forest, where the deep green of the foliage had changed to varying tints of yellow, white, red and purple. The maples being, particularly, objects of great beauty. The basswood and poplar contributed many shades of yellow and tender green, while the white ash had in many places changed its summer robe of green to one of deep purple. All this colour mixed with the deep green of the conifers—pine, spruce, and balsam fir,—which were dotted here and there up the mountain side, conspired to produce a general effect of wondrous beauty. Such a

landscape, in fact, as can only be found in its perfection beneath the clear skies and in the pure air of Canada.

Upon reaching the foot of King's Mountain, the vans were stopped and the party alighted. The President, Mr. R. B. Whyte, then announced what the programme was for the day, and gave out the names of those who were to act as leaders.

After an hour had been spent profitably and pleasantly in discussing the contents of the luncheon baskets, the work of the day began.

Upon invitation by the president, most of the party decided to accompany him to the summit of the mountain. The majority followed the beaten path and worked their way up quietly and easily, but a few venturesome spirits determined to find their way straight up the face of the rocks and it was only after a long and tedious climb that they succeeded in gaining the top. The time at the disposal of the excursionists would only allow them a short while to gaze on the wide panorama spread out for many miles beneath them. Looking out through the tops of the trees in the foreground away to the right lay the Chats Lake and rapids connected with Lake Deschenes by the Ottawa River, which like a band of silver marked the mid-distance and extended across the picture until it was lost sight of on the horizon to the extreme left. Immediately in front twelve miles distant lay the cities of Ottawa and Hull, with Aylmer to the right and Gatineau Point to the left. Deep down in the valley at the feet of the spectators lay the smooth surface of King's Mere, reflecting like a mirror the pretty residences on its shores. In every direction could be seen fertile farms with their snug and well kept buildings peeping through the luxuriant forest growth, truly a beautiful picture, speaking of quiet, peace, and happiness.

Both on the way up and in the descent the naturalists were busily engaged in collecting specimens for study. The botanists returned with well filled boxes. Michaelmas Daisies, Golden Rods and various berry-bearing plants were now in perfection and were eagerly gathered by the collectors. As the bottom of the slope was reached the sharp click! click! click! of the mineralogists' hammers bore testimony that they were not losing their opportunities. At 4 o'clock the party re-assembled. It had been announced at the beginning of the day that the return journey would be by the upper road and it was therefore arranged that

the usual addresses by leaders should be given at the top of the hill near the summer residence of the late Lt.-Col. Dennis.

Some of the leaders were unfortunately prevented from attending the excursion, and there were consequently only two addresses.

The president, speaking for the botanical leaders delivered an admirable address upon the various plants collected during the day, explaining how the different species of Aster and Solidago might be distinguished, and drawing attention to their medicinal properties and various uses.

Mr. H. M. Ami, the leader in geology then followed with a sketch of the geological features of the locality, explaining how the Laurentian mountains were formed and enumerating the most important minerals contained therein.

This pleasant day was brought to an end by an enjoyable drive home, the city being reached by 7.30.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the above Society is to be held in this city upon the 5th and 6th October. The president for the year is Mr. James Fletcher of this Club. A cordial invitation has been extended to our members to attend the various meetings. The President's address upon Insects Injurious to Crops, will be delivered in the Council Chamber of the City Hall on Friday evening (5th) at 8 o'clock, and there will also be several addresses by prominent men.

THE WINTER MEETINGS.

The Soiree Committee beg to inform the members of the club that they are now preparing the programme for the winter course of lectures. They will feel much obliged if such members as are desirous of reading papers before the club during the ensuing season will send in the titles as

soon as possible and at the same time indicate whether they have any preference as to the date of reading their papers. The inaugural meeting will probably be held in the beginning of December. Titles of papers must be sent in before the 15th November, after which date the committee will take steps to fill up any vacancies which may then exist in the programme.

AN IMPORTANT WORK.

"ENTOMOLOGY FOR BEGINNERS" for the use of young folks, fruit-growers, farmers and gardeners, by A. S. Packard, M.D., Ph.D.

We have received from Dr. Packard's publishers a copy of his new work bearing the above caption. This little book is undoubtedly an important one and its appearance very well-timed. At the present day when the necessity is acknowledged for knowing something of the life-histories of the many injurious insects which annually destroy a large proportion of our crops, it is a rather remarkable fact that there was not until Dr. Packard's book appeared, any small manual to be had at a low price, such as those who were not entomologists would care to buy and have on their shelves "in case they might require it." Moreover, undoubtedly, one of the greatest hindrances to a beginner when anxious to make a collection of insects and to learn something of their habits, was the fact that there was no small, systematic work from which he could obtain the necessary information which he required at the very start—such as the way to collect, kill, mount, preserve, and classify his specimens.

This drawback which has existed for so long is, we believe, now supplied by the above mentioned work.

The want of a convenient hand-book was particularly felt by those educationists who were wide-awake enough to appreciate the value of entomological studies as a means of training the mind of youth in a way which, at the same time that it sharpens the faculties of observation and memory, gives the power to think—from the fact that it deals with real things which actually exist and which the students can find and

examine for themselves—presents its details to those willing to learn in such an attractive manner as to induce attention. Further, above and beyond all this, when it has served its end as a successful educational means of training the mind, the recipient is possessed of a stock of useful knowledge which, no matter what his occupation may be, he will have frequent opportunities to make use of for his own good and the benefit of his neighbours.

It is perhaps open to discussion whether the different sections of "Entomology for Beginners" might not advantageously have been arranged rather differently, or whether indeed it may not be better for the beginner to study some of the last chapters first. This, however, is a trifling matter, and the student will soon learn where each of the sections is situated. As arranged at present, we find first of all, in what may be called Section I, chapters on the structure, metamorphoses and classification of insects. This last is not in strict accordance with the accepted systems, some of the older orders having been subdivided, until instead of 8 orders we now have 16. Dr. Packard has spent many years in close study and careful thought on systematic entomology. He says of the present system: "The classification presented is in accordance with recent studies, and "the conviction that certain of the lower so-called 'orders' of insects, "such as the 'Orthoptera, Pseudoneuroptera,' are heterogeneous, un- "natural groups, which for the sake of clearness and truth to nature "should be broken up into distinct orders." The reasons are given for the changes and the points are well sustained. We have no hesitation in saying that the new classification is a good one, and anticipate its ready acceptance by scientific entomologists.

There are only two defects which strike us. One is that it is perhaps too much condensed; the other that the degree of amplification is not given of all the figures.

Chapter 4 gives a short account of some of the interesting types of insect architecture.

Chapter 5, consisting of 34 pages, gives an excellent account of injurious and beneficial insects, and enumerates the leading remedies.

The remainder of the work is devoted to a careful and most intelligible treatise on collecting and preserving specimens for the cabinet, also

what will be invaluable to beginners, a Bibliographical list of works on entomology and a very complete glossary of terms.

The whole comprised in a compact 8vo. vol. of 367 pages, clearly written, well printed and copiously illustrated. It is published by Messrs. Henry Holt & Co., of New York for $2, and can be ordered through Messrs. J. Durie & Son, of this city, we trust ere long it will be in the hands of many of our members.

CENTRAL CANADA EXHIBITION ASSOCIATION.

The first annual exhibition held at Ottawa under the auspices of the above-named association opened upon Monday, 24th September, and closed Saturday, 29th idem. It was on the whole a most decided success, although in some lines the exhibits were fewer than had been anticipated. The Natural History exhibits were displayed in the Art Gallery, and attracted much attention. It was satisfactory to notice that with one exception the whole of this exhibit was sent in by members of our club. As pointed out in a previous issue, it was a matter of some importance that we should make a good exhibit, not only to show that the club was actively and successfully pushing on the investigation of the natural resources of the locality, but also to show our sympathy with an institution which must have a most beneficial effect upon the prosperity and advancement of the city of Ottawa and the surrounding district. Amongst the exhibits which attracted special attention were a most extensive and valuable collection of the economic minerals and ores of Canada, exhibited by Mr. B. T. A. Bell, the editor of the Canadian Mining Review.

In Sec. 1 the first prize for a collection of native stuffed birds was taken by Mr. Edwards. His well mounted and naturally set-up specimens were an attractive feature of the exhibition.

Mr. George R. White took second prize with a large collection of beautiful unmounted skins, well prepared and nicely arranged.

Mr. Edwards's exhibit of stuffed fish was the only one sent in.

There were only a few specimens, but they were sufficient to show his skill as a taxidermist.

Secs. 3, 4, 5 were collections of insects. In Sec. 3 there were two collections, the larger made by Mr. Fletcher, which was a complete collection of all the different species of butterflies ever taken in the locality, systematically arranged and named. The other a general collection of insects of various orders made by Mr. Fred. Magee. Mr. Fletcher's were the only collections of injurious insects and foreign insects. These were contained in 15 cases, and made a fine display.

Sec. 7, a collection of native reptiles in spirits, was exhibited by the curator of the Ottawa Literary and Scientific Society.

Sec. 8, collections of native plants. There were three very fine collections exhibited under this head. Mr. Robert Whyte sent his fine collection of local plants, which are all arranged, named and mounted on white cartridge paper.

The second prize was awarded to Miss Isabel Grant. This was a smaller collection than the last, but shewed great care and industry on the part of the collector.

Mr. Whyte also exhibited an extensive collection of Australian ferns of great beauty.

Perhaps one of the most interesting exhibits as well for the beauty of the specimens as for the tasteful manner in which they were displayed was Mr. F. A. Latchford's collection of land and fresh water shells.

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"How to Study Botany," by T. J. W. Burgess, M.B., F.R.S.C.

We have much pleasure in noticing an excellent essay bearing the above modest title, which was read by our fellow member, Dr. Burgess, before the Hamilton Association on 10th May, 1888. It is a charmingly expressed and succinctly written statement of the advantages, difficulties and pleasures to be derived from a study of the science of botany. The manner in which the author considers a beginner can best acquire a knowledge of this branch of science is put forward in a clear and simple manner. Those who have had the pleasure of work-

ing with Dr. Burgess or of examining his collection, know how well qualified he is to instruct others, as well in the science of accurately identifying his material as in the art of making, preparing and mounting beautiful specimens for the cabinet. The only thing to be regretted is that the edition is a small one, and consequently it cannot come into the hands of many who would like to see it. We have received two copies for the club library, a perusal of which we highly recommend to our botanical members.

FLORA OTTAWAENSIS.

It has been decided by the Council to reprint the 13 pages of the "Flora Ottawaensis" which have so far appeared, and for the future to keep a separate pagination for that part of the OTTAWA NATURALIST. This is done to meet the wishes of several of the members who have expressed a desire to have these pages printed in such a manner that they may be separated from the monthly numbers without injuring the rest of the volume.

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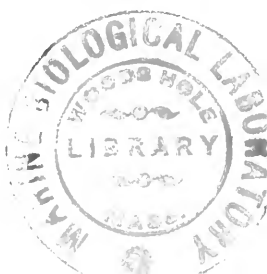

OUR PATRON.

We have much pleasure in announcing that His Excellency the Governor-General, Lord Stanley of Preston, has graciously consented to become the patron of the Club in the place of the Marquis of Lansdowne.

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THE PROGRAMME FOR THE WINTER OF 1888-89.

Acting upon the recommendation of the Soiree Committee, the Council has decided that during the coming winter, instead of having one long paper read at each soiree, as has been the custom in the past, a number of short papers and interesting notes should be substituted.

This change is suggested for the purpose of making the discussions more general and of a conversational nature.

Each evening will be devoted, as much as possible, to the consideration of one branch of science only, and will be under the joint management of the leaders and the Soiree Committee. This has been thought advisable as the leaders are most familiar with the work that has been done in their several branches during the season. The leaders' reports will also be read upon the evening bearing the name of their branch.

An ample supply of papers upon each subject has been promised.

The admission fee will be the same as in past years, viz., *free* to all members of the Club and of the Ottawa Literary and Scientific Society, and 10c. each to non-members.

The Monday afternoon course of Popular Elementary Lectures will be *free* to all comers as heretofore and it is hoped that they will be well attended.

PROGRAMME.

SOIREES.

1888.		
Dec. 13.	President's Inaugural Address	Mr. R. B. Whyte.
1889.		
Jan. 17.	Geological Evening	
" 31.	Botanical Evening	
Feb. 14.	Entomological Evening	
" 28.	Conchological and Ornithological Evening.	
Mar. 7.	General Zoology Evening	

MONDAY AFTERNOON LECTURES.

1889.		
Jan. 7.	Ornithology, ...	Prof. Macoun
" 14.	Conchology, ...	Mr. Latchford
" 21.	Geology, ...	Dr. Ells
" 28.	Geology, ...	Mr. Ami
Feb'y. 4.	Entomology, ...	Mr. Fletcher
" 11.	Entomology, ...	Mr. Harrington
" 18.	Zoology, ...	Rev. G. W. Taylor
" 25.	Botany, ...	Prof. Macoun
Mar. 4.	Botany, ...	Mr. Fletcher
" 11.	Botany, ...	Mr. Whyte

The above meetings will be held as usual in the museum of the Ottawa Literary and Scientific Society, 25 Sparks street. The soirees will begin at 8 p.m. punctually. The Monday afternoon lectures will begin at 4.15 p.m. and close at 5.30 p.m. punctually.

THE PRESIDENT'S INAUGURAL ADDRESS.

DELIVERED THURSDAY EVENING, DECEMBER 12, 1888.

Mr. Chairman and Members of the Ottawa Field-Naturalists' Club.

Though very much averse to taking the responsible position to which you elected me for the second time last March, I cannot but feel proud of the honor conferred upon me when made President of such an active working society of students of nature as the Ottawa Field Naturalist's Club, and am much gratified to be again able to congratulate you upon the general prosperity of the Club, and that in the face of difficulties greater than usual, which will be referred to hereafter.

Though our membership has not been increased so largely as last year, still we have added the respectable number of 19 to our list, and the very gratifying attendance at the general excursions shows that there has been no falling off of interest in the Club work. These excursions were four in number. The first to Kirk's Ferry on June 2nd. This, the largest excursion yet held by the Club, and which promised to be our most successful one, was unfortunately spoiled by the rain, which fell from midday till evening. Many of the party never left the vans, and only a few—the happy possessors of waterproofs—were able to explore the woods in the vicinity of the falls. But very little collecting was done, and an early start was made for home.

On June 23rd we visited the shores of Lake Duchesne, near Aylmer, for the second time, and had a very enjoyable excursion. Though held in the same week as last year, the extreme lateness of the season interfered very much with the expected collections, as plants found in full bloom the previous year were yet only in bud.

On July 2nd we visited Eastman's Springs and the Mer Bleue, probably the most interesting locality to the naturalist visited by the Club. After testing the more or less nasty-tasted water of the different springs, the bog was visited and large collections made of the many interesting and beautiful plants for which it is famous, including the insect-eating sundews, the bearded orchis, the horned bladderwort, and a great profusion of the lovely white fringed orchis, collected by many of our botanists for the first time.

The fourth and last of the season, on September 15th, was our eighth trip to King's Mountain, visited this year for the first time in the autumn, and I think the general verdict was that the locality lost nothing by the change. If there was not such a profusion of flowers as in the spring, neither was there of mosquitoes, and the clear beautiful day made the view the finest on record.

Another excursion was advertised to Sulphur Springs, but owing to the continued wet weather, after being postponed two weeks, had to be dropped altogether.

You will no doubt have noticed in the July NATURALIST a brief account of the Montreal Natural History Society's excursion to Montebello. They kindly sent an invitation to any of our Club able to go to meet them there. Unfortunately we did not receive it in time to organize a party, and I very much regret that a business engagement prevented my being able to represent the Club; but I am glad to know that we were most efficiently represented by Messrs. Whiteaves and Ami, who gave a most glowing account of the kindly treatment they received from our Montreal friends.

I notice in the account given in the NATURALIST a feature that I have often thought we might adopt with great advantage at our own excursions, that is, the giving of prizes for the best collections made during the day. I well remember, on the two occasions when I had the pleasure of meeting our Montreal friends—at Calumet in 1879 and Montebello in 1881—the great interest taken in these competitions not only by the competitors and their friends but by everyone present. Prizes are given in botany, geology and entomology, for unnamed as well as named collections, thus making them interesting to the juniors and more advanced students alike. I would like to draw the attention of our lady members to the fact that at Montebello all the prizes in botany and geology were carried off by ladies, and that the large number of specimens collected show that the fair prize-winners deserved their honors. I have several times urged the advisability of giving prizes at our outings, but have not been able to persuade the Council to see the advantages of it as I do; but if I should be on the Council next season I will certainly try again, as the more I think over the matter the more convinced I am that the effects would be in every way beneficial.

Our Saturday afternoon sub-excursions were not nearly so numerous as last year, owing to the very large number of wet Saturdays in the early part of the season, and in the latter part to the absence from the city of the leaders who take charge of these outings; but though few in number, they included two of the most successful yet held by the Club. One, that to the Beaver Meadow, Hull, though not very largely attended, was in every other way so satisfactory that it might be taken as a model of what the Council aim at in their Saturday afternoon trips, therefore a brief sketch of it will not be out of place here.

The meadow, a favorite resort of our botanists, is about a mile from the street car terminus north of the Aylmer Road. The party of about 25 explored the north side without much success, but on crossing over to the south side we beheld the most magnificent display of spring flowers I ever saw—Bellworts, Trilliums, Squirrel corn, and many others in the greatest profusion—a sight well worth the walk to see. After making large collections the party reassembled to hear the usual addresses. The most notable plants collected were exhibited and their principal characteristics and properties explained as simply as possible by your President, special attention being directed to the Cruciferæ. Prof. Macoun, by special request, gave a most admirable address on the willows, many of which were then in flower, explaining the different groups into which this most difficult order is divided, and the best way to collect and study them. Mosses and allied forms were also referred to. Mr. Fletcher, on behalf of the entomological leaders, spoke of the principal insects captured, with special reference to gall formation, and also gave some valuable advice on how to begin the study of insect life, what apparatus was necessary, and where it could be procured. Prof. Macoun then gave a short address on some birds he had observed, illustrating his remarks with specimens he had collected for the museum, and by others flying overhead, making altogether a combination of pleasure and instruction that ought to be attractive not only to students of natural history but to every thinking person who desires to become acquainted with the beauties of the world around him.

The other excursion referred to was that to the Experimental Farm on July 14, which was the largest sub excursion on record, over 60 members taking part in it. As a full account of it was published in

the August *Naturalist* it will not be necessary to repeat it here, but I would strongly advise any one wishing to see the farm under the best auspices to go with the club on our next visit. The only important innovation attempted in the mode of conducting these sub-excursions during the past summer was, in addition to the usual talk on the plants collected, the giving of a simple lecture on some one of the botanical families, explaining the distinguishing features of the family, and in what it differed from allied families, drawing attention to the members of it that were of most value and interest to man. I am sorry that the plan was not carried out as thoroughly as I would have liked, the irregularity of our excursions and frequent absence from the city of the botanical leaders interfering very materially with the success of the scheme, but I am quite satisfied, from our short experience this year, that if properly conducted it would prove a most instructive and attractive feature of our afternoon outings, and I would most strongly commend the idea to the favourable consideration of the leaders for next season.

Our little magazine has been published with more or less regularity during the past season. If any of you thought that it sometimes appeared rather late in the month I would beg of you to make allowance for the difficulties our publishing committee have had to contend with; the absence of our editor for two months, the assumption of his duties by the other members of the committee and the moving of our printers led to delays which were quite unavoidable. In addition to the usual reports and papers read at our soirees, reports of excursions, &c., it contains four instalments of Mr. Fletcher's revised Flora Ottawaensis, a work of very great value to every botanical student. As originally published in 1880 it was merely a list of all flowering plants and ferns found here, but as revised it gives the usual habitat and special localities for the rarer plants, the time of flowering, and in many cases the points of difference between allied species, making it immensely more valuable than as first printed. I need hardly say that all this must have entailed a great deal of labour on Mr Fletcher, and, though I am sure a labour of love, must have been a severe tax on the time of such a busy man as we know him to be, and he deserves the thanks of the club and of every botanical student in the country.

The club contribution to the exhibition last summer was not as full an exhibit of the club work as I would have liked. Several members on whom the committee relied for assistance were absent from the city, and their collections were not available. Notwithstanding this drawback, the space allotted to us was a great centre of attraction to visitors. Mr. Fletcher's magnificent collection of foreign butterflies, injurious insects, and Ottawa butterflies, Mr. Latchford's cases of shells, Mr. G. R. White's birds, Mr. Bell's great mineral display, along with the botanical collections, made a display of which we have every reason to be proud.

It has often occurred to me while observing the working of the Club during the last three or four years, that in some respects it has become too mechanical for the best results, not only as far as the effects on our members is concerned, but for the cause we all have at heart, the study and cultivation of a love for natural history. To confine myself to the section I know most about, that of botany. As you are aware, the Council at its first meeting after election appoints two or three members to be leaders in each department, whose duties are to arrange excursions, look after the interest of the branch, and make a report at the end of the year of the work done—duties which, as a rule, are performed with most commendable zeal and efficiency. But though most valuable results have flowed from the system since its inauguration eight years ago, I cannot but think some serious drawbacks attend it, the principal being the tendency to weaken the spontaneous work of the other members. I think I see a disposition to lean too much on the leaders. At our excursions, for instance, many of our young botanists who make collections are too ready to get the whole work of naming their specimens done for them by the leaders—a plan which I need hardly say will never make them botanists. There is all the difference in the world between the knowledge one has of a plant he has got named by some one else and one that he has ferreted out for himself; and it is only when he fails to find it out that he should call on the leaders for assistance. Others carry this dependence still further, and do not collect at all, expecting that the leaders will have done so, and that they will get the names of the plants they have seen at the close of the outing; and the knowledge that this assistance can so

easily be got tends to prevent individual work. One is very apt to say "What is the use of bothering about this? I'll ask the leaders." About things that, if it were not so easy to get their information second hand, they would have got first hand by investigating the matter for themselves. Whether you agree with me or not as to the evils of the present system, I hope the scheme I have to propose to counteract what seems to me its drawbacks will have advantages enough, apart from its main object, to commend it to your favorable consideration.

It is this: That during the active collecting season—say from May to September—a course of weekly meetings should be held in some convenient place—one another's houses would do very well—open to all the botanical students of the Club, to compare notes and talk over the week's work. Though such meetings would be necessarily under the control of the leaders, everyone should be expected to contribute something they have observed during the week—a new locality for a rare species, any abnormal specimens they have observed, any species new to our list—in short any fact of interest to them, or which they think would be of interest to other members. And I may say here that young students are very apt to undervalue the importance of their own observations. I am sure much valuable information is lost because the observer did not think it of any consequence, or that it would be sure to have been seen by some one before him. Such meetings as I propose would be of great value not only to the juniors by bringing before them the results of the work done by the more advanced students, but also to the leaders, who would have in this way brought under their notice all the work done by all the members of the branch, instead of as at present, when they draw up their report having to depend almost entirely on their own note-books. Were this done, any new fact observed would become common property when of most value and interest—that is, when fresh and capable of verification. Indeed there is no end to the advantages that would be derived from such meetings in furthering the educational work of the Club, and that, as I have always maintained, is the most important phase of our work, that in which there is the greatest field for well directed effort.

But in order that our efforts in that direction may bear full fruit we have first to disabuse people's minds of the very common delu-

sion that peculiar difficulties beset the study of natural history, only to be overcome by a favored few. Many a time I have heard the remark "I would like to know something about botany, but it would take too much time, and I never could remember the long names;" to which my answer has been: "If you are only anxious to learn it is not nearly so difficult as, say, Latin, or German, or algebra, or half a dozen other subjects that an average boy or girl is expected to master during their school life." To show what can be done by anyone who is in earnest about it I will ask your attention to what has been done by some members of our own club, leaving out of consideration our professional naturalists and confining myself to those who study nature for the love of it, first apologizing to the gentlemen concerned for mentioning their names without permission. In the (in our club) somewhat neglected subject of conchology, one of our members while a student at college occupied his few leisure moments in the study of our shells, to such purpose that he is now, as I was told the other day on good authority, one of the first amateur conchologists in the Dominion. Those of you who were present at our afternoon lecture on conchology last winter will know to whom I refer. To those who were not I would say come to the lecture on that subject in this winter's course, and see what a master of his subject Mr. Latchford is. Another student at the same University of Ottawa, Mr. W. L. Scott, devoted himself so assiduously to the study of birds as to be a thorough ornithologist before he left college. In the same department we have another member (Mr. Lees) who uses his eyes to such good effect that, as Prof. Macoun tells me, his list of bird arrivals sent in to the leaders last spring was as complete as his own or that of Mr. G. R. White, the two recognized heads of the department, and I may say that Mr. Lees has acquired his knowledge without taking the life of a single bird, and all in the last two years.

One more example for the last in the most important branch of entomology. It would be hard to name an amateur naturalist more widely known over the whole Dominion, and through the pages of the *Canadian Entomologist*, to which he is a frequent contributor, over the world, than our friend Mr. Harrington. I have selected these names from among many others because they are all alike very busy men, and

acquired their knowledge of nature in the hours that others wasted or worse than waste.

I often grieve to think of the hundreds of young men and women in this city who aimlessly walk our streets because "they have nothing else to do." To all such I say, turn over a new leaf and join the Field Naturalists' Club. You have no idea how much happier and healthier you will be if you earnestly devote yourself to the study of some branch of natural history; and you cannot fail to learn one of the most valuable lessons—how to use your eyes, how to observe and compare. You have no conception of how much of the beauty of this lovely world of ours is lost to you because you don't know how to use your faculties. In conclusion let me quote from an essay on "How to Study Botany" by our member, Dr. T. J. W. Burgess, F.R.S.C., of London, Ont. In speaking of the study of botany as a means of teaching us how to observe and compare, he says:—"Do this honestly, and you cannot fail to become lovers of nature, and, being lovers of nature, better and happier men and women, men and women in some degree approaching that illustrious scientist of whom it was said:

"And Nature, the old nurse, took
The child upon her knee,
Saying: 'Here is a story book
Thy Father has written for Thee.'

'Come, wander with me,' she said,
'Into regions yet untrod,
And read what is still unread
In the manuscripts of God.'

"And he wandered away and away
With Nature, the dear old nurse,
Who sang to him night and day
The rhymes of the universe."

"And whenever the way seemed long,
Or his heart began to fail,
She would sing a more wonderful song
Or tell a more marvellous tale."

DISCUSSION.

Mr. J. Ballantyne had listened with much pleasure to the President's concise report of the Club's progress. He particularly agreed with what was said about the advantages of beginners relying on themselves instead of going to the leaders upon every occasion for assistance. He was of the opinion that if the President's suggestions were carried out much better results would be secured. Not only would the individual students find a far greater interest in their work, but they would impart it to others, and thus the influence and utility of the Club would be widened and felt by a larger number.

Mr. Fletcher endorsed what Mr. Ballantyne had said, but thought it possible to carry that spirit too far. There were certain difficulties at the outset in studying any science which, although surmountable by close application, were much more advantageously overcome and valuable time was to be saved by applying for help from those better informed. It must, however, be only for help, not to have the work done for them. He had heard with extreme pleasure of the good work in ornithology which had been done by Mr. Lees. It was remarkable that such results could have been obtained without having recourse to what was the greatest objection to ornithology, the necessity for killing the specimens, particularly in the breeding season. He did not consider that killing insects was such an objection to entomology. The specimens were killed outright very rapidly, and were seldom allowed to escape in a wounded and mutilated condition. Moreover, it was certain that insects had not the higher feelings, as birds have, of affection for their mates and their young, and he considered it pretty well established that they could not feel pain in the same way either. He would be pleased to hear something more from Mr. Lees of the plan he had followed.

Mr. Lees said the plan was very simple, and consisted merely of going to the woods very early in the morning with a good field glass and note-book and sitting quietly watching the birds and making notes on their habits. He could not allow all the credit to be given to himself for the work recorded; an equal amount had been done by his constant companion on these excursions, Mr. Norman Ballantyne.

Dr. Ells cited some experiments which seemed to prove that fish could not feel pain in the same way as higher animals.

Mr. J. Ballantyne could not agree either with Dr. Ells or Mr. Fletcher that the lower animals could not feel pain. He thought that worms when impaled on the hook of the angler showed unmistakable signs of pain.

Mr. H. B. Small, President of the Ottawa Literary and Scientific Society, agreed heartily with the President in his remarks on the value of students depending on their own researches for the identification of specimens, as much of the value to be gained by personal examination of a plant depended on such a plan for fixing its name in the memory. If they were simply told by someone else what a certain plant was, they would probably have to ask again the next day, unless committed to writing. A very good evidence of the value of this method of study came to his notice some years ago, when he was connected with one of the United States preparatory military schools in New York State. At the botany lecture a bunch of wild flowers was laid on the table, gathered at haphazard for the occasion, and one or more pupils took one to analyse and explain before the class, whilst at its close each student took a specimen away for examination, a report thereon in detail to be handed in at the next weekly lecture. So ardently did the pupils vie with each other in this, that some of the reports were full enough of matter to have made magazine articles, and the knowledge thus gained was lasting in its after effects.

Mr. Small strongly urged on the Club extending their summer rambles to points accessible by railway, as the older fields of research round the city had been well gone over, and he recommended each member of the Club to bear in mind the fact that if they would only take the trouble of getting even one friend to accompany them or to attend the meetings, it would be the best manner they could adopt to advertise the society, and aid the workers in it by countenancing their efforts with their personal support.

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ELEMENTARY LECTURE ON GEOLOGY.

BY R. W. ELLS, LL.D., F.G.S.A.

Delivered on Monday Afternoon, January 21, 1889.

In attempting to prepare a paper for this Society on the subject of Geology, I must confess I have found myself at a considerable loss to know how best to discuss it—for such is its greatness and so limited the time at my disposal that the utmost economy of material must be exercised in order to touch even upon the leading points. I have thought however that possibly a brief sketch of the views held from time time as to the origin and early history of our earth might be of interest first of all, and then we might present a brief outline of the several systems into which the science is generally divided.

Strictly speaking, Geology is the science which tells us about the earth. It investigates the many changes which have taken place on its surface, both in relation to organic and inorganic matter as well as the causes which have produced these changes and the influence which they have exercised. It may for the sake of convenience be considered under three heads, structural. dynamical and historical, though some authors make a much more elaborate division of the subject. Of these the first, *Structural* geology, deals with the general form and structure of the earth, the kinds of rock, whether *sedimentary* or *stratified* or igneous and unstratified with their mode of occurrence, either *plutonic* or deepseated, not reaching the surface, or *eruptive*, volcanic and reaching the surface. It takes cognizance also of the metamorphic rocks and the manner in which the metamorphism has been effected, as well as the general condition of the earth's crust, as affected by faults, joints, veins, etc. It also considers the origin and structure of mountains and many similar subjects connected with the earth's architecture.

The second, *Dynamical* geology, treats of the forces or agencies by which the several changes have been effected, whether aqueous, igneous or organic. Among the first of these, the *aqueous*, may be classed rivers, seas, glaciers, &c. The 2nd, or *igneous*, refers to the agency of the internal heat of the earth, as volcanoes and their resulting effects, geysers, etc.; whilst the 3rd, or *organic*, includes, 1st, vegetable accu-

mulation as peat-bogs, etc., and, 2nd, animal agencies, such as coral reefs and other subjects of that nature.

The third division, *Historical* geology, or as some call it "*Stratigraphical* geology, treats of the rocks in the order of their formation with the contemporaneous events in their geological history, and includes both stratigraphical and paleontological geology, the latter being regarded by some, however, as a distinct branch, with a review of the laws or systems of progress in the globe and in its kingdoms of life. While in this place we can only consider the science of geology properly so called, we may say that its relation to many other physical sciences is exceedingly intimate. Among these may be specially mentioned astronomy, chemistry, mineralogy, zoology and botany, with all of which, and with others, the elucidation of the many geological problems which constantly arise requires an acquaintance more or less profound. In the present stage of the science each of these subjects is frequently assigned to a specialist in that particular branch, in so far at least as it applies to the science of geology. Thus the chemist and lithologist study the composition and peculiarities of the several kinds of rock structure. The paleontologist studies the remains of organic life, in which now paleontological botany forms a special branch. The mineralogist works out the peculiar properties of the several varieties of minerals which are encountered, and this division of study is carried on almost indefinitely in certain lines; thus one person devotes his time to studying the peculiarities of special forms of life, as, for instance, the graptolites, the trilobites, the extinct mammalia, and so on.

With the early history of our planet, or that part of its history which precedes the appearance of solid land, known in geological language as the Laurentian time, geology proper is supposed to have nothing to do, its strict province being confined to the study of the rocks of the earth's crust itself. So intimately, however, are the rocks of the Laurentian time connected with the original crust of the earth that the consideration of the agencies which led to the deposition or formation of that crust is by many regarded as strictly within the province of geological investigation, and in most works on the science we find a chapter devoted to the early history of the earth, viz.: that portion of it

preceding the commencement of the geological record as we consider it. This portion of the earth's history is generally known under the term cosmogony, and under this head we consider the many changes which have transpired previous to the formation of the first solid crust. While of necessity this portion of the earth's history must be treated almost entirely from a theoretical standpoint, it has always been endowed with peculiar interest and the theories connected therewith can be traced back for many hundreds and even thousands of years. Anyone who has ever read that great work "Lyell's Principles" must have been astonished and interested in the many curious and diverse views as to the early stages of the earth's history there presented. To enumerate these would form material for many hours talk alone. Thus we learn that the earliest Indian and Egyptian schools of philosophy ascribed the first creation of the world to an omnipotent and infinite Being who had existed from all eternity and by whom the earth and its inhabitants had been repeatedly destroyed and reproduced. The frequent submergence of land beneath the waters of the universal ocean was also held by them, and the act of creation of life was ascribed to that person of the Hindoo Trinity called Bramah, thus: "In the beginning of things the first sole cause created with a thought the waters, and then moved upon their surface in the form of Bramah the creator, by whose agency the dry land was produced and the earth peopled with plants, animals, celestial beings and men." The Egyptian philosophy also held the theory of recurrent creations; the returns of the great catastrophes by which the surface of the earth was destroyed were determined by the period of the Annus Magnus or Great Year, a cycle composed of the revolutions of the sun, moon and planets, and terminating when these returned to the same sign from which they set out at some remote epoch, the duration of which cycle was estimated at from 120,000 to 350,000 years.

While it would be of great interest to examine the many theories propounded for the creation of the world by such men as Pythagoras. Strabo, Aristotle and other early philosophers, lack of time prevents, The idea of repeated inundations of the globe appears to have been held by most of them, the different relative levels of land and sea, had been, even so early as that time, observed. The theories for the repeopling of

the earth after the destruction of organic life also varied; thus the Gerbonites, a sect of philosophers who lived some centuries B.C., held that after every period of 36,400 years there were produced a pair of every species of animal, both male and female, from whom other animals might be propagated and inhabit this lower world, but when a circulation of the heavenly orbs was completed, which was supposed to be finished in that time, other genera and species were propagated, as also plants and other things, the first order was destroyed, and so on forever.

The theory of Strabo to account for the phenomena of submergence and upheaval is worthy of much attention, and shows that even many hundreds of years ago considerable thought had been bestowed upon some of the most puzzling problems of science. "Thus," he says, "it is not because the lands covered by the seas were originally at different altitudes that the waters have risen or subsided or receded from some parts and inundated others, but that the same land is sometimes raised up and sometimes depressed, and that the sea is simultaneously raised and depressed, so that it either overflows or returns into its own place again. We must therefore ascribe the cause to the ground, either to that which is beneath the sea or to that which becomes flooded by it, but rather to that which is beneath the sea for this is more movable, and on account of its humidity can be altered with greater celerity. It is proper, he observes, to derive our explanations from things which are obvious and in some measure of daily occurrence, such as deluges, earthquakes and volcanic eruptions and sudden swellings of the land beneath the sea, for the last raise up the sea also, and when the same lands subside again they occasion the sea to be let down, and these affect not merely the small but the large islands and even the continents, which can be lifted up together with the seas."

The cosmogony stated in the Koran is brief but of interest. Thus: "The Prophet declares that the earth was created in two days, and the mountains were then placed upon it, and during these and two additional days the inhabitants of the earth were formed, and in two more the Seven Heavens. Concerning the deluge the waters were supposed to be poured out of an oven, and all men were drowned save Noah and

his family; then God said, "O earth! swallow up thy waters, and thou, O heavens! withhold thy rain, and immediately the waters abated."

But it is impossible here to follow the many curious theories of creation and the early views as to the early condition of the earth down to the present. For many centuries, in fact the time has in some places scarcely yet expired, a conflict between the theologians and the men of science concerning these points and the causes of the various geological phenomena was waged with considerable bitterness, in which it did not always happen that the views of the former were consistent either with reason, truth or common sense. The chronology of the Bible evolved by Archbishop Usher and first published in 1701 limited the age of all things to 4004 years B.C., so that the theories necessary to compress the history of the earth as evidenced by the succession of strata everywhere apparent, and of which many contained the remains of extinct animals and plants, into this limited period, were often exceedingly curious. While the rival doctrines of the *Neptunists*, who held that the present physical condition of the earth was due almost entirely to aqueous agencies, and the *Vulcanists*, who maintained that the active agent was principally fire, caused a wordy warfare almost if not quite as violent as the other. As late as 1809 De Luc propounded the hypothesis that the form and composition of the continents and their existence above the seas must be ascribed to causes no longer in operation. These continents, he held, emerged at no very remote period upon the sudden retreat of the ocean, the waters of which made their way into subterranean caverns. The formation of the rocks of the earth's crust, he held, began with the precipitation of granite from a primordial liquid, after which other strata containing the remains of organized bodies were deposited, till at last the present sea remained as the residuum of the primordial liquid and no longer continued to produce mineral strata; while Werner, who is generally considered the leader of the Neptunists' philosophy, held the theory of universal formations, which had been simultaneously precipitated over the whole earth from a common menstruum or chaotic fluid, and regarded basalts and other rocks, which we now know to be of igneous origin, as precipitates by chemical action from water.

The controversy of these two factions at last reached such a pitch that a new school gradually arose, which professed the utmost indifference to the views of both parties and determined to devote its labors to observation, ignoring theories entirely unless supported most strongly by facts obtained in the field, and to this end the researches of the members of the Geological Society of London, established in 1807, were largely devoted, and at length became instrumental in rescuing the science from the dangerous position into which it had been brought, largely by visionary enthusiasts, both in science and theology. Since the formation of this society, which forms one of the most important epochs in connection with the progress of the science, the study of geology has proceeded without due regard to the dictates of reason. The assistance of kindred sciences has been evoked, and while of necessity many changes have occurred in the interpretation of the several problems, these changes have been made after careful consideration of all the facts relating thereto, till now geology stands on the proud pedestal as one of the most useful and important of the sciences.

The generally accepted theory as to the earliest stages of the earth's history is that now known as the "Nebular Hypothesis." By this it is assumed that not only the earth but all the planets, together with the sun, and in fact all the celestial bodies, first existed as a gaseous mass. This in its revolution around a central axis from time to time threw off huge rings which, partaking of the motion of the original mass, gradually formed by condensation the planetary and stellar bodies, the remaining nucleus of our system still remaining as its sun and centre. The process of condensation and cooling proceeded gradually till in time the first crust of the earth was formed, and became covered with water, gradually also the first land rose from beneath the wave and from this point the beginning of the Geological record must be assumed. While therefore the discussion of this theory would be of great interest as well as of the views regarding the condition of the earth's interior we must be content with this brief notice and consider the divisions of geology proper and more particularly in reference to that branch of it known as historical or stratigraphical geology.

For purposes of convenience it has been found desirable to divide the portion of geological time which elapsed since the formation of the

first rocky crust into several parts. These may be generally known as the Azoic Paleozoic, Mesozoic and Cenozoic. By the first, the *Azoic*, is known that portion as yet held to be devoid of organic remains. This has, however, by some been subdivided into two, the *Azoic* and *Eozoic*, from the discovery of certain structures which have been regarded by some authorities as of organic origin in certain portions of these earliest rocks, more especially of that peculiar so-called organism known as the Dawn Animal, or *Eozoon Canadense*, which has the honor of being regarded as our first known form of life. It is but fair, however, to state that the organic nature of this substance has been strongly combated by many scientific men, the great defender of its organic nature at present being Sir William Dawson, through whose efforts and researches it was first most prominently brought into notice, and who has devoted more time and close study to its history than probably any other person. Some, however, hold that in this Azoic time, or the Eozoic part of it, evidences of organic life are manifest in the presence of the beds of graphite or carbon, which are claimed to represent the early presence of vegetable matter in some form. The beds of iron ore are also regarded by some as indicating the presence of organic agencies as well as our deposits of Apatite. These, however, are all as yet subjects of controversy and will probably remain so for many years. The Azoic may be said to embrace two periods, the *Laurentian* and *Huronian*, and is followed by the *Paleozoic*, a time when organic life flourished everywhere over the world's surface, and so generally were the species distributed that precisely the same forms are found at points the most widely removed. The *Primary* or Paleozoic time embraces several periods, or systems so-called, including the Cambrian of our nomenclature, or the Lower Silurian of earlier times, the Cambro-silurian or middle Silurian, the upper Silurian or Silurian proper, the Devonian, Carboniferous and Permian; and forms the longest and probably the most important portion, in many ways, of the earth's history. The succeeding time, the secondary or Mesozoic, embraces the Triassic, Jurassic and the Cretaceous, while the Tertiary or Cenozoic includes the Eocene, Miocene and Pliocene. The closing period, the Post-tertiary, includes the Pleistocene, recent and prehistoric.

The earliest or Laurentian rocks form what we may call the backbone of our continent. They are all crystalline, and consist for the most part of gneisses, granites, limestones, schists, labradorites, quartzites and in some places altered slates. They contain, prominently among minerals, apatite, graphite and mica with great beds of iron ore and many others of great interest to the mineralogist. These rocks are well developed in the Chelsea hills and the country to the north. Geographically and roughly speaking, they may be said to extend from Labrador along the north side of the St. Lawrence to Lake Superior and Lake of the Woods, whence they trend away north-westerly and reach almost the Arctic Ocean. Various theories as to the origin of these different kinds of rocks have been put forth. For many years they were regarded by most geologists as altered sediments entirely, which had been recomposed from the debris resulting from the disintegration of the first existing crust of the earth, through the agency of water or the atmosphere, as well as by the action of the ocean, by which the sands, etc., were redistributed and formed sedimentary layers, which subsequently became metamorphosed into the gneisses, limestones, etc. By others it is held that a great part of these rocks was formed by deposition from a semi-fluid magma, and that they represent the true crust of the earth without the agency of water, while other portions are true altered sediments. Still others again hold that all *Archean* rocks, by which term is meant generally, though the phrase is somewhat ambiguous, all rocks devoid of organisms, thus including Huronian as well as Laurentian, were formed of sedimentation, and that they are originally crystalline rocks, in part at least due to chemical agencies, their crystalline character not being a superinduced but an original property. In such a variety of opinions it seems hard to decide which should have the preference, and while it is scarcely possible that the old wars of the Neptunists and Vulcanists will ever revive in all the intensity of early days, there is yet to be found in the statements of the advocates of either theory plenty of food for discussion. In solving such problems the microscopist plays an important part by the examination of thinly-sliced rock sections, from which their characters are in many cases readily deciphered and their igneous or aqueous origin easily determined. It is probable that both agencies have been largely exerted. Certainly

if the organic nature of the *Eozoon Canadense* can be considered as established, there can be no doubt of the sedimentary character of much of the strata of the system. So also the beds of quartzite and slate, in which the graphite sometimes occur, would in any other system be classified as of aqueous origin. In certain cases of apparent sedimentation, such as the banding of gneisses, this is not so clear since this structure might be induced by other causes, such as pressure, shearing, etc., and we frequently find gneissic structure in true granitic rocks, In fact, no hard and fast theory can be drawn in geological discussion any more than in many other sciences. So much difficulty has been found in drawing the line of division between the two groups of Archean rocks, the Laurentian and Huronian, that very often the two are comprised under one head, the pre-Cambrian, in which the Cambrian is held to constitute the lowest fossiliferous series,the underlying pre-Cambrian being, in so far as yet known, with the possible exception mentioned above, non-fossiliferous.

With the primary or paleozoic rocks our acquaintance with the organic life of the globe may be said to begin, though from the advanced types of life first found it is held by many that lower and earlier forms must have existed in earlier times, the remains of which have completely disappeared from the record because of the great metamorphism to which the rocks of the preceding age have been subjected. Thus in the lower Cambrian are found the remains of huge trilobites with a length of 17 or 18 inches, in fact of a size unknown or unsurpassed in subsequent periods. As we advance in Paleozoic time, however, the various species increase with great rapidity, and in some places, judging from their remains, the shores and shallow waters must have absolutely swarmed with life. That these shores were exposed to the action of sun and wind, tidal currents, etc., is evidenced by the presence of sun cracks, ripple marks and false bedding even in the oldest Cambrian strata, while the presence of beds of conglomerates with sandy layers indicates that the character of the sea beaches of those early days was in many respects very similar to those observed along the coasts at the present time. In fact, in the interpretation of geological problems in the stratified rocks, sufficient attention is rarely paid to the present shore phenomena, varieties of texture in rock, passage from

conglomerates to sandstone, limestone and shale being sometimes supposed to form a basis sufficient to draw well defined lines between rocks of different systems. If, however, we traverse any of our coasts of the present day we find in very limited space the greatest variety of beach. Here we have a stretch of fine sand, passing speedily into grit and soon becoming a rough shore covered with loose stones of various sizes, while a little further on, this may possibly, especially near the mouth of some small stream, give place to beds of soft clayey mud. In one place we have a considerable accumulation of sea shells which may, however, be only local, and we may traverse long stretches of shore without observing any trace of organic life. Now precisely similar conditions must have, to a great extent, prevailed in early times, and the variously composed beaches of that period have now become the hard stratified rocks which are distinguished by the terms Cambrian, Silurian, Devonian or what not, as the case may be, the fine clay mud becoming shale, which by alteration passes into a hard clay slate, the fine sandy stretch will form a bed of hard sandstone or possibly a glassy quartzite, while the pebbly beach will pass into a conglomerate which may be interstratified, and often is, with beds of shale and lime-stone, and yet all these various kinds of rock are of precisely the same age, notwithstanding their great diversity of character.

Although we may undoubtedly assume from the advanced type of many of the Cambrian fossils that a long ancestry of earlier forms must have existed, of which the traces have been removed, the fact is patent that the increase in species is wonderfully greater as we advance to more recent periods. From the fossils collected also from all available points on the world's surface we find that a wonderful uniformity in order of life existed, so that from the strata of New Zealand or Australia precisely the same forms are obtained as are found in the rocks of Great Britain, Norway and Canada to the Rocky Mountains.

While, however, the forms of marine life speedily increased, we do not find indications of land plants till we reach the later portion of the Silurian period. Of sea weeds, however, there was a great abundance even in the earlier eras. But in the Devonian period plant life assumed great proportions. The hillsides and marshes were beautiful with the green of that earliest land vegetation. Further we know that

n those early forest glades insect life abounded, whose cheery hum broke the monotony of the long silence, while the rich tints displayed by the flashing of their wings enlivened the sombre gloom. Many of these insects were of the order Neuroptera, and in size equalled, if even they did not far surpass, those of the present time, having a spread of wing of eight or ten inches, and in some recently found specimens of nearly two feet. The earliest remains of these insects have been found in our own country, or more properly speaking in the provinces by the sea, the fern ledges near St. John, N.B., having yielded a rich harvest to the labors of the local geologists, and so wonderfully preserved were they that the delicate veinings of the wings are yet perfectly distinct. Large fishes also occupied the waters in the Devonian time, and the visitor to the geological museum will find there a fine collection of the same forms as those described years ago by Hugh Miller from the Old Red Sandstone of Scotland. These also are found in New Brunswick and along the adjacent shore of the Gaspe Peninsula, where the strata are sometimes thickly strewed with their well-preserved forms. So great in fact was the number of species in that period that the Devonian has been styled the age of fishes. The distribution of these fish remains is worthy of notice, for while the Devonian rocks are well and widely known throughout Canada, the fish localities are very few, being mostly, in so far as yet known, confined to two areas, one at Campbellton, N.B., and the other on the north side of the mouth of the Restigouche, opposite Dalhousie, where they occupy a portion of the shore about five miles in length. In these cases also the most delicate markings of the scale are as perfect as in the living fish to-day.

I have passed over the periods of the Cambro-Silurian and Silurian of our scale with scarcely a reference. These systems are largely represented in Canada and everywhere abound in organic remains, but are for the most part not conspicuous for economic minerals. Each of the systems is divided into several formations, each of which in turn is characterized by its own peculiar forms, but as these pertain more particularly to the province of the Paleontologist we will not pause longer on this portion of the subject, but pass to the consideration of the closing portion of the paleozoic, viz.: the Carboniferous.

The rocks of this period, though unknown to old Canada, have a large development in the Lower Provinces, and are of special interest from an economic standpoint as the source of our coal supply. For while from time to time we may read startling reports of the discovery of valuable seams of coal in the provinces of Quebec and Ontario, these famous discoveries on investigation have invariably resulted in disappointment to the discoverers. Coal is for the most part confined to the Carboniferous formation. In New Brunswick, however, a small seam of anthracite is found in the Devonian rocks west of St. John, though of no economic value, and in the extremity of the Gaspè Peninsula a small seam from two to three inches thick is seen in the Devonian cliffs which front the Gulf of St. Lawrence. In the Territories and British Columbia, however, bituminous coal, lignite and anthracite, occur in great quantities, but for the most part in rocks much newer or later in age than the Carboniferous, viz.: the Cretaceous. As none of these rocks are found in Ontario or Quebec, the reason for the absence of coal in these localities is easily explained. The Devonian of Western Ontario is, however, regarded by many as the source of the oil commonly but erroneously known as coal oil, a name given to it at first from its supposed relation to the coal fields of Michigan and the Middle States, a supposition afterward found to have no foundation in fact, though the name has adhered to the material.

The Carboniferous time was especially distinguished by the presence of vast swampy forests of tropical aspect, the decay of which afforded the material from which the immense coal beds were derived. The extent of these swamps and the lapse of time necessary for their growth may to some extent be inferred from the presence of seams of coal from 20 to 40 feet thick, the supposition advanced by good authority being that for the production of one foot of coal about eight feet of peat swamp was requisite. In these ancient groves also we find the remains of our first lizards, some of which, from their footprints, must have been of large size. The earliest traces yet known of these are found in the Lower Carboniferous of New Brunswick and in the millstone grit of Nova Scotia.

The close of the Carboniferous, or rather of its later portion, the Permian, marks an important geological boundary, viz., the close of the

paleozoic age, and in the ensuing period, the Triassic, we take up the third great division of geologic time, the Mesozoic.

The development of the Triassic rocks in Eastern Canada is very limited, certain small areas in Nova Scotia, New Brunswick and Prince Edward Island, in all of only a few square miles in extent, comprising all that is present known of the formation between the Atlantic and the prairie section. Small areas have been recognized in the Rocky Mountain district, and on the Pacific coast, in Queen Charlotte Islands and in Vancouver, beds supposed to be of this age have been found underlying the Cretaceous and containing characteristic fossils.

The Cretaceous or third division of the Mesozoic is, however, largely developed in that portion of the Dominion lying to the east of the Rocky Mountains as well as in British Columbia. It both places it is remarkable for the presence of immense beds of coal which at times almost rival in thickness the greatest beds of Nova Scotia. The great abundance and variety of fossils in these localities clearly indicate the horizon of these beds, while the presence of such great seams of coal on either side of the Rockies renders this formation of the greatest economic importance. The newer Tertiary formations are sparingly developed in Canada, a few localities in the North-West Territories closely associated with the Cretaceous and for some years almost inseparable, having of late been judged to belong to this period of time. But the great thickness of formations which are found in England and France, and which there complete the geological record, are, in so far as yet known, almost absent from this portion of the American continent.

Throughout the long interval of the many millions of years which elapsed between the beginning of the fossiliferous rocks and the close of the Tertiary many eras of subsidence and elevation of the earth's crust must have taken place, and are evidenced very plainly by the varying character of the sediments. Thus conglomerates and coarse grits are supposed to represent shallow water and beach deposits, while fine slates represent deposition of sediment under deeper and quieter conditions. From the observation of these peculiarities some authors have developed the theory of geological cycles, by which is meant a regular periodical recurrence of the physical conditions of the earth's

crust, as regards elevation and submergence, throughout each one of the great systems into which the geological scale has been divided.

We have now reached in our hasty sketch that portion of the earth's history which is most closely related to our own time, viz., the *Post-tertiary*, the phenomena of which are generally discussed under the head of superficial geology. At the close of the Pliocene or last of the divisions of the Cenozoic or Tertiary a great change of conditions as regards the surface of much of the globe evidently took place, introducing what is known as the *glacial epoch*, a time of intense cold, when large areas of the northern hemisphere, at least, became covered with ice, which extended probably over the whole or greater part of Canada. Whether similar glacial conditions occurred at earlier stages of the earth's history is a subject which has evoked considerable discussion, some eminent authorities maintaining that the evidence of such ice action, as seen in the presence of glaciated or striated stones in conglomerates, are clearly visible even as far back as the Paleozoic time. It would be out of place here, even did time permit, to discuss the causes that led to the changes in the climate of this period, such considerations more properly belonging to the domain of the astronomer and physicist.

The last of the geological periods, that now under consideration, is also styled the Quaternary or Post-pliocene. It is generally divided into two parts, the first known as pleistocene or *diluvial*, in which many of the mammals are of species now extinct, and the *alluvial* or recent, in which all or nearly all the mammals are of still living species. The indications of a change of climate at the close of the Tertiary are seen in the character of the organic life of that time, and it affected the higher latitudes both of the old and new worlds. The cold gradually increased until the conditions now prevailing in Greenland reached a latitude of about 39° in Eastern America. Over a great part of the hemisphere north ot this parallel it is held by many that a great ice cap, many hundreds and even thousands of feet in thickness, covered the surface, which, following the law of glaciers, moved steadily but slowly forward. The effect of the movement of so vast a body of ice was of necessity to remove the soil and superficial deposits and to

smooth and in places polish the underlying rocks. After the culmination of this period of cold, which was probably to some extent due to elevation of the continent, there succeeded an era of milder climate, with partial submergence, followed again by a period of re-elevation and increased cold, with a partial recurrence of the former glacial conditions, after which gradually the ice retreated northward and the present condition of surface began to be assumed. Traces of the ice age yet exist in the elevated areas of the highest mountain ranges even in comparatively low latitudes, and glaciers of considerable size are found in the Rocky Mountains of British Columbia at the present day.

The presence of the ice sheet is recognized by its markings upon the exposed rock surface. Instances of this are common on the ledges about Ottawa and even in the heart of the city itself, the grooving and striation of the surface due to the planing of the ice being well seen in the quarry at the corner of Sussex and Rideau streets. In many cases also the action of ice is recognized by the presence of smoothly-rounded hill slopes. The direction in which the ice passed if the exposed striated surfaces are well seen, can generally be told from the shape or contour of the elevations. Thus the rock surfaces away from the direction of ice-flow, called the "lee side," are usually rough and weather-worn, while those which face the direction of the flow are all ice worn; hence the term *stoss seite*, or struck side, is applied to the latter.

In opposition to the theory of a great universal ice cap of immense thickness just stated is the view now entertained by many that the most of the glacial phenomena were caused rather by a number of small or local glaciers which had their source about the summits presumably of every mountain range, and in their course followed the prevailing configuration of the surface. This view is well supported by the direction of the rock striations in the provinces of Quebec, New Brunswick and Nova Scotia, where the evidences in favor of a great south-easterly moving ice sheet are very few, and where the indications evidently point in the other direction or in favor of local glaciers.

Among the supposed indications of the presence of a great ice sheet, besides the striation of the rock, is the presence of scattered

boulders of various kinds, at points far removed from their native place, and such boulders often furnish conclusive proof of the direction in which the glacier moved. Thus if the glacier or boulders from a certain range of hills are found to the north of that range, the inference is that the ice moved northward. Such evidence is not always, however, strictly conclusive as to the agency of a glacier, for though ice in some form must have been largely instrumental in the moving of boulders, in very many cases the active agent has been in the form of floe or floating ice, either in bergs or huge pans, such as now float up and down the St. Lawrence, and which have carried huge masses of Laurentian rock from their original place on the north shore of the river to the south side, where they can now be seen for hundreds of miles along the beaches of the Gaspè coast.

Subsequent to the ice age we find a period of depression and submergence, during which the present surface was hundreds of feet under water, and the arctic currents from the north carried huge trains of bergs, with their loads of dirt, stone and gravel, just as at the present day are seen off the coast of Newfoundland, which by their stranding and subsequent melting deposited their debris at points now many hundreds of feet above present sea level. The proofs of submergence are well seen in the presence of beds of clay, containing often great quantities of marine shells of forms similar to those now found in northern waters. These can be picked up at many points about Ottawa and Montreal as well as elsewhere, while bones of seals have been found in the brickyards in this vicinity. With the nodules of Green's Creek you are also, most of you at least, familiar.

The amount of submergence has also been a fruitful source of controversy, some holding to the view that this must be determined by the present elevation of known shell beds above the sea level, ignoring the evidence of drift boulders, and thus limiting it to some 500 feet. Others, again, maintain that as much of the glacial phenomena is due to the action of ice bergs and floating ice, the submergence should be measured by thousands instead of hundreds of feet, and in certain places there is unmistakable evidence of the presence of old sea beaches several thousands of feet above the present level. The various claims of the rival schools can be found in most text books on geology, but it

is certain that both agencies were largely employed in sculpturing the rock surface and fashioning the features of our landscape as we now see them.

In addition to the more active agents of disturbance just described, others which perform their work quite as effectually probably exist. These are the atmosphere, rains, frosts, winds and the wash and wear of tides and seas. The degrading action of rivers in motion, by which immense quantities of material are removed and carried down and deposited at their mouths, as in the case of the Mississippi, the Nile, and nearer home, the St. Lawrence, is well known, and from these sources an estimate has been made of the rate of degradation of our continents and the number of years which would elapse before these would be reduced to the present sea level should no further period of upheaval occur. Some idea of the immense force of excavation exercised by running waters can be formed by considering the great canons of the Colorado, where huge chasms thousands of feet deep have been cut out by the action of streams, sometimes comparatively small, till now these present some of the most remarkable geological phenomena in the world. It is probable also that the great rock cliffs about this city owe their origin to a great extent to the wearing action of the rivers in this vicinity.

With the modified conditions of climate which succeeded the glacial period, the conditions of life as we now find it began or were resumed. Evidences of the presence of the human race are visible at the close of that period and even in the interglacial time, while some observers contend that human remains have been obtained as far back as the Miocene Tertiary. But with this phase of the subject we have not time sufficient to deal. Gradually the slowly moving fingers of time have fashioned and rounded our hill tops, have carved out the water courses and hewn the basins of our lakes. The action of sun, frost and rain have softened the hard sterile rock and produced the soil necessary for the cultivation of those things required for man's existence. Many if not all of the geological agencies which have been so potent in past ages are in active operation today, though possibly their action is not so marked as under the peculiar conditions of earlier geological times, but they are going forward all the same. The gradual

processes of submergence and elevation are still visible at many places and even in well recorded time portions of our continent are known to be rising from the sea while others are gradually sinking. The latter is well observed in some portions of the coast of Nova Scotia and New Brunswick, where the remains of forests which grew above the sea are now found some 30 to 40 feet below high water mark. Volcanic agencies are still at work forming or removing mountains. The fearful destruction and disturbances of several years ago in one of the islands of the Java archipelago are still fresh in our memories, when a whole mountain was blown into the sea with such force as to send an ocean wave completely round the globe ; while during the past summer the frightful eruption in Japan buried many square miles of country under liquid mud, with the destruction of hundreds of lives. Such instances enable us to realize in some slight degree the enormous forces with which nature does her work.

I have in this sketch omitted any marked reference to the geology of the surrounding district. This field has been ably worked by Mr. Ami, who I am sure will at the next meeting entertain you thoroughly with an account of the various geological features in this immediate vicinity.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

As announced in our September number, the annual meeting of the Entomological Society of Ontario was held in Ottawa upon the 5th and 6th October. The meetings were well attended, and several useful and interesting papers were read. The President's annual address was delivered in the City Hall by Mr. James Fletcher, of this Club, on the evening of Friday, 5th, before a large audience, including Hon. Chas. Drury, Minister of Agriculture for Ontario ; Mr. John Lowe, Deputy Minister of Agriculture for the Dominion ; Prof. Saunders, and many others. It treated of the practical application of the science of Entomology for keeping in check the attacks on cultivated crops by injurious insects. A *résumé* of the insect injuries of the year was also given, and attention was drawn to new works which had been published. Some simple apparatus used for caging and breeding insects was exhibited and explained.

Hon. Chas. Drury spoke in high terms of the work being carried on by the Society, an appreciation which he had shown by coming all the way from Toronto to attend the meeting.

Sir J. A. Grant proposed a vote of thanks in his usual happy and eloquent manner, and surprised many of the audience by his knowledge of entomology. Some years ago Sir James possessed a very nice collection of insects; but being much engaged with his professional duties he decided that his cases would be of more use if placed where they could be examined more freely than in his own house, and generously presented them to the museum of the Ottawa Literary and Scientific Society.

Prof. Saunders, in seconding the vote of thanks, spoke of the progress of the Society, from the time it was first organized, by a few earnest workers, down to its present influential and stable condition.

Dr. Bethune urged upon the audience the pleasures and beneficial results obtainable from the study of insects, and particularly drew attention to the remarkable work accomplished by Miss Eleanor A. Ormerod, the Entomologist of the Royal Agricultural Society of England. He pointed out that ladies were in many ways better suited for carrying out some of the delicate and tedious observations than men were, and hoped that more would join in carrying on the work of the Society.

The election of officers took place upon the morning of the 6th, and resulted as follows:

President—James Fletcher, Ottawa.

Vice-President—E. Baynes Reed, London.

Secretary-Treasurer—W. E. Saunders, London.

Librarian—E. Baynes Reed, London.

Curator—Henry S. Saunders, London.

Council—J. M. Denton, London; J. Alston Moffatt, Hamilton; Gamble Geddes, Toronto; W. H. Harrington, Ottawa; Rev. T. W. Fyles, South Quebec; (and all former Presidents, who are ex-officio members of the Council).

Editor of the Entomologist—Rev. C. J. S. Bethune, Port Hope.

Delegate to the Royal Society of Canada—H. H. Lyman, Montreal.

CONTRIBUTION TO THE GEOLOGY AND PALÆONTOLOGY OF THE TOWNSHIPS OF RUSSELL AND CAMBRIDGE, IN RUSSELL, ONT.

I.—PHYSIOGRAPHY AND GENERAL GEOLOGY.

By W. Craig, (Duncanville)

The Townships of Russell and Cambridge are almost perfectly level. The Township of Russell is bordered on the south, west and north by a rim of slightly higher land. The main portion and all the centre of the township is quite level and continues so into and through the Township of Cambridge. The soil, or drift of the level land, is composed of very fine blue and red clay, covered in some places by two to three feet of brown loam. The blue clay is of considerable thickness, from twenty-five to one hundred feet, and there are no shells in it. It has probably been deposited in deep water and came from the north. At a depth of thirty to forty feet under the clay there is generally found water-worn gravel or hard pan. In one locality the hard pan is composed of small water-worn pebbles and blue clay ground down to a smooth surface and as hard as rock, When this is drilled through water is always found and rushes up in such quantity that wells cannot be walled up with stone. In other places the gravel is loose and filled with small shells. In one place, when digging a well at about eighteen feet from the surface, in the clay, a bone of some animal was found, supposed to have been a rib. It was about eighteen to twenty inches in length, about one inch in diameter and almost round, and in the same excavation at a depth of thirty-one feet a cedar limb about three inches in diameter was found lying on two or three inches of small white shells covering the gravel. The red clay has been deposited after the blue as it is nearer the surface. They are both very fine and where exposed in cuttings are found to be stratified in layers of three or four inches. They are splendid brick clays and should be first class for the manufacture of terra cotta. In the township of Cambridge the clay covers the whole township and is covered by loam the same as in Russell; and on the north side of the township there is an extensive deposit of yellow sand

(Saxicava) overlying the clay. This sand has come from the north and along the northern boundary of the township is almost continous, and extends into the township in ridges or bands for three or four miles. These ridges and low spaces between follow each other in regular succession like waves on the ocean. This was at one time a winter paradise for the red deer, which had shelter and food in abundance and wintered here in thousands. In one place there are several remarkable sand hills, rising almost round from the level swamp or at the end of a ridge, about fifty feet at the base and twenty to thirty feet in height; they seem to have been formed in eddies of water. Travelling through the woods here some years ago I came to one of those hills and climbed to the top and was surprised to find in the snow on the flat top, the beds of several deer. In the south-east corner of Cambridge there is an extensive bay; the sand has not come so far south and the depression was not filled up. The Nation river drains the two townships into the Ottawa, and although the table land is level, it is scarred, seamed and cut up in all directions by streams and gullies, the soil being so very fine it washes out very easily and cuts into gullies, some times to a great depth. The Castor river and its branches drain the township of Russell into the Nation above Casselman. The river follows the strike of the underlying rocks. The Nation at Casselman flows across a ledge of Trenton rock northerly, then turning westerly follows the strike of the rock for three miles and then turning suddenly eastward forms the Ox Bow, below Casselman. The banks are very high, and every little stream running into the river has cut down a channel to its present level. During spring freshets the river rises between Casselman and the Ox Bow, from twenty-five to fifty feet over summer level, and the water piles into the gorge faster than it can get around the bow. The rock exposure at Casselman dips to the north and the strike is east and west, the edge of the rock is up stream and the river flows over the back of the ledge making a considerable fall, but not perpendicular. The rock is covered by drift to the boundary of Russell, about six miles from Casselman, the rock here is the same as at Casselman, solid beds of Trenton limestone, dip north and strike west. It here enters the township of Russell and is next exposed in the bed of a small creek near the

Castor, where the water has cut a deep channel through the rock. Four or five acres further west the Castor river crosses the ledge. The river flows eastward across the rocks and has cut a channel through them of ten or twelve feet in depth, the lower beds of rock are solid limestone and the upper limestone and shale in alternate layers of five or six inches, which form the top of the Trenton. About a mile to the westward there is another exposure of Trenton rock on the south side of the Castor river. They are tilted up at a very high angle, dipping to the north, the southern edge in some places almost vertical. Still further westward at Louck's mills the rock is exposed in the river, there is a break or fault here and the rock seems to dip under the drift on the south side of the river to the south and on the north side to the north, the rock exposure continues up the stream past Duncanville and is here probably Utica. To the north the Hudson river formation is exposed, presenting first grey sandstone, weathering brown and holding *Ambonychia radiata*, further north black bituminous shale is found overlaid by sandstone and a considerable area of red shales, the red shales weather to red clay and are probably the source of the bands of red clay already mentioned which has been carried to the east and south of the red shale. There are no indications of minerals in the townships, but on the northern border of Russell in sinking a well a vein of iron pyrites was found. There are no mineral springs in the township of Russell, but there is one in the township of Cambridge, on lot 18 in 5th concession, in the bottom of a deep gully. It comes up through the clay, and is slightly salt, but has never been analysed. The spring is in a level dell, and on digging to clear out the outlet it was found to be a mixture of leaves, sticks and clay. The deer had come here for ages to drink and had tramped all together. If the drift was removed from the two townships the general appearance would be a great central depression from east to west, and along the centre of that depression the rocks broken and tilted up as if pushed up from below. How has this depression been formed? If it had been scooped out by glacial action there would be boulders left behind, but we do not find any here. Then after the rocks were broken up the clay was deposited filling up all the inequalities in the rocks, making all level except where some of the

higher peaks of rock remained over the surface, when the water commenced to dry off the streams cut their way back through the drift, leaving the land in its present condition of elevation and gradual denudation.

II. PALÆONTOLOGY.

By Henry M. Ami, M.A., F.G.S.

(1.) At Cook's Rapids, on the Castor River, on the 8th lot of concession IX. in the Township of Russell there is exposed a series of bluish-gray shaly, nodular and at times unevenly-bedded limestones which, from the fauna it holds, is clearly referable to the middle portion of the Trenton formation (Ordovician), an horizon which is met with at Ottawa, and represented in the beds which crop out in the vicinity of the Waterworks Office and at the foot of Parliament or old Barrack Hill. The association of fossil remains is precisely similar here as in those localities, and amongst them were recognized the following species :—

1. *Buthotrephis gracilis*, Hall.
2. *Licrophycus succulens*, H. (Sp.)
3. *Pascolus globosus*, Billings.
4. *Brachiospongia digitata*, Owen.
5. *Protarea vetusta*, Hall.
6. *Streptelasma corniculum*, Hall.
7. *Prasopora lycoperdon*, Vanuxem
8. *Strophomena alternata*, Conrad.
9. *Leptæna sericea*, Sowerby.
10. *Orthis testudinaria*, Dalman.
11. " *pectinella*, Conrad.
12. " *occidentalis*, Hall.
13. *Platystrophia lynx*, Eichwald.
14. *Bellerophon bilobatus*, Sowerby.
15. *Bucania bidorsata*, Hall.
16. *Cyrolites compressus*, Conrad.
17. *Murchisonia bellicincta*, Hall.
18. " *Milleri*, Hall.
19. " *gracilis*, Hall.
20. *Trochonema umbilicatum*, Hall.
21. *Asaphus megistos*, Locke.
    (*Isotelus gigas*, DeKay.)
22. *Encrinurus vigilans*, Hall.
23. *Dalmanites callicephalus*, Green

The above species were collected by Messrs. Craig and Summerby in company with the writer during a sub-excursion of the geological branch in 1884, and, as may readily be inferred from the small list presented, the same could be greatly increased by subsequent research in those measures which are very fossiliferous.

(2.) From a locality not far distant from the last one (1) Mr. W. Craig, ex-M.P.P., has made an interesting little collection, amongst which the following species have been recognized as not occurring in the previous list:—

24. *Lichenocrinus crateriformis*, Hall.
25. *Amplexopora Canadensis*, Foord.
26. *Pachydictya acuta*, Hall.
27. *Fusispira elongata*, Hall.

Of these No. 24 is particularly interesting, and differs in some respects from its congener found near Government House, Rideau, some six years ago. It is parasitic on a specimen of *Orthis testudinaria*, Dalman, and has a portion of the column preserved.

(3.) Another exposure of what appears to be a ridge or escarpment of Trenton limestone was observed running slightly obliquely to the road between lot 10, con. X., Russell, and lot 30, con. V., Cambridge, where the measures have a gentle dip N. 15° E. a few degrees, and indicate the presence of a line of dislocation with the remains of an ancient escarpment. No fossils were found in this exposure, however, and accordingly the precise horizon to which this ridge must be referred remains doubtful, but is most probably Trenton.

(4.) At Casselman, on the Nation River, and below the Canada Atlantic Railway bridge, there is exposed a considerable thickness of Trenton limestone where the Club held one of its most successful excursions in June, 1883, and amongst the species collected on that occasion the following have been recognized:—

1. *Palæophycus obscurus*, Billings.
2. *Pachydictya acuta*, Hall.
3. *Prasopora lycoperdon*, Vanuxem. (P. Selwyni, N.)
4. *Streptelasma corniculum*, Hall.
5. *Strophomena alternata*, Conrad.
6. *Leptæna sericea*, Sowerby.
7. *Orthis testudinaria*, Dalman.
8. *Platystrophia, lynx*, Eichwald.
9. *Rhynconella increbescens*, Hall.
10. *Cyrtodonta*, sp.
11. *Murchisonia bellicincta*, Hall. (large variety.)
12. *Trochonema umbilicatum*, Hall.
13. *Asaphus platycephalus*, Stokes. (*Isotelus gigas*, DeKay.)
14. *Serpulites dissolutus*, Billings.

SOIREES.

Third.—The third meeting was held on 31st January, and was devoted to the discussion of botanical subjects.

Mr. Fletcher read the report of the Botanical Section.

Mr. Ballantyne then gave an interesting account of some observations made on the duration of the leaves on our various species of evergreen trees. With the white pine *(Pinus strobus)* he had found that as a rule the needles remained on the tree about 18 months. Leaves produced in the spring of one year fell in the summer of the following one, so that the life of a pine needle was two summers and one winter.

In the Spruces the leaves remained on the trees for a much longer period, he considered seven years to be about the length of their duration. The Canadian Balsam Fir not quite so long, four or five years; and the Hemlock a still shorter time, probably only three years.

The cedars were rather more difficult to understand. They seemed to drop their foliage throughout the year and not at any special season. In this case it was not the separate scales which fell but small twigs dropped off. The Tamarac, another conifer, of course, is deciduous, and drops its leaves every autumn.

Mr. Fletcher spoke of the length of life of the needles of *Picea Sitchensis*, the Menzies spruce which he had found on Vancouver Island growing to a height of not less than 40 feet, and still retaining the sharp stiff needles on the stem, so that it was very uncomfortable to climb up it to procure the cones.

In answer to a question he explained that the cause of the falling of the leaves of deciduous trees was due to the gradual deposition of matter in the passages and the lignification of the petioles so that they could no longer perform their functions.

Mr. Ballantyne's address was followed by the exhibition of a collection of Australian ferns belonging to Mr. R. B. Whyte. Mr. Fletcher drew attention to several specimens belonging to genera represented in our Canadian flora and showed the advantages of having specimens from all parts of the world, if we wanted to thoroughly understand any family of plants.

A paper by Mr. H. M. Ami was read upon the variety *obtusilobata of Onoclea sensibilis*. The writer considered it merely an occasional form

of the species and unworthy of a varietal name. The antiquity of the species was shown by the discovery by Dr. G. M. Dawson of well preserved specimens in the rocks of the Laramie age in the North-West Territories.

Dr. H. B. Small read an entertaining account of a volume of lectures on botany which he had recently acquired. These lectures were delivered at Harvard University in 1788 by Dr. Benj. Waterhouse and were the first lectures delivered in America upon botany of which we have any record.

Mr. Robert Whyte spoke for some time upon the subject of bog plants, and illustrated his remarks by exhibiting a fine collection of the local species. The various so called insectivorous forms were treated of and the theories as to their powers of digesting food discussed. This address gave rise to much animated and edifying discussion in which many valuable items of information were brought out.

Messrs. Baptie, Harrington, Ballantyne and Fletcher took part in the discussion. The sundews and pitcher plants were discussed and their habits and structure explained.

During the evening the following note by Prof. John Macoun, was read :—

NOTE ON THE POISONOUS PROPERTIES OF THE *AGARICUS RODMANI.*

BY JOHN MACOUN, M.A., F.L.S., F.R.S.C.

During the past autumn many edible mushrooms have been collected in the vicinity of the city, some of which have had doubts thrown upon their value by an unfortunate occurrence which took place early in September.

A lady purchased two lots of mushrooms on the market, one from the stalls and the other from the open market. The latter lot was that from which the lady partook and which resulted in her death.

Late in September Mr. Martin Benson of this city also purchased a lot on the market and when they were being cooked his wife noticed that they had an offensive smell and the family refused to eat them. A few were sent to the writer who advised Mr. Benson not to use them as they were to say the least of it, unpleasant to both taste and smell.

A few were dried and then forwarded to Prof. Charles Peck, New York State Botanist, who is the highest authority on Agarics in America. He reported that the mushroom in question was related to the edible one, that it had been found in New York State and in France. He said that in France it was looked upon with suspicion but for his own part he did not think it was poisonous, though owing to its woody nature and unpleasant smell he did not set much value on it. Its scientific name is *Agaricus Rodmani*, having been named after its discover. It differs from the common mu hroom in having an unpleasat smell while being cooked, in being quite firm and not expanding nearly so much, and in the stem being quite large where it joins the cap and tapering to the point which seems to enter the soil to some depth.

There are fully thirty species of edible mushrooms along the roadsides, in woods, meadows, and pastures around Ottawa, yet those ignorant of this fact, persist in rejecting good Agarics and partaking of deleterious ones simply because they look like the common mushroom.

If the following simple directions were followed no person need be poisoned and much valuable food could be collected every autumn by those desirous of doing so. At present I have fine mushrooms gathered nearly ten years since that are just as well suited for the table now as they were when collected In other countries this practice of drying mushrooms for future use is extensively practiced and there is no reason why we should not do the same here.

Directions for testing Mushrooms or Agarics of all kinds :

(1.) Reject all that have an unpleasant smell either in a raw state or when cooking.

(2.) If the smell is pleasant chew a small portion of the raw specimen and swallow the juice. If a burning sensation is felt in the mouth or throat the mushroom is more or less poisonous and should be rejected. On the other hand if the taste is pleasant the mushroom is edible. All puff-balls are edible as long as the spores are white, when the inside begins to turn yellow the specimens should be thrown away.

An interesting discussion on the value of mushrooms as food followed the reading of this paper, in which Mr. Whyte, Mr. Ballantyne and Mr. Harrington took place. Mr. Fletcher spoke of some of

the common edible fungi found in the neighbourhood of Ottawa, and also referred to the use made of the Fly Agaric (*Agaricus muscarius*) by the peasants of Northern Russia, who steep it in alcohol to produce prolonged intoxication.

Dr. Baptie said that many fungi undoubtedly contained a very powerful poison, and that people who collected or ate mushrooms ought to examine them carefully. He also drew attention to the fact that some species might be quite wholesome when fresh, but might become poisonous as soon as decomposition set in.

Fourth.—The fourth meeting of the winter course was held on the evening of February 14th, and was made very interesting by the leaders of the entomological section. The report on the work of the branch during the season of 1888 was read by Mr. Fletcher. Several new and rare species had been added to the list of species recorded from the locality since the last report, and much useful work in economic entomology had been prosecuted.

Mr. W. H. Harrington delivered an admirable address upon the Capricorn beetles, which commit such serious ravages by boring timber after it is cut in the woods. This address was illustrated by a beautiful collection of these beetles which had been made in the locality by Mr. Harrington.

There was considerable discussion upon the habits of insects, and many enquiries were made as to the best methods of meeting the attacks of injurious species.

THE ANNUAL MEETING.

The annual meeting for the election of officers for the coming year will be held on Tuesday, 19th March, at 4 o'clock in the afternoon in the usual place, the museum of the Ottawa Literary and Scientific Society. All the members are earnestly requested to be present, as matters of great importance to the welfare of the club are to be discussed. Any who have not already paid their subscriptions are requested to do so before the meeting.

MONDAY AFTERNOON LECTURES.

The course of Elementary Monday Afternoon Lectures has been unusually successful during the past season, the attendance and after-discussion being particularly satisfactory. The first of these delivered upon January 7th was by Mr. F. R. Latchford upon Conchology. Owing to a serious illness, Prof. Macoun was unable to deliver a lecture on this day upon the subject of Ornithology. Mr. Latchford kindly consented to take charge of the class and delivered a most instructive address, in which he gave the club the benefit of his experience in collecting shells and preserving them for the cabinet. The second lecture, on the 21st of January, was upon the subject of Geology by Dr. Ells. This was so highly appreciated that the publishing committee was requested to print it *in extenso*, which was done in the January number of the OTTAWA NATURALIST.

The second lecture on Geology proved no less interesting than the last, as Mr. Henry M. Ami dwelt with the practical side of the science, Applied Geology. In a clear and concise manner Mr. Ami sketched the history of Ottawa from the earliest times up to the present, and arranged the various formations or sub-divisions of strata into three grand natural divisions, viz.: *The Laurentian* or *Archæan ; the Palæozoic ; the Post-Tertiary.* Each of these was treated separately, and the characters of each described in such a manner as to be easily recognized. Specimens of the formations comprised in these three great systems were passed round and examined. Interesting localities to visit and study, worthy of careful examination, were pointed out, and an earnest appeal made on behalf of geological research and enquiry, urging the members to devote some attention to geology, as the field was most inviting and the work promising. Special stress was laid upon the economic value of the several formations discussed and the occurrence of such minerals as iron, mica, graphite, apatite, galena, and many others in this district, besides the cement stones and marls with fine building stones which show how important a study geology is. A lengthy and animated discussion followed Mr. Ami's remarks.

Mr. John Stewart thought that the long ridges of boulders, &c., which occurred at Hull, Que., near Lake Flora were of glacial origin,

and pointed to a second period of glaciation, as he had observed the *debris* of these resting directly upon stratified marine deposits, which are themselves underlaid by glacial "till" or clay.

Mr. Ami had examined the region mentioned, and believed those deposits to be much more recent. They were correllated with the "Ottawa gravels," which are met with at Britannia, Rochesterville, Lansdowne Park, Gilmour's Mills, &c., and which mark a period of time subsequent to the "Leda Clay" formation, a period of lake basins and wide river expansion, which has since been gradually diminishing until the present river flows.

Dr. Ells had also seen them, and believed they were formed along the shores of rivers and pointed to similar ridges in process of formation in the St. Lawrence below Quebec. Dr. Ells, Dr. Small, Messrs. J. Ballantyne, and R. B. Whyte, besides the lecturer, took part in the discussion.

The fourth lecture, on February 4th, was by Mr. J. Fletcher upon Entomology. The value of the study as a practical branch of agriculture was shown; the different classes of injurious and beneficial insects were described, and the mode of application of some of the remedies for injurious kinds was explained. The fifth lecture, on January 11th, was given by Mr. W. H. Harrington upon the same subject. The structure and classification of insects were dealt with and the reasons for dividing insects into the different orders were explained in a clear and intelligible manner. Mr. Harrington also gave some valuable suggestions as to the best way to collect and study insects. The animated discussion at the termination of the lecture showed the high appreciation by the audience of Mr. Harrington's address.

Of our Monday afternoon lectures the one looked forward to with perhaps the most interest was that of the 18th of February, on Zoology by the Rev. G. W. Taylor, of Billings Bridge, late of Victoria, B. C. Mr. Taylor has been a member of the club since 1884, and although so far beyond the field of its operations, has always taken a deep interest in its work and welfare. He is an ardent lover of Nature and an authority in several sciences, particularly in Entomology and Conchology. He has lately removed to Ottawa, and the council recognizes in him a valuable acquisition to our list of active members.

The lecturer began by defining the limits of his subject and by showing the lines which separated the animal kingdom from the mineral and vegetable kingdoms. He said that while it was an easy matter to distinguish between animals and vegetables of the higher orders, it was exceedingly difficult, if not impossible, when we descend to the protozoic forms of animals and the correspondingly low forms of plant life. He stated that, apart from what could be seen in the more highly organized, the essential difference between plants and animals is that the former absorb from the air carbonic acid and give off oxygen, while the latter do the opposite, a most beautiful illustration of the mutual dependence of the different orders of created beings upon one another.

The lecturer explained briefly the classifications of zoology from the vertebrata down to the protozoa. His explanations were of the most lucid and concise nature, and so clear that his hearers could not fail to understand.

In conclusion he advised and urged on his hearers to take up the study of Nature, if it was only for the benefit of their health, and advised them, if they wanted to study any branch of natural history, to begin with some branch of zoology, as it was impossible to acquire a thorough knowledge of geology or any of the other branches without some knowledge of the animal kingdom. That he knew of no place so favorable to the study of science as Ottawa, with its free libraries, museums, and masters of science, who were always willing to help beginners. For anyone who wanted to study zoology he recommended the hand book on that subject by Sir William Dawson, and closed his excellent lecture with an appeal to the members present to undertake some original work in some particular direction. Mr. Taylor concluded by stating that he believed it one of our duties as well as of our privilege to study the great diversity of the animal creation, and that after the study of God's Word should come the study of God's works.

The president alluded animatedly to the fact that no effort had been made on the part of any member of the club to acquire a knowledge or even to give a list of the vertebrate animals of this vicinity, and thought that it was a pity that a subject which was of such importance, as Mr. Taylor had shown this to be, should be left untouched

for so long a time, when so much good work was being done in almost every other department,

Mr. Ami bore testimony to the excellence of the lecture, considering the vastness of the field it covered, and thought that the animals of this district could be worked up with comparative ease.

Dr. Ells moved a vote of thanks, and stated that he, as a member of the staff of the geological survey, would be glad to assist any one who took up the study of any branch that he knew anything of, by either taking them to the field with him or by showing them anything he could at the museum.

The vote of thanks was seconded by Mr. Lees.

Mr. Taylor, in replying to the vote of thanks, said he had just been reading in a scientific paper that there were only seven species of reptiles in Canada, which showed the utter ignorance which existed on the subject, and ventured to say that at least that number of species could be found within a radius of one mile from where they were standing.

The sixth lecture, on the 25th of February, was to have been upon Botany, by Prof. Macoun, but he was much too ill to attend the meeting. At the request of the president, Rev. G. W. Taylor delivered a lecture upon Conchology, in which he showed himself to be a thorough master of his subject.

The seventh lecture, on March 4th, was by Mr. J. Fletcher upon Botany. The possibility of studying botany at all times of the year was claimed, and the investigations which could be most advantageously carried on during the winter months dwelt upon at some length. The different forms of buds were referred to, and some specimens of buds of Lilac were exhibited, which had been made to expand by placing the twigs in water inside the house. The life of a plant was sketched and the uses of the different organs indicated.

The eighth and last lecture of the course was delivered by the president, Mr. Robert Whyte, upon the afternoon of March 11th. "The best way to study Botany" was explained in a lucid and attractive manner. Where, when, and how to collect and preserve specimens were described, and the delights of the study dwelt upon in such a

manner as to make the audience wish they could at once go to the woods and put the president's precepts into practice. The germination of seeds and the important part played by the cotyledons was illustrated by a good supply of young plants of turnips, peas and wheat, which had all been grown specially for the purpose.

The interest shown in the subjects presented by the full attendance at these afternoon lectures is a source of great encouragement to the council, who trust that a lasting result will be shown by increased efforts during the coming season to work up the natural history of the district.

———:o:———

REPORT OF THE ORNITHOLOGICAL AND COLOGICAL BRANCH FOR THE YEAR 1888.

READ ON THE EVENING OF 28TH FEBRUARY.

To the President and Council of the Ottawa Field Naturalists' Club.

GENTLEMEN,—In making up the report of this branch for the past year the leaders have adopted a new plan, and instead of publishing the usual list of arrivals and departures of the birds they have thought it advisable to substitute the following synopsis of the year's work :—

There were five observers at work who made reports of their observations, viz. : the leaders (Prof. Macoun and Mr. Geo. R. White), Mr. J. F. Bowerman, Mr. N. Ballantyne and Mr. W. Lees. Prof. Macoun's list of 106 species (most of which were shot) was made during the months of April and May. Mr. White's list of 98 species extends from 28th Jan. to 28th May, and was published in the spring report of the Club in the July number of the NATURALIST. Mr. Bowerman shot at Ottawa, between 2nd April and 19th June, 47 species, besides 20 others in Prince Edward County not included in this report. The skins of these were, however, not preserved. The observations of Messrs. Ballantyne and Lees, who worked together, and whose lists of 101 each are almost identical, began with February and

extended over the remainder of the year. They were made altogether without the aid of a gun, the birds being observed by means of field glasses.

In all there were observed here during the year 142 species, of which 33 were noted by all five observers, 39 by four of them, 25 by three, 13 by two and 32 by one only. The result of these observations is the addition of seven new species (two of which await further confirmation) to the Club list, bringing the total number recorded by the Club up to 222. The additions are as follows :—

1. *Hydrochelidon nigra surinamensis.* Black Tern ; already noted by Mr. White in Spring Report.

2. *Buteo lineatus.* Red-shouldered Hawk : one shot at the Quarries on the Montreal Road on 24th Sept. by Mr. White.

3. *Otocoris alpestris praticola.* Prairie Horned Lark : this sub-species should have been recorded before, as it is a summer resident, whilst *O. alpestris* is a winter visitor. The present sub-species is rather common from about the beginning of March. Mr. White questions this.

4. *Acanthis linaria rostrata.* Greater Redpoll : Mr. White reports this species as having been taken here some years since, but for some reason it has never been recorded by the Club.

5. *Geothlypis agilis.* Connecticut Warbler : this species was observed by Messrs. Ballantyne and Lees : by the latter in the Mer Bleue at Eastman's Springs, July 21, and at Clark's Bush July 22, and by both at Dow's Swamps Aug. 5 and Sept. 2. As this species was only identified with the glass it is inserted as doubtful, pending further investigation.

6. *Cistothorus palustris.* Long-billed Marsh Wren : one specimen shot by Mr. Edwards, Taxidermist, on 21st May, and now in the Museum of the Geological Survey.

7. *Turdus Aliciæ.* Gray-cheeked Thrush : several reported shot here and in Prince Edward County, Bowerman. We see no reason why this bird should not have been observed here before, but as there is also doubt as to the identification of this species, it is held under query as in the case of No. 5.

Mr. Bowerman also reported *Dendroica Dominica*. Yellow-throated Warbler, as shot here by him on 24th May. This is a bird of the Southern States, and as it was not identified by a professional ornithologist and unfortunately the skin was not preserved the leaders do not feel justified in assuming the responsibility of recording it for the first time in Canada. It may be stated that there is a specimen of this bird in the Geological Survey Museum, but the locality of its capture is unknown.

The following birds were observed at somewhat unexpected times:

Larus argentatus smithsonianus—American Herring Gull—June 5. Usually appears here in April.

Corvus Americanus—American Crow—A few individuals remain here all winter feeding on the refuse from slaughter-houses.

Acanthis linaria—Redpoll—June 3. A winter bird, seldom observed later than March.

Spinus tristis—American Goldfinch—Has remained with us all this winter in large numbers; probably induced to do so by the unusual abundance of white cedar cones, of the seeds of which they seem fond.

Spinus pinus—Pine Siskin—May 2. Usually appears in winter only.

Amongst the new birds observed were:

Ectopistes migratorius—Passenger Pigeon.

Haliaëtus leucocephalus—Bald Eagle.

Falco columbarius—Pigeon Hawk.

Syrnium nebulosum—Barred Owl.

Picoides arcticus—Arctic three-toed Woodpecker.

Picoides Americanus—American three-toed Woodpecker.

Empidonax pusillus Traillii—Traill's Flycatcher.

Spizella pusilla—Field Sparrow.

Passerina cyanea—Indigo Bunting.

Lanius Ludovicianus excubitorides—White-rumped Shrike.

Vireo flavifrons—Yellow-throated Vireo.

Helminthophila peregrina—Tennessee Warbler.

Dendroica tigrina—Cape May Warbler.

" *vigorsii*—Pine Warbler.

" *palmarum hypochrysea*—Yellow Palm Warbler.

Sylvania pusilla—Wilson's Warbler.

Parus Hudsonicus—Hudsonian Chickadee.

The following birds, not yet on the Club list, we think might reasonably be expected to occur here. Our readers should therefore be on the alert and endeavour to add them to the list during the present year :

Falco peregrinus anatum—Duck Hawk—Follows the migration of water-fowl, and should be looked for in spring and fall. Rev. Mr. Young reports having seen it in Renfrew Country.

Megascops Asio—Screech Owl—Should be found in barns in the country in winter.

Calcarius Lapponicus—Lapland Longspur—Said to accompany the flocks of snow-flakes—*Plectrophenax nivalis*—seen here at the beginning and end of winter.

In conclusion, the leaders think that they may fairly congratulate the Club on the character of the work done in this branch during the year. At the same time they would direct the attention of the members to the great importance of having carried on by as many as possible of them during the coming summer a series of careful observations on the migration, food, breeding and other habits of the birds of this locality.

JOHN MACOUN,
GEORGE R. WHITE,
Leaders.

Ottawa, 26th February, 1889.

———:o:———

REPORT OF THE BOTANICAL BRANCH FOR 1888-9.

During the past season the amount of work done in this section has been decidedly less satisfactory than in recent years.

The number of additions to the list, too, is smaller than in any previous year. The leaders, however, do not feel discouraged, and hope next year by extra efforts to stir up more enthusiasm amongst the younger members. The local flora now being published in the OTTAWA NATURALIST will be a great help to students, and the leaders trust that the members will organize early in the spring and make an effort to increase considerably the list of plants now recorded from this locality. Special mention, however, must be made of the work done by Mr.

W. Scott, the Science Master of the Normal School, who has not only collected assiduously himself right through the season, but has delivered a series of lectures in the Normal School, in which each student was provided with a specimen of a fresh plant—an innovation of a most valuable character. Good results cannot but follow from this method of teaching.

Professor Macoun still continues his unceasing labours with results of incalculable value. His researches amongst the mosses may fairly be said to have revolutionised our knowledge of these difficult plants. In connection with Dr. Kindberg of Linköping (Sweden), Mons. Cardot of Steiny (France), and Prof. Venturi of Nice (Italy), he is making a systematic re-examination of all the Canadian Musci, with the remarkable results that fully fifty species will be added to the North American moss flora, over forty of which are new to science. Seven of these have been found in this locality and are new to science. Two of these are named with characteristic names, i.e., *Pylaisia Selwyni*, named in honor of Dr. A. R. C. Selwyn, the Director of the Geological and Natural History Survey of Canada, who, although not himself specially a botanist, has always given Prof. Macoun every opportunity to use to the best advantage his great talents in this line, for the benefit both of the Dominion of Canada and for the scientific world at large. *Bryum Ontariense*, of interest from having been confounded for many years with *Bryum roseum*, is named in honor of our own fair province.

An interesting re-discovery was made last spring in the form of a parasitic fungus, which was found very effective in materially diminishing the numbers of one of our injurious cutworms *(Agrotis fennica)*. This fungus was named *Empusa (Entomophthora) virescens*, by Mr Roland Thaxter, a high authority upon these forms. This species was discovered at Ottawa in 1884, when it almost annihilated a remarkable occurrence of the cutworms mentioned. A well-known example of these fungi is the *Empusa muscæ*, which causes the death of house flies in autumn, when they may be found attached to walls or windows by their probosces and surrounded by a white cloud of the spores of the fungus which has destroyed them. As the new additions to the local plants will appear in the *Flora Ottawaensis* now being published, it would be useless to give a list of them here. The new species of

mosses discovered in this locality by Prof. Macoun are described below and appended to this report. The growing for observation and study of rare plants from other parts of the Dominion has been continued by the leaders, and as the Botanic Garden at the Experimental Farm is to be begun in the spring, the leaders beg to urge upon the members of the club the importance of assisting in the collection of native plants from this locality. A special feature of the garden is to be the collection and cultivation of as complete a series of Canadian plants as possible, and they have no doubt that important botanical results will follow this opportunity for botanists to study in a state of nature and in large numbers many of our rare and local plants. Already large collections of seeds have been sent in by Prof. Macoun and Dr. Dawson, of the Geological Survey, and donations from many others have been received from remote and inaccessible localities. There is much that our local botanists can do in this line to assist this important work, which will give another opportunity for showing that the Ottawa Field-Naturalists Club is a practical and useful organization. In conclusion, the leaders have to express their great indebtedness to the president, Mr. R. B. Whyte, for his unceasing labours on behalf of the branch. This has been particularly the case with regard to the Saturday afternoon sub-excursions, nearly all of which he attended, and when the leaders, as was frequently the case, were absent, he undertook the direction of the party and delivered the elementary lectures which form so important a feature of these out-door classes.

JAMES FLETCHER,
H. B. SMALL, M.D. } Leaders.

:o:

DESCRIPTIONS OF NEW SPECIES OF MOSSES FOUND AT OTTAWA.

By Nils Conrad Kindberg, Ph. D. (Linköping, Sweden.)

DICRANUM SCOPARIFORME. Kindb. N. sp.

Intermediate between *D. scoparium* and *D. fuscescens*. Dioecious. Leaves greenish-yellow, flexuous, lanceolate, subulate with a short and flat subula; margins nearly flat or slightly incurved, densely and sharply serrate to $\frac{1}{3}$; cell-walls not interrupted by pores; upper cells oblong-oval, lower not much narrower, inner basa light brown; costa thick, percurrent with two serrate ridges at

the back in the upper part. Capsule curved, not striate. Pedicel red, short. Described from specimens found by Dr. G. M. Dawson at bottom of canyon below the bridge, Elk River, Rocky Mountains, but also found in McKay's woods, Ottawa, at the base of trees: also in Nova Scotia and Prince Edward Island.

D. STENODICTYON, Kindb. N. sp.

Allied to the last species. Dioecious. Tufts very dense, blackish brown, only the top leaves straw yellow, 2-3 c.m. high. Leaves flexuous, not undulate or crispate, short ovate—lanceolate, short—acuminate and blunt; margins flat above the middle, densely serrate above, more or less denticulate below; cell walls not porose; upper cells oblong, lower sublinear, alar hyaline, faintly brown; costa narrow, not percurrent, simply dentate at back. Barren. The colour of the plant resembles *Hypnum sarmentosum*. In damp woods at Ironsides, P.Q. October 1884.

BRYUM (Rhodobryum) ONTARIENSE, Kindb. N. sp.

Intermediate between *Bryum roseum* and *Bryum Beyrichii* (Hersch.) C. Müller.

Comal leaves very numerous, lingulate, abruptly and short-acuminate, revolute to $\frac{2}{3}$ or $\frac{3}{4}$, yellow-margined above with great confluent teeth; costa stout, excurrent. Capsule pale, with a distinct curved and doubly shorter collum; teeth papillose and hyaline above; archegonia numerous; lid convex, short apiculate, not *oblique*.

Hitherto confounded with *Bryum roseum*, and quite common throughout Ontario, generally in a barren state. On old logs in all maple woods around Ottawa. Barren.

LESKEA NIGRESCENS, Kindb., N. sp.

Plants very small, densely tufted, blackish-green, stems short, creeping, pinnate. Stem leaves close, appressed when dry, open erect when moist, at base broadly ovate and scarcely reflexed, acuminate, entire, obscurely but faintly papillose, branchlet leaves erect, very much smaller and looser, blunt at the short acumen; cells round-oval, costa obsolete rarely reaching to the middle. Dioecious. Only barren specimens found.

This species could possibly be referred to the genus *Heterocladium* but the costa is not furcate.

On flat boulders in McKay's woods. Oct. 12, 1885.

PLATYGYRIUM REPENS, *Bruch & Schimp.*

VAR. ORTHOCLADOS, Kindb. (N. var.)

Branches elongate and not curved. All basal leaf-cells orange. Peristome orange, segments linear, not completely free at base, smooth or denticulate at one side, not shorter than the teeth.

The European species has the teeth of the peristome pale, ordinarily longer than the linear subuliform, hyaline-bordered and free segments; the branches of the stem are shorter and curved, only the alar leaf-cells orange. The figure given by Schimper (Lesq. & James,) representing the peristome is not corresponding.

The description of *Neckera brachyclada*, C. Müll (in syn. muscor. omn. frond.) found in Pennsylvania and Massachusetts, but not mentioned by Lesqureux & James, could be referred to our plant, except that it is indicated as monœcious. On old logs at Ottawa; probably common. Oct. 12, 1885.

PYLAISIA SELWYNI, Kindb., N. sp.

Differs from *P. intricata* in the denser, darker green tufts, the leaves broader, short-acuminate, reflexed to the acumen at one border or at both, the short alar and marginal cells more numerous, the capsule short oval, the segments adhering to two-thirds of the teeth. Very abundant on old fences, Richmond Road, Ottawa. May 15, 1885.

HOMALOTHECIUM CORTICOLUM. Kindb. N. sp.

Monœcious; tufts dense, glossy; stems radiculose, pinnate; branches densely crowded, curved; stem leaves ovate, abruptly narrowed to the recurved or straight acumen; branch leaves ovate-oblong, acute or short-acuminate, straight; all leaves more or less denticulate and reflexed all around; alar cells quadrate, not numerous; the marginal also quadrate, the other oblong-rhomboidal; perichetial leaves entire, long-acuminate; capsule cylindric-oblong, slightly curved; teeth yellow, segments with a high basilar membrane; lid short-apiculate; pedicel rough; l.c.m., long. Greater than *Homalothecium subcapillatum.* On bark of trees in woods at Ottawa, Ont. Oct. 24th, 1887.

CHECK LIST OF CANADIAN PLANTS—By J. M. Macoun. 8vo. Ottawa, 1889. 50c.

A very useful pamphlet has just been issued by our fellow member, Mr. J. M. Macoun, in his complete (and corrected up to date) check list of all the plants which have ever been found in Canada. Mr. Macoun has had exceptional advantages in the preparation of this list. As assistant to his father, Prof. John Macoun, he has had the magnificent collection of the Geological Survey to examine as to doubtful species. The museum has now acquired most of the collections of the early botanists of the beginning of the century. He has also had the benefit of his father's assistance and advice. The use of check lists for all collectors and explorers is very great. With a complete check list all that is necessary, when a new locality is visited, is to put a tick or a date against the name of each species observed during the day, and thus a great labour is saved at a time when the traveller is tired out and disinclined for the tedious work of writing a long list of names. We advise every botanist in the club to secure copies while they are to be had.

———:o:———

A NEW CRUSTACEAN.

In the Bulletin de la Societé Zoologique de France for June, 1888, S. A. Poppe, of Vegesack, Germany, describes a new species of Diaptomus, a genus of fresh-water Copepoda, under the name, *D. Tyrrelli*. It is a small red crustacean, or "water-flea," about a twentieth of an inch in length, with large oar-like antennæ and one eye in the middle of the head in front, but unlike the genus Cyclops, to which it is closely allied; the female carries but one lateral egg-sac. It occurs in great abundance in Summit Lake, near Stephen, in the Rocky Mountains, often coloring the water around the shore a brilliant red. From this lake it was collected by our member, Mr. Tyrrell, of the Geological and Natural History Survey, in the summer of 1883, and in whose honour it is named.

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April, 1888.

THE OTTAWA NATURALIST

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SUMMARY

— OF —

Canadian Mining Regulations.

NOTICE.

THE following is a summary of the Regulations with respect to the manner of recording claims for *Mineral Lands*, other than Coal Lands, and the conditions governing the purchase of the same.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining a mining location for the same, but no mining location shall be granted until actual discovery has been made of the vein, lode or deposit of mineral or metal within the limits of the location of claim.

A location for mining, except for *Iron* or *Petroleum*, shall not be more than 1500 feet in length, nor more than 600 feet in breadth. A location for mining *Iron* or *Petroleum* shall not exceed 160 acres in area.

On discovering a mineral deposit any person may obtain a mining location, upon marking out his location on the ground, in accordance with the regulations in that behalf, and filing with the Agent of Dominion Lands for the district, within sixty days from discovery, an affidavit in form prescribed by Mining Regulations, and paying at the same time an office fee of five dollars, which will entitle the person so recording his claim to enter into possession of the location applied for.

At any time before the expiration of five years from the date of recording his claim, the claimant may, upon filing proof with the Local Agent that he has expended $500.00 in actual mining operations on the claim, by paying to the Local Agent therefor $5 per acre cash and a further sum of $50 to cover the cost of survey, obtain a patent for said claim as provided in the said Mining Regulations.

Copies of the Regulations may be obtained upon application to the Department of the Interior.

A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

NOTICE—**The May Excursion to Kirk's Ferry has been postponed until Saturday, 2nd June.**

May, 1888.

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DEPARTMENT OF THE INTERIOR,
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At any time before the expiration of five years from the date of recording his claim, the claimant may, upon filing proof with the Local Agent that he has expended $500.00 in actual mining operations on the claim, by paying to the Local Agent therefor $5 per acre cash and a further sum of $50 to cover the cost of survey, obtain a patent for said claim as provided in the said Mining Regulations.

Copies of the Regulations may be obtained upon application to the Department of the Interior.

A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

NOTICE—The August Excursion will be to the "Victoria Sulphur Springs," on 18th August, by Omnibus. Tickets, 25 Cents.

July, 1888.

THE OTTAWA NATURALIST

VOLUME II. No. 4.

The TRANSACTIONS Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1884.)

CONTENTS.

OTTAWA, CANADA:
Citizen Printing and Publishing Company, Queen St.

1888.

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To members, 8 " .75

NOTICE.—The Treasurer begs to call the attention of members to the advertisements.

NOTICE—The August Excursion will be to the "Victoria Sulphur Springs," on 18th August. See Page 76.

August, 1888.

THE OTTAWA NATURALIST

VOLUME II. No. 5.

The TRANSACTIONS Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1884.)

CONTENTS.

OTTAWA, CANADA:
Citizen Printing and Publishing Company, Queen St.

1888.

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Copies of the Regulations may be obtained upon application to the Department of the Interior.

A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

September, 1888.

THE OTTAWA NATURALIST

VOLUME II. No. 6.

The TRANSACTIONS Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1884.)

CONTENTS.

OTTAWA, CANADA:
Citizen Printing and Publishing Company, Queen St.

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Entomology—J. FLETCHER, W. H. HARRINGTON, T. J. MACLAUGHLIN.

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A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

October, 1888.

THE OTTAWA NATURALIST

VOLUME II. No. 7.

The TRANSACTIONS Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1884.)

CONTENTS.

OTTAWA, CANADA:
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A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

November and December, 1888.

THE OTTAWA NATURALIST

VOLUME II. No.

The TRANSACTIONS Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1[illegible])

CONTENTS.

OTTAWA, CANADA:
Citizen Printing and Publishing Company, Queen St.

1888.

Published Monthly at $1.00 per annum.

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A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

NOTICE.—Annual Meeting March 19th at 4 P.M.

January and February, 1889.

THE OTTAWA NATURALIST

VOLUME II. NOS. 10 & 11.

The TRANSACTIONS Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1884.)

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Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

March, 1889.

THE OTTAWA NATURALIST

VOLUME II. No. 12.

The Transactions Of the Ottawa Field-Naturalists' Club

(Organized March, 1879. Incorporated March, 1884.)

CONTENTS.

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Published Monthly at $1.00 per annum.

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DEPARTMENT OF THE INTERIOR,
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