1881. 1882.

OTTAWA

Field-Naturalists' Club.

TRANSACTIONS No. 3.

Ottawa, Canada:
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1882.

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OTTAWA

FIELD-NATURALISTS' CLUB.

TRANSACTIONS NO. 3.

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OTTAWA, CANADA:
CITIZEN PRINTING AND PUBLISHING COMPANY, METCALFE STREET.
1882.

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H. M. AMI.

LIST OF MEMBERS.

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Ami, Samuel F.
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Anderson, Mrs. W. P.
Armstrong, Rev. Wm., *M.A.*

Baptie, Prof. Geo., *M.A.*
Bell, E. B.
Bell, Ernest S.
Bennetts, F. K.
Billings, B.
Billings, W. R.
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Bradley, Inglis W.
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Bristow, Mrs. A. A.
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Butterworth, C. A.

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Campbell, William
Chamberlin, Mrs.
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Chrysler, F. H., *B.A.*
Clark, T. McLeod
Cousens, W. C.
Curtis, Smith

Davy, R. A., *C.E.*
Dixon, F. A.

Ewart, D.

Fleming, Sandford, *C.E.*, *C.M.G.*, *M.R.S.C.*
Fletcher, James
Fletcher, Mrs. J.
Fortescue, L.
Fortescue, Mrs. L.
Fraser, A.

Geddes, W. H.
Gemmill, J. A.
Gisborne, Francis H.
Grant, George W.
Grant, J. A., *M.D.*, *F.R.C.S.*, *F.G.S.*, *M.R.S.C.*
Gray, H. H. O.
Griffin, W. H.
Grignard, A.

Hale, J.
Hamilton, L.A., *D.L.S.*
Hanham, A. W.
Hannington, Rev. E. A. W.
Hardie, John
Hardie, T. Melville
Harrington, W. Hague
Harrington, Mrs. W. H.
Harris, W. Dale
Hector, Thos.
Hodgins, John

Jarvis, F. A.
Johnson, E. V., *C.E.*

Kemp, Rev. A. F., *M.A.*, *LL.D.*

Latchford, F. R.
LeSueur, W. D., *B.A.*
LeSueur, Mrs. W. D.
Lett, F. P. Austin

LIST OF MEMBERS.—*(Continued.)*

Lindsay, A.
Lowe, John

MacLaughlin, T. J.
Martin, Joseph
Matheson, D.
McLaughlin, S.
McLean, J. D.
Monk, J. B.
Morris, R.
Mowat, J.

Newby, Frank
Nicholson, M. Vernon

Patton, Rev. H. B.
Perley, Henry F.
Pettegrew, W. S.
Plunkett, James
Poirier, P. S.

Rauscher, Rudolf
Ripley, C. J.
Rogers, C. C.

Scott, W. L.
Selwyn, A. R. C., *F.R.S.*, *LL.D.*, *M.R.S.C.*
Shannon, S. Leonard
Sinclair, Miss E. J.
Small, A.
Small, Beaumont, *M.D.*
Small, H. B.
Sowter, E. T. W.
Steers, C. J.
Stewart, J. C.
Symes, Miss
Symes, P. B., *A.K.C.*

Thorburn, John, *M.A.*, *LL.D.*
Todd, A. H.
Tomlinson, J. B.
Tyrrell, J. B., *B.A.*

Watters, Henry
Watts, J. W. H., *A.C.A.*
White, Geo. R.
White, *Lt. Col.* Wm.
Whiteaves, J. F., *F.G.S.*, *M.R.S.C.*
Whyte, G. C.
Whyte, Miss Isabella
Whyte, J. G.
Whyte, R. B.
Wickstead, R. J., *B.C.L.*, *LL.D.*
Wiggins, E. Stone, *LL.D.*
Wiggins, Mrs. E. S.
Wood, H. O., *P.L.S.*
Wright, Miss
Wright, W. R.

Young, James.

CORRESPONDING MEMBERS.

Hill, A. J., *C.E.*, "Camp D" C. P. R., British Columbia.

Macoun, Prof. John, *F.L.S.*, *M.R.S.C.*, Government Botanist, Belleville, Ont.

Saunders, Wm., *M.R.S.C.*, President Ent. Soc. of Ontario, London, Ont.

Annual Report of the Council.

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

The Council elected by you on the 15th of March, 1881, in submitting their report upon the work performed during the year just closed, can with much satisfaction congratulate you upon the progress which the Club has continued to make in the investigation of the natural history of the locality. Twenty Council meetings were held, at the first of which three standing committees were appointed to have charge respectively of printing, excursions and soirees. Much work was accomplished by these permanent committees, as well as by temporary ones appointed as occasion required. The Council made it their first duty to carefully and earnestly consider what means might be adopted to stimulate the interest of the members in the objects of the Club, and to secure an increase in the work performed by them. These deliberations resulted in the appointment of leaders in the several branches of natural history and in the offer of prizes. The duties assigned to the leaders were :—To render any assistance in their power to the members engaged in collecting or studying in their respective branches; to bring together for mutual aid and encouragement the members interested in the same subject; to organize and direct working parties; to keep notes of work done and to report to the Council at the close of the season. Valuable reports were received from the several sections, proving the value of the system, and indicating that much work might be accomplished by its continuance. For the best collection of specimens in each branch a prize was offered as an incentive to collectors, and as an inducement to others to study the

natural sciences. Competition was open to every member of the Club, and the collections were to be made personally in this locality during the season, and to be submitted, properly arranged and named, for examination by 31st December, 1881. Special prizes were also offered by the President to members making the largest additions to the lists of plants and shells already published in the Transactions of the Club. Of the latter, that for additions to the lists of plants was awarded to Mr. H. M. Ami, and that for additions to the lists of shells to Mr. Latchford. The Club prize for the best botanical collection was awarded to Mr. T. Melville Hardie. A fine collection of shells was exhibited by Mr. F. Latchford, for which, however, no prize was given, as he had secured the President's prize for additions to lists of shells, and the Committee did not wish to establish the precedent of allowing a member to obtain more than one prize for the same collection. No collections were received in the other branches.

At the beginning of the year there were upon the rolls the names of 102 members, and 30 new members were elected during the year. Several have, however, left the city, and a few have forfeited their membership through non-payment of arrears, so that the number now stands at 115. The Club is thus stronger in members, and especially in active workers, than at any previous time. The list of corresponding members remains unchanged. Mr. A. J. Hill has continued to send valuable collections of plants and insects from British Columbia.

Four very pleasant and well attended excursions were held during the summer. The first was to Chelsea on the 26th of May, the halting place being Gilmour's Grove, upon the bank of the Gatineau. The second was on the 8th June to Montebello, forty miles below Ottawa, on the Quebec shore of the river, where the excursion joined one from the Natural History Society and proceeded to the beautiful grounds of the Hon. J. L. Papineau. Three prizes for botanical collections to be made during the day were offered by this Club to the Montreal Society for competition among the members of both. These were taken by Mr. H. M. Ami, of Ottawa; Mr. Thomas Barron, of Lachute, and Miss Graham, of Montreal. Before separating, short addresses were given by Dr. Dawson, President of the Natural History Society of Montreal,

and by Mr. R. B. Whyte, First Vice-President of this Club. The third excursion was to Meach's Lake, four miles beyond Chelsea, on the 27th of July. The fourth was upon the 29th August, to the Black Rapids, upon the Rideau River, about eight miles from the city, a locality not previously visited by the Club.

The Council, in pursuance of a vote passed at the last annual meeting, caused to be printed 500 copies of the Transactions (No. 2) of the Club for the year 1880-81, the value of which was greatly increased by a fine plate, lithographed by Mr. Grignard. The Transactions of the Club still continue to be welcomed by naturalists in other places, and are frequently requested by scientific societies in exchange for their publications.

The following exchanges and donations have been received during the year: Report of the Department of the Interior for 1880, from Mr. P. B. Symes; Annual Report for 1880 of the Librarian and Commissioner of the Nova Scotia Provincial Library; A List of Plants growing in Malden and Medford, from the Middlesex Institute, Malden, Mass.; Parts IV and V of the Transactions of the Epping Forest and County of Essex Naturalists' Field Club; Entomological Report of the Department of Agriculture, Washington, for 1880, from the Editor, Prof. Comstock; Part 3, Vol. V, of Proceedings and Transactions of the Nova Scotia Institute of Natural Sciences; Bulletin No. 1 of the American Museum of Natural History, New York; Epidermal Organs of Plants, by Chas. F. Cox, F.R.M.S., from the author; Annual Address of the President of the Scientific Society of Bridgeport, Conn.; Report of the Horticultural Society of Massachusetts for 1881.

The Naturalists' International Directory for 1881 has been purchased for the use of members wishing to correspond or exchange with naturalists elsewhere. It gives, as far as possible, the names of scientists in every country, stating the subjects studied by each person, and whether they have collections or desire exchanges.

On the 7th of April Prof. Macoun, by request of our worthy patron, His Excellency the Governor General, re-delivered his very interesting lecture upon the "Capabilities of the Prairie Lands of the North-West, as shown by their Flora and Fauna," a synopsis of which appeared in

Transactions No. 2. His Excellency and several members of his suite were present, and the lecture was well attended. It was illustrated by excellent photographic views of scenes in the North-West and British Columbia, which were shown by Mr. Topley with the aid of a powerful magic lantern. For this lecture the Ottawa Literary and Scientific Society kindly placed its lecture room at the disposal of the Club, which also still enjoys the free use of the museum of that Society for its various meetings.

A Conversazione was conducted by members of the Club for the Ottawa Literary and Scientific Society on the evening of the 6th January, the proceedings at which were all of a scientific nature. Dr. Grant delivered an eloquent address upon the value of scientific researches and the pleasure which they afforded to those who pursued them. Readings, or addresses, upon natural history subjects were also given by Messrs. H. B. Small, J. B. Tyrrell, W. H. Harrington and Prof. Baptie. The remainder of the evening was devoted to an examination of the different exhibits and of miscroscopical animals and slides. Mounted plants were exhibited by Messrs. Fletcher, R. B. Whyte and H. B. Small. The latter showed a collection made by him in England forty years ago (showing how well they could be preserved), and also a fine volume of photographic illustrations of meteorites by Hahn. Two excellent spectroscopes were exhibited by Mr. J. Tomlinson, and microscopes by Messrs. Whiteaves, Tyrrell, Fletcher, Wickstead, Ami, Harrington, and Dr. Small. The winter course of soirees comprised five, devoted respectively to the Inaugural Address and reports, geology, microscopy and botany, entomology, conchology and general zoölogy. The following is a list of the papers read at these soirees :—No. 1. November 25th, 1881—President's "Inaugural Address," J. Fletcher. Reports on geology, botany, entomology, ornithology, and oology. No. 2. December 9th, 1881—" Some remarks on the geology of the Ottawa Valley, and on the stratigraphy in the vicinity of Ottawa City," A. R. C. Selwyn. " Notes of an exposure of the Potsdam at Buckingham Basin, Des Lievres River, Quebec," H. M. Ami. No. 3. January 13th, 1882—" Microscopic examinations of filterings of the Ottawa water supply," Rev. A. F. Kemp. No. 4. February

10th, 1882—"House Flies," W. H. Harrington. "Notes on the Acaridæ, with description of new species," J. B. Tyrrell. No. 5. March 10th, 1882—"Ottawa Unionidæ," F. Latchford; "The Utica Slate Formation," H. M. Ami; "A Notice of the Bank Street Road Pine," Dr. Small; "Report of conchological branch." At each of the soirees, in addition to the papers of the evening, there were remarks made by members and exhibitions of specimens and microscopes.

In conclusion, the Council would recommend a division of the laborious duties now performed by the Secretary-Treasurer; also an increase of the annual subscription fee to $1, the payment of which to entitle a member to receive a copy of the Transactions, as published, and to attend the Club soirees without further charge.

Signed on behalf of the Council,

W. H. HARRINGTON,
Secretary.

OTTAWA, March 21st, 1882.

TREASURER'S BALANCE SHEET.

The Treasurer in Account with the Ottawa Field-Naturalists' Club, 1881-82.

DR.		CR.	
To Balance on Hand	$ 55 52	By Printing, Stationery, Postage, etc	$ 16 52
Annual Subscription Fees	44 50	Prizes	5 50
Receipts from Prof. Macoun's Lecture	6 40	Expenses of Prof. Macoun's Lecture	3 50
do from Excursions	23 95	do Excursions	30 22
do from Soirées	13 30	do Soirées	8 50
do from Transactions	22 84	do Transactions	65 20
		Balance	37 07
	$ 166 51		$ 166 51

W. H. HARRINGTON,
Treasurer.

21st MARCH, 1882.

CHANGES IN RULES.

In pursuance of the suggestions offered in the last paragraph of the report of the Council, Rules Nos. II and VIII, as published in Transactions No. 1, were amended to read as follows :—

II. *Management.*—The Club shall be under the management of a Council, annually elected, consisting of a President, two Vice-Presidents, a Secretary, a Treasurer, a Librarian, and a Committee of three other members, all of whom shall be eligible for re-election ; three to form a quorum. Minutes of the meetings and proceedings of the Council to be duly kept.

VIII. *Annual Fee.*—The annual membership fee shall be one dollar, payable in advance, due on the third Tuesday in March, and no member in arrears shall be entitled to any of the privileges of the Club. New members to pay the fee for the current year upon election. The payment of the annual fee to entitle a member to receive a copy of the Transactions, as published, and to admission to the Club Soirées without further charge.

FIRST SOIREE.

FRIDAY, NOVEMBER 25, 1881.—INAUGURAL ADDRESS. JAMES FLETCHER, President

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

This evening it is again my privilege, now for the third time, to deliver the opening address in our course of winter entertainments. I am happy to be able to inform you that the Club is in a very prosperous condition. Not only has the number of members on the roll been increased, but also that of those actively engaged in studying natural history and so furthering the object for which the Club was organized. As it has now become a custom of the Club to publish among other papers the inaugural address of the President in full, and as we have this evening to receive some of the reports of the different branches, my address will not be of so great a length as heretofore. In the two previous years too much space in the Transactions has been taken up by the President's address, to the exclusion of less general and therefore more valuable matter.

There are two methods one or other of which is generally followed in introductory addresses to such societies as our own. The first is to treat of some special subject; the second is to consider generally the present condition or progress of science. I shall not, however, follow either of these courses this evening. As the one selected by a Club as the chief executive officer, the President is responsible for much. He has, in the first place, to look after the working of the whole Club and see that a continuous work of scientific investigation is carried on. With the assistance of the excellent council that you elected at the same time as myself at the last annual meeting, I believe that this has been done. There is also another important duty which seems to devolve specially on myself, as President, and that is to stimulate the members to keep up their individual studies, to keep constantly before them what has been done in the past, is being done at present, and what we may hope to do in the future, and I cannot help thinking that this is the proper subject for the opening address—in fact this should be the President's annual report to the Club. I believe we are doing most valuable work towards working up the natural history of the country. We are already making a name for ourselves and are becoming a centre of reference. I have no doubt at all that as it becomes more generally known throughout the district that such an organization exists, where an inquirer can obtain readily information on such subjects as the best means of dealing

with insect foes, or as to the value of soil, or the nature of minerals found, or the uses of our native plants—in fact of the causes and effects of all subjects treated of in the natural sciences, I believe, I say, that our opportunities for usefulness will be increased almost without limit. Immediately after their election, your Council commenced operations by sending a circular to every member, the object of which was to endeavour to get more of the members to take an active part in studying the natural history of the locality; in view of this end, and as an assistance to beginners, it was decided to appoint leaders in the different branches of science, and their duties, as expressed in that circular, were as follows:—To render any assistance in their power to the members engaged in collecting or studying in their respective branches; to bring together for mutual aid and encouragement the members interested in the same subject; to organize and direct working parties; to keep notes of work done, and report to the Council at the end of the season. These reports have been received and show very satisfactory results. In addition to the above, as an incentive to collectors and to induce others to study the natural sciences, it was decided to offer a prize in each branch for the best collection of specimens made during the year. These collections are to be properly named and arranged and submitted for examination by 31st December next, and I sincerely hope there will be a large number of collections sent in.

The second part of the Transactions of the Club, giving a record of all its proceedings for the year 1880-81 has been published. Through the generosity of Mr. Grignard it is embellished with a beautiful plate, of a new species of fossil found by Mr. W. R. Smith, at Belleville, and figured in our Transactions because illustrative of the genus Porocrinus, of which Mr. W. R. Billings found imperfect specimens of another species in this locality. It will be remembered that the concluding lecture of our last year's winter course was given by Prof. Macoun, of Belleville, on "The capabilities of the North-West Prairie Lands as shown by the Fauna and Flora." This lecture was of great interest, and a *resumé* of it is given in Transactions, Part II. At the beginning of this year, that is, immediately after the annual meeting in April, the Council received a letter from His Excellency the Governor General stating that he had been unavoidably prevented from attending this lecture, and expressing a wish that it might be repeated. Accordingly on the 7th of April Prof. Macoun came and re-delivered the lecture. He also exhibited specimens of the most important plants mentioned, and the success of the evening was much enhanced through the kindness of Mr. Topley, who showed by means of a magic lantern an admirable collection of photographic views, many of which were of the exact localities mentioned in the lecture.

During the past summer, in addition to the excursions held by the different branches, and one or two special expeditions to distant localities, too far for

general excursions of the whole Club, the usual periodical excursions into the surrounding country for the purpose of making collections have been held. I regret exceedingly that owing to absence I was only able to attend the last of these; but from all accounts they were quite as enjoyable and profitable as those held during the previous seasons. Of the four excursions arranged by the Council during the season, the first was to the Chelsea Hills, on the 26th May; the second, the chief one of the year, was to Montebello, to meet the members of the Montreal Natural History Society. At this joint excursion it was decided by your Council to offer three prizes for the best collections made during the day, and there were two others given by the Natural History Society, of these, that for the best botanical collection, named and arranged without the assistance of a book, was taken by Mr. H. M. Ami, of our Club, with 80 species; the others were all taken by members of the Montreal society. The Hon. J. L. Papineau's kindness in throwing open his grounds and museum to the Naturalists increased materially the enjoyment of the day. Joint excursions of this nature are of the utmost value, giving Naturalists from different districts an opportunity of exchanging ideas and comparing notes. I hope we shall always be able to arrange at least one every year with our Montreal friends. The next excursion was to Meach's Lake, three miles beyond Chelsea. This is a favourite locality for the conchologist. It was here that Mr. Heron detected the rare mollusk *Physa Lordi*, which has not been found in any other locality in Canada except British Columbia, where it was first found by its discoverer, Mr. J. K. Lord. It is a very handsome and distinct species, and was well figured in Part I of our Transactions. Here, too, Mr. Latchford found a few of the handsome *Limnæa megasoma*, and there are many other interesting shells to be found there.

The last excursion of the season was on the 27th August, to the Black Rapids, on the Rideau River. This was a locality we had long wished to visit, but had been prevented by the want of a suitable boat. Dr. Wicksteed, however, again this year put his steam yacht *The Princess Louise* and her crew at the disposal of the Club for one day; the Committee then decided to make this oft spoken of trip. It proved most enjoyable. The scenery is very beautiful; it was a fine day, and some interesting specimens were collected.

Our corresponding members still continue to take a lively interest in the Club. Mr. A. J. Hill, now in British Columbia, has been collecting most energetically, and I have received from him several packets of plants, insects and seeds during the past summer, the duplicates of which I shall distribute among the members of the Club as soon as I have named them all. Many of them have never been recorded on the Canadian lists. One of the plants, called *Lewisia rediviva*, is of peculiar interest, and is worthy of a short notice here. It belongs to the order *Portulacaceæ*. Mr. Hill writes me from Ashcroft in May last as follows:—"I send you specimens of a beautiful little pink flower, which is now in blossom here in one

spot in great profusion. It appears first of all, early in the spring, as a small tuft of green fleshy grass-like leaves. These after a while, and immediately before the flower buds appear, wither down, so that the plant while in blossom has no foliage at all; but bud after bud comes out of the upper extremity of the rootstock, till in some instances it shows a crown of six or eight of the loveliest pink flowers, much resembling in general appearance and consistency small fully expanded cactus flowers." These flowers in some of the specimens Mr. Hill sent are an inch in diameter, are borne on short fleshy scapes, which are jointed above the middle, where they bear 3 to 7 awl shaped membranaceous bracts, and have from 8 to 12 petals, the outer ones of which are ovate and the inner oblong linear; they are semi translucent and rose-coloured, veined with red; the stamens and anthers are a deep rose colour and vary in number from 16 to 32, they have a very beautiful effect as they lie back on the delicate corolla; from their centre springs the pistil, which is white and divided up at the summit into 6 or 8 thread-like stigmas; the calyx adds much to the appearance of the plant, especially before the flower buds expand; it is composed of 6 or 8 broadly ovate petaloid sepals of a delicate brown colour. Mr. Hill writes futher that "the flowers like those of the Portulaca expand only in the bright sunshine," and he continues: "It appears like sacrilege to tread on the beautiful thing; but in some places they are so thick that it is impossible to avoid them; they are however confined to a very circumscribed area on the meridian of Ashcroft." The roots are thick and short, and in Oregon, near the mountains, where it is plentiful, it is called *spatulum* or *spætlum* by the natives who gather the roots and use them as an article of food. The bark being stripped off, the inner portion is found to be white and farinaceous; this is boiled in water, when it forms a substance similar to boiled arrowroot. The specific name *rediviva* is very appropriate, for the roots are so exceedingly tenacious of life that some specimens Mr. Hill collected in May last after having been carried about in a packet of other dried specimens all the summer and supposed to be quite dry, were found on opening the parcel two weeks ago to be sending out healthy crests of leaves. Some of these I planted and they are growing vigorously. Among the correspondents from whom we have received publications will be noticed the Epping Forest and County of Essex Field Club. When in England last summer, as your President, I experienced much courtesy from the council and members of this Club; I was made an honorary member for the period of my visit, and received invitations to all their meetings; I was fortunate enough to be able to attend one of their excursions, and this day was one of the most enjoyable of my whole holiday.

The Epping Forest and County of Essex Field Club has a membership of over 300, and is a larger and more influential institution than any other of the same nature in England. It was organized about the same time, and with exactly the same object, as our own club. They have already published five

parts of Transactions in the two years and a half. It has occurred to me that, being constituted so like ourselves, an account of one of their field days will not only be entertaining to most of you, but may also be suggestive of some valuable ideas of which we may take advantage, so as to render our own excursions as attractive as it is possible to make them. The excursion referred to was held on 25th June, at Chigwell, in Essex. The beautiful scenery around this place has been graphically described by Dickens in his "Barnaby Rudge." The members of the Club met at the railway station and then walked to Chigwell, a distance of about two miles, through lovely English lanes. I say English lanes, and I think anyone who has ever seen one will appreciate my drawing special attention to them They are a characteristic feature, and I believe not to be found of the same description in any other country. Few things are more beautiful; their steep banks of refreshing green, surmounted by well trimmed hedges, and clothed from top to bottom with feathery grasses and lovely flowers, breathing forth delicious odours, have an effect little less than enchanting on visitors from other climes. Their beauty is ever varying; plant after plant throughout the whole summer, succeeding in its turn, claims the reward of its effort by forcing up its head into the sunlight to bear its corolla or crown of glory; the gay butterfly with bejewelled wings adds its charm to the scene; and the hum of the bee as it hurries by is no unimportant factor of the whole. Truly this sum of beauty should be sufficient to demand from all—the most unobservant—some small share of attention. But is it so, my friends? I regret, for the sake of the happiness of the many, to have to say it is not. While at Chigwell some of the party took the opportunity to visit the Kingshead Inn mentioned by Dickens, and the old parish church, which contains a rich collection of ancient brasses and monuments. Two of the most interesting for their age are a monument to T. Cateshill, who died in 1595, and a brass to Archbishop Harsnett, formerly master of the Grammar School there, and founder of two schools—one for young children and the other for teaching Latin and Greek, and the founder expressly stipulated that the master of the latter should be no "puffer of tobacco." Perhaps there is no object of greater interest in the village than a curious avenue of yew trees, which forms a covered way from the church door to the road, a distance of about twenty yards. The trees stand in two rows, and, as far as I can remember, are about twelve feet apart; the branches, springing out horizontally about ten feet from the ground, meet overhead, and form so dense a mass that it is quite impossible to see daylight through them. The trees are not large specimens, few of the trunks having a diameter of more than twelve inches; they are, however, supposed to be very old, and one of the members, Mr. Unwin, who, before we left the churchyard, read a short and interesting paper on the history of the parish, also exhibited an illustration of the church more than 100 years old, which showed the avenue exactly the same as

it now appears. In England the yew tree is the typical form of *Taxus baccata, L.*, and grows to the size of a large tree, sometimes fifty feet high, with a massive trunk. One specimen at Hounslow has a girth of 27 feet. This tree little resembles our Canadian variety of the same plant, *Taxus baccata, L.*, var. *Canadensis*, Gray, which is a low straggling shrub growing in swampy woods and seldom more than three or four feet high, and does not form a trunk at all. The paper ended, we continued our walk as far as Oakhurst, the residence of the Rev. W. Linton Wilson, the Vice-President, where a large schoolroom was put at our disposal. After some time spent in the examination and comparison of specimens collected during the day, our host summoned us into an adjoining room, where a sumptuous repast had been prepared, to which ample justice having been done we all took our seats for the great attraction of the day, a paper on Infusoria, by Mr. Saville Kent, one of the highest authorities on these minute animalcules. The paper was virtually an outline sketch of Mr. Kent's magnificent work now in course of publication. Judging by the parts which are already issued, it is by far the finest work ever published on the subject, and will be a necessary companion for anyone taking up this interesting study. In illustration of the paper Mr. Kent sent round the room a complete set of the illustrations with which his book is to be embellished; there were also several living specimens collected during the day which were examined through microscopes of which there were several very fine ones brought by different members. Subsequent to the paper there was much interesting discussion, and the difficult points were ably explained by the lecturer. There was also read a communication from Mr. English upon a new method of preserving plants in their natural shapes, beautiful specimens being at the same time exhibited, which might easily have been mistaken for living plants, so well had their shapes and colours been preserved.

I have noticed this excursion at some length because I think that it will be of use to us to see how others doing the same work as ourselves carry on their proceedings. It will be found by the reports to be read that much work has been done by ourselves in many lines of natural history, but yet I must express a hope that next season will produce some active students in one or two of the branches which so far have attracted little attention, as well as some specialists in those which have already been worked. Something new is sure to turn up even in a study of the most common objects when submitted to an exhaustive investigation. In the small family *Nuphar* I believe I have succeeded in discovering during the past season that what has been considered a form of *N. luteum* by American botanists, and which was added to our Ottawa list last year under the name of "*N. luteum*, Smith var.," is only a hybrid between *N. advena* and *N kalmiana*. I am led to this belief from an examination of the fruit; but so far my conclusions have not been confirmed by any other botanist. This, however, is

sufficient to show that much interesting information may be derived from well trodden paths. I am surprised that so few have turned their attention to ornithology, the study of those gay visitors which add such an indescribable charm to our sylvan rambles. I hope to see a microscopical branch organized at an early date. To anyone who can afford the luxury of a microscope, unlimited amusement and instruction is in store. No one can once enter upon this study without being compelled to become an enthusiast. It opens up such new worlds and fields of thought that the mind is almost overwhelmed with wonder and reverence for the Omnipotent Being who created such marvels of beauty and adaptation to required uses. The fact that nothing is useless is forced upon our minds with such force as almost to cast everything else into the shade. I am particularly anxious next year to see great life in the Club, so as to take as much advantage as possible from the visit of the American Association for the Advancement of Science to Montreal, when I hope not a few of our members will join that noble Association.

Scientific life in Canada may be said to have had its birth in 1857, when the last meeting of that association held in Canada was convened, and now, when it is held here again, I have the most sanguine hopes that it may be the cause of a renaissance in scientific studies in Canada. There are few cities in the Dominion which possess so many advantages, and opportunities for learning, as Ottawa does, for all who are desirous of obtaining a knowledge of scientific matters. First of all, of inestimable value is the magnificent museum of the Geological and Natural History Survey, which removes already every excuse for ignorance upon geological and mineralogical matters, and as soon as the collections in the other departments of natural history are completed we shall have here a source of reference upon every subject of interest to the naturalist. The addition of such men as Dr. Selwyn, the director, Mr. Whiteaves, and Dr. George Dawson, among others, cannot fail soon to make itself felt in society here. Their eminence and reputation as naturalists are not confined to this country but are of world-wide acceptance in scientific circles. The museum is now open to the public, and has been arranged so that its economical collection can at once be referred to by anyone desirous of identifying or learning the uses and value of any mineral deposit. There is of course also a scientific collection for the use of scientific students. The next institution worthy of mention in this connection is doubtless the Library of Parliament, where the best works on most subjects are always to be had for reference. The Literary and Scientific Society too, with its learned President, the Rev. Dr. Kemp, is an institution well calculated to help on the cause of science. The Museum, although small, is possessed of several valuable and typical collections for reference; the Library is good and there is every year a course of science lectures which every member of this Club would do well to attend. In many of the Departmental reports published by the Government will

be found accounts of explorations and experiments which are of great interest to scientific men.

In connection with St. Joseph's College there is a Geological Society and well arranged museum. The Institut Canadien has its science classes, and of course so do also the Normal School and Collegiate Institute. In short, there is no excuse at all for anyone in Ottawa to plead ignorance on scientific subjects. Let us then strive to make the most of our opportunities, and do our utmost to render our Club of the greatest possible usefulness. Let us proclaim by our works that we wish to help on the general cause of science. Let each of us strive to cultivate his faculty of observation, so that nothing of interest escapes our notice. The notebook should be the naturalists' constant companion, the time of the appearance and departure of every bird and insect should be noted, the occurrence of every rare animal, fish, or shell, the discovery of every mineral or interesting fossil remain—all of these should be recorded.

We must not, however, content ourselves with only making observation and collecting facts. This is not science. Science is organized knowledge. Our observations, therefore, must be arranged, and recorded systematically in the clearest possible way, for our own use and for the use of others. The literature of science, especially periodical literature, has become so powerful and voluminous that without it progress is impossible to the student; this renders it necessary that all facts should be recorded in as concise and exact a manner as possible. No one can contemplate the progress of physical science during the past century without feeling that a new era has begun in the history of man. The powers of the human mind are extending their grasp and rising to a state of higher activity. The nature and order of material things are exhaustively investigated from the infinitely great to the infinitely small. The causes and effects of things are sought out most persistently. Physical science scans alike the distant orb from which we receive light and heat and also the imponderable and invisible particle, and demands from insentient matter the laws of its being. Scientific inquirers were doubtless at all times thus engaged; but formerly there was too much scope given to the imagination and too little observation and experiment. Systems were built up on arguments derived from the probable rather than the actual and proved. The strictness of logical conclusions was held to be of more account than honest labour in ascertaining the correctness of the data on which the conclusions were built. This, however, is not the case to-day. No assertion in science remains long unchallenged, and the statements of philosophers are submitted to every ordeal, and their conclusions tested by every criticism which honesty, acumen or fierce partizanship can apply. One of the great characteristics of the scientific activity of the day is its practical tendency. The public expects from its thinkers and experimentalists not clever paradoxes and ingenious puzzles, but plain methods of grappling with stern necessities—discoveries by means of

which the powers of nature may be subjugated to the powers of man in his ceaseless struggle with her material elements. Scientific researches into the constitution of things which by the ignorant are too often assumed to be useless in their application to the practical affairs of life, are by the intelligent now appreciated as honest efforts to add to the sum of verified facts, which are of the highest value, not only as truth, but also as disconnected links which may at any moment be connected by others and produce practical good. Medical science furnishes numberless examples, particularly in the history of Zymotic and other microscopic diseases.

The scientific genius of the age, too, has responded to this demand for tangible results. Students have ceased to speculate upon unsubstantial theories, and no longer spend their lives in search of the "Philosopher's stone" or the "Elixir of Life." Science is no longer a lifeless abstraction floating above the heads of the multitude. It has descended to earth and mingles with men. The history of modern times is full of instances of this. It is by a knowledge of science that we are able to seek out and detect the mineral treasures embowelled in our mountains; by the same power we are enabled to dissolve from their stony beds the organic remains of former ages and re-use them to fertilize again our fields. It teaches us how to combine elements which separate are inert and harmless, but which united can in a moment of time demolish structures which have taken years to build. In the art of photography it has given to man the sunbeam as a pencil infallible in the accuracy of its delineation, and in the electric telegraph it has given him the lightning of the clouds as a messenger.

The powers and benefits bestowed upon man by science are so numerous that no one now dares to speak slightingly of her. The hidden forces of nature, the laws by which her phenomena are governed in all their variety and succession, everything is undergoing a rigorous scientific investigation from which result discoveries that would be deemed simply miraculous did not their number and frequency almost exhaust our faculty of wonder.

REPORT OF THE GEOLOGICAL BRANCH

For the Season of 1881.

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

The leaders of the Geological Branch of the Club, in presenting this, their first annual report on the proceedings of that division of the Club for the field season of 1881, regret that, owing chiefly to the small number of members interested in geology, it was found impossible to carry out the intention of the Council to organize working parties, or to hold periodical short excursions of the branch; and consequently the work accomplished has been by members individually, and almost wholly in the palæontological section.

In mineralogy there is no work to report, and it has been deemed advisable to withhold some notes that were made of stratigraphical observations until a more connected and comprehensive report could be prepared, to include future observations. It is very desirable that this branch should make a united effort to accomplish a thorough survey of the stratigraphy of the surrounding townships, and this year's leaders recommend to the attention of their successors for the ensuing field season the desirability of systematically beginning such a work.

It is thought that a few new species of fossils have been found, but it has been necessary to prepare this report so early in the year, before the field work can be said to have actually ended, that the collectors have not been able to put their specimens in order, determine doubtful varieties, and prepare lists or descriptions of them.

It has also been found, in compiling the notes submitted, that the substance of many of them was already contained in the "Geology of Canada, 1863," so that it is unnecessary to issue them in this report. In fact all the observations of the branch bear testimony to the wonderful accuracy and extended scope of that valuable work.

The most systematic and important effort of the year consisted of an exploration of the celebrated Bird's Eye and Black River outlier at Paquette's Rapids, at the foot of Allumette Island, where Messrs. Billings, Ami and Soutter, of this Club, spent a week collecting fossils, in company with Mr. Hurlburt, the accomplished palæontologist of Utica, N. Y., and Mr. Weston, of the Exploring Staff of the Geological Survey of Canada. The greater number of these specimens were found to be of species identical with those of the Little Chaudière beds, referred to hereafter.

In the absence, then, of comprehensive notes from which a full report of the year's work could be compiled, it may be interesting to the members in general, as well as a help to the younger ones desiring to begin the study of palæontology, to give a list of the different localities in this neighbourhood in which the several formations may be found, at the same time indicating the best fossiliferous beds.

Taking the rocks in ascending order, the Potsdam sandstone, the lowest member of the Lower Silurian age, and the one immediately succeeding the rocks of the Archæan era, is found at the Nepean quarries on the Richmond Road above Britannia; at Lake Windeago, East Templeton; and at Buckingham Basin, on the property of Mr. Bangs. An exposure is also reported as occurring at Hog's Back.

No fossils have been reported from the Potsdam in Ottawa, nor from the formation next in order of age, the Calciferous, which occurs at Hog's Back and the Black Rapids on the Rideau River, nine miles from the City, where the Club held one of its excursions last summer. Casts of Calciferous fossils have been reported as seen in a quarry on Mr. Robert Skead's Farm, South Shore of the Ottawa, opposite Duck Island.

Mr. J. H. Bell reports a very interesting exposure in Marlborough, about 30 miles south of the City, probably referable to the Calciferous sand-rock; rich in fossils, and with crystals of quartz, making brilliant patches on the surface as they glisten in the sunlight. It is proposed to give to the Club a detailed description of this exposure in a separate paper.

The formation which comes next, the Chazy, has in this locality so far proved poor in fossils. The beds at Aylmer and south-east of the mouth of Green's Creek are the best in the immediate neighbourhood, no very interesting fossiliferous beds being known nearer than L'Orignal or Grenville.

The Bird's Eye and Black River formation, constituting the base of the Trenton group, is, on the contrary, specially rich. The Little Chaudière, on the Hull side, is, when the water is low, the best place in this vicinity. Fossils are also found in a similar bed on the Ontario shore opposite, on Lots 3 and 4 in

Concession 3, Rideau Front of Gloucester; Lot N, Concession A, Nepean; at the summit of the Chazy outcrop already referred to south-east of Green's Creek, and at the quarries near Hog's Back, on the Gloucester side of the Rideau River.

The formation next in order is the Trenton, and as most of the limestone in the immediate vicinity of the City belongs to it there are many fossiliferous localities that would repay careful attention, but only a few of the richest known are mentioned. That at Barrack Hill, described in the Geology of Canada, 1863, as most productive of new species, and from which was obtained the greater part of the crinoids and cystids described in Decades 3 and 4, does not seem to be accessible now, having probably been covered by debris from the excavations for the Lover's Walk.

Good fossiliferous localities, and easy of access, occur east of the steamboat landing on Sussex Street; at McKay's Bay; the quarry at Brigham's Lake, Hull (Crinoids); Wright's quarry, Hull; at the railway cutting immediately west of the crossing of the Aylmer road (Monticuliporæ); at the old lime kilns, Mount Sherwood; and above the Chaudière Falls on the Hull side of the river, at low water.

Beds of the Utica formation, constituting the base of the Hudson River group, and immediately overlying the Trenton, occur on the banks of the Rideau at the rifle range, at Cummings' Bridge, at a small creek between Cummings' and Hurdman's Bridges, and in the brook above Billings' Bridge. Mr. Ami is preparing for the Club a paper upon the fossils found by him in these beds.

No formations more recent are known to exist near Ottawa until the post-tertiary clays are reached, of which there are good fossiliferous localities below Rockliffe on the south bank of the Ottawa, when the water is low; at the mouth of Green's Creek, and in the gravel beds at Gloucester station on the St. Lawrence and Ottawa Railway.

In conclusion it is hoped that a large number of members of the Club may be induced to pursue this most attractive branch of field work during the coming season, particularly now that the headquarters of the Geological survey have been brought to Ottawa, that the magnificent collection in its museum will shortly be open for study and comparison, and that some of the officers of the survey who are members of the Club may be induced to lead this branch with the success that their high scientific attainments would ensure.

WM. P. ANDERSON,
W. R. BILLINGS,
H. M. AMI,

Leaders of the Geological Branch.

REPORT OF THE BOTANICAL BRANCH

For the Season of 1881.

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

In making a report of the work done in the Botanical Section during the past year, your committee must first congratulate the Club on the progress made in this branch and on the success that has attended the system inaugurated this season. We also take this opportunity to thank the members for their evident desire to render our duties easy, and for the interest they have shown in the work of the new system.

Owing to the spring circular having been issued after the botanical season had opened; some who would have liked to commence work with the Club, for

want of preparation, posponed their beginning until another year; and, to judge from the many who have sought information regarding the collection and preparation of specimens, the fruits of this season's work will be evident next year in the increased number of working botanists. This year six new collections have come under our notice and the same number of new collections may be said to be in possession of the Club.

In accordance with the notice contained in the circular, a series of sub-excursions was organized. Your committee started each Tuesday morning, from the west end of the City to the woods in that vicinity, and each Thursday morning, from the east end to McKay's woods and Beechwood Cemetery. In the latter localities much valuable work was done to improve our knowledge of their flora, a complete list having been made of all the species observed and the date of their first appearance in flower, together with other notes of interest. As opportunities offered themselves, Saturday afternoon excursions were made throughout the season to points at a greater distance. Of the most noteworthy was one to the neighbourhood of Billings Bridge, where the *Trillium Cernuum* formerly grew in great abundance; but owing to the wood where it was most abundant having been destroyed only two imperfect specimens were obtained. Another similar excursion took place to the Mer Bleue, where *Woodwardia Virginica*, *Scheuchzeria palustris* and other bog plants were collected, including a remarkable *Viola* with very long petioles; in some instances nearly 6 inches in length. After careful examination it has been referred to *V. blanda*. Templeton, Hogsback, Mechanicsville, Lake Flora and other places were also visited. In addition much individual work has been done by members, and we are pleased to note that the important branch of aquatic plants has received full attention, as will be seen on reference to the list appended.

The plants added this year to the Flora Ottawaensis are 31 in number, some of which are very rare. More we expect will be added during the winter when members arrange their summer work and competitive collections and lists are sent to the council. This is very satisfactory considering the thorough manner in which the locality has been worked in former years.

The following are a few of the more important plants on the list:

Polygala paucifolia. The only specimen found recently in this locality was gathered by Mr. H. Ami, near the St. Louis Dam, but the late Mr. B. Billings collected it in 1866. It was also found at Montebello and was noticed among some plants sent from the Mattawa District.

Rosa Carolina, Swamp Rose, was found near Meach's Lake.

Wolffia Brasiliensis, in the Rideau Canal.

In the difficult and little known genus *Potamogeton*, Mr. Fletcher has done much valuable work, which we hope the Club will benefit by on some future occasion. Referring to this work he writes: "I have found the rare "emersed form of *Potamogeton Vaseyi* in the Rideau Canal, with well developed "floating leaves. I was not successful in securing the fruit, all the floating "leaves having been destroyed by insects before it matured, which made it "impossible to discover the plants." In reference to another species he writes: "*Potomogeton Robbinsii* I found in Meach's Lake; but without flowers or fruit. "The Rev. T. Morong, the leading American specialist in this family, writes me "as follows with reference to this plant: 'It had been hunted for in fruit for 20 "years or more, in vain until two years ago, when it was found near Ashland, "in Mass. It had always been considered a submerged form previous to this, "but that year the water was very low and some of the stems reached the surface "and bore fruit; as a rule all the submerged species or forms are reproduced "by gemmæ."

Isoetes lacustris.—This curious plant, which has been classed Club Mosses, was found by Mr. Fletcher in Malloch's Bay, near the railway, at the lowest point attainable by the water falling.

Several new plants were found by members, but at a distance too great to be added to the list; as they will probably be found in this locality, their names are here mentioned as a guide: At Paquette's Rapids, *Sagittaria pusilla*, Nutt., *Helenium autumnale*, *L.*, *Eriocaulon septangulare*, With.; at Montebello, *Allium Schœnoprasum*, L., *Convallaria majalis*, L., and *Arabis hesperidoides*, Gray

Before closing the report we would urge upon each Botanist the necessity of a more systematic method of work. If each would take a particular locality and prepare a list of all plants growing there, the Club would soon be possessed of the most valuable information. We would further urge all to make notes of the work done and prepare a report for the leaders at the close of the season. A few have done so this year but the majority have neglected this duty. We would advise those about entering the study to commence work at once, by learning the system upon which the science is based and examining all collections they have access too, thus becoming familiar with the work they intend to pursue; and we would ask all to apply freely to the leaders whenever aid or information is required. It must be borne in mind that they are appointed for use only, and are to be looked upon as Club property.

BEAUMONT SMALL, M.D,
R. B. WHYTE,
Leaders of the Botanical Branch.

APPENDIX.

Flora Ottawaensis; Additions to Previous Lists.

Nymphæaceæ.
Nymphæa tuberosa, Paine.
Caryophyllaceæ.
Lychnis diurna, Sibth.
Spergula arvensis, L.
Polygalaceæ.
Polygala paucifolia, Willd.
Leguminosæ.
Astragalus Cooperi, Gray.
Rosaceæ.
Rosa Carolina, L.
Umbelliferæ.
Heracleum lanatum, Michx.
Compositæ.
Nardosmia palmata, Hook.
Aster miser, L., *v.* hirsuticaulis, Gray.
Solidago serotina, Ait.
Centaurea Cyanus, L.
Plantaginaceæ
Plantago media, L.
Convolvulaceæ.
Calystegia sepium, R. Br. *v.* Americanus, Sims.
Solanaceæ.
Physalis pubescens, L.
Cupuliferæ.
Quercus coccinea, Waug.
Betulaceæ.
Betula nigra, L.

Salicaceæ.
Populus monilifera, Ait.
Lemnaceæ.
Wolffia Brasiliensis, Weddell.
Naiadaceæ.
Potamogeton Vaseyi, Robbins. (*Emersed form.*)
lonchites, Tuck.
gramineus, L. *v.* graminifolius, Fries.
lucens, L.
perfoliatus, L. *v.* lanceolatus, Gray.
pusillus, L. *v.* major, Fries.
v. tenuissimus, Mertens and Koch.
pectinatus, L.
Robbinsii, Oakes.
Cyperaceæ.
Cyperus phymatodes, Muhl.
Eriophorum vaginatum, L.
Filices.
Cystopteris fragilis, Bohn.
v. dentata, Hook.
Lycopodiaceæ.
Isoetes lacustris, L.

REPORT OF THE ENTOMOLOGICAL BRANCH

For the Season of 1881.

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

In compliance with the instructions received from you I beg to submit a brief report upon the work done in Entomology. This important branch of science offers such a fine field for the investigations of our members that it is pleasing to note even the slight increase of interest therein that was manifested during the past season, and which was noticeable at our excursions. Many insects were brought to me during the summer and others taken to our president; some of these were brought for identification and information regarding their habits, while the remainder were contributions to our respectlve collections. The season for insects began at least two weeks earlier than in 1879 or 1880; such common forms as flies and spiders appearing before 15th March, on which date a number of small coleoptera, chiefly carabidæ, were observed. On the same day appeared *Apis mellifica*, Linn., the honey-bee, and *Polestes annulatus*, or mud-wasp. The latter is very abundant during the summer, and may be seen in large numbers upon the watered streets, gathering the moist lime-stone dust with which it builds its cells. Hundreds of these cells may be found under the stone window-sills and cornices of the Parliament Buildings. This wasp remains, in diminishing numbers, until the end of October, and stray ones may occur even later on sunny days. *Pieris rapæ*, Linn., the cabbage butterfly, was noticed on the 1st of April, but during the first week of that month there was a continuous cold penetrating north wind, with low temperature, so that insect appearances were reduced again to the minimum. A recurrence of bright warm weather brought them forth in rapidly increasing number and variety, and during the remainder of the spring they were very plentiful. On the 9th April hybernated specimens of *Vanessa antiopa*, Linn., the butterfly by some known as the Camberwell Beauty, were in flight, and on the following day tiger beetles, *C. purpurea*, Oliv., were numerous in dry fields. About the 20th mosquitoes began to make their presence felt both by members and non-members, and in some of the neighbouring woods they were more than usually obnoxious. On the 24th, in a young pine-grove, on the other side of the Ottawa, I obtained a number of Buprestidæ, though not expecting to find them abroad so early. Of *C. Virginiensis*, Drury, I took 1 male and 2 females, and of *C. liberta*, Germ., 14 males and 13 females. A few pine weevils were also seen, and many of the pine saw-flies.

The currant saw-fly, *Nematus ventricosus*, King, also about this date was depositing its eggs, and as these hatch in about a week the young worms were at their destructive work by May-day, new broods appearing all through the summer and requiring constant watching.

On May 6th (Saturday afternoon) a botanical and entomological party visited the woods in the vicinity of Billings' Bridge, and about 25 to 30 species of coleoptera were collected. Among these were *Serica sericea*, Ill., of which numbers were found feeding upon wild gooseberry bushes, and *Chrysomela elegans*, Oliv., of which the food-plant could not be discovered although the beetles were abundant. *Platycerus quercus*, Weber, was found to be destroying the buds of maples and other trees by eating them completely out, so as to leave but a shell, thus killing the leaf-clusters. The beetles were found in the buds, sometimes a pair in a bud. Many of the curious larvæ of *Photinus angulatus*, Say, one of our fire-flies, were observed crawling upon the trunks of trees in swamps, or suspended by the tip of the tail to the bark in the same manner as the larvæ of the Coccinellidæ, or lady-birds, when changing to the pupa state. The sultry weather of the following week brought forth swarms of insects of all varieties, and a very fair collection might have been made in the city.

The insect fauna of the Hull side of the river is in my opinion richer than that of this side ; many insects occuring abundantly there that I have not seen on this side. This was quite noticeable during a short trip that I made (21st to 24th May), with two other members of the Club, to the Wakefield Cave, about 20 miles north of Ottawa. We obtained, for instance, three species of tiger beetles, *C. longalibris*, Say., *C. limbalis*, Kl., and *C. 12-guttata*, Dej., which I have not taken in this county. *Conotrachelus nenuphar*, Hbst., the plum-weevil, was very abundant on wild cherry trees; and I may note that there was scarcely a tree unaffected by "black-knot." Several specimens of *Pachyta monticola*, Rand, were captured flying about elder flowers.

On the 27th May a Club Excursion was held to Chelsea. The day was very bright and hot, and favourable for entomologizing, but the wood being almost entirely beech the variety of species found was not great. *Icthycerus novaboracensis*, Forst., the beech-weevil and largest Canadian curculio, was exceedingly numerous; specimens were seen on nearly every beech tree, and sometimes several on the same tree. *Dicerca divaricata*, Say., the beech-borer, was also common, and specimens were observed depositing their eggs in old trees. Among other beetles found on that day may be mentioned *Calchophora fortis*, Lec., *Dicerca tenebrosa*, Kirby. *Alaus occulatus*, Linn., and *Amyops*, Fabr., and *Corymbites cruciatus*, Linn. On the 31st May, *Chrysobothris Harrisii*, Hentz., was taken on pine and the weevils infesting that tree were abundant. For the 4th June I have a record of over 60 species of Coleoptera, but butterflies appear to have been less abundant than in some former seasons, some species which occur here not having been observed at all. Among the beetles may be mentioned *Saperda vestita*, Say., basswood-borer *C. nenuphar*, Herbst., plum-weevil, *Anthronomus quadrigibbus*, Say., apple-weevil, *Psenocerus supernotatus*, Say, currant-borer, and *Saperda candida*, Fabr., the apple-tree-borer. The latter beetle I have as yet found only beyond Hull, where it occurs upon the shad-bush or service-berry and seems to be increasing in numbers. Three years ago a single specimen was captured, whereas last summer several could be taken in an hour's collecting. On the occasion of the Club's excursion to Montebello, on 8th June, a great variety of insects were observed, including species not occurring here within my knowledge. I have made a synopsis of the beetles collected by members of the Club during that day and give the number of species in each of the principal families collected:—Cicindelidæ 1, Carabidæ 35, Scarabæidæ 8, Chrysomelidæ 15, Elateridæ 13, Curculionidæ 13, Coccinellidæ 5, Staphylinidæ 6, Cerambycidæ 3, Lampyridæ 9, Mycetophagidæ 3, other families 18, in all 129 species Coleoptera. The Carabidæ were nearly all taken under drift-wood and leaves on the damp shady shore, and a search for this family in such localities will always be well rewarded. The sandy shores of Kettle Island would be a good locality to investigate. While insects were unusually abundant during May and June, the two following months were not so prolific as was expected, owing probably to food plants having partially failed on account of the dry season. During the summer Mr. W. L. Scott informed me that a number of grape vines at Fairview (residence of Hon. R. W. Scott) had been attacked by a small active bluish beetle. This beetle is named *Graptodera chalybea*, Ill., and is commonly known as the "grape-vine flea-beetle." The eggs are laid in the spring upon the young leaves, on which the small dark-coloured larvæ feed, perforating them with holes, and, if numerous, stripping the vines. The greatest injury, however, is wrought by beetles which live during the winter under the bark, in crevices, etc., and perforate and destroy the buds just as they begin to swell in spring. The tortoise-like beetle *Chelymorpha argus*, Licht., was abundant in July and August and individuals varied much in their markings. Specimens were brought to me by different persons, who considered them to be unusually rare and curious beetles. During the season larvæ of *Sphinx quinque maculata*, Harworth, were exceedingly common upon tomato plants, and another sphinx, *Deilephila lineata*, Fabr., occurred abundantly in September, as evidenced by the

number seen about the flower beds on Major's Hill. A full grown larva of *Philampelus achemon*, Drury, was taken by Mr. J. C. Stewart upon Virginia Creeper (Ampelopsis quinque-folia) and others were found by Messrs. James Young and John Christie feeding upon grape-vines. Empty cocoons of the beautiful moth *Callosamia promethea*, Drury, were found near Hull, but repeated search failed to discover the larvæ or new cocoons. Two captures of another splendid moth must be recorded. This moth, *Erebus odora*, Say, is a southern form and its occurrence here is therefore particularly interesting. One was taken by Mr. Geo. Patrick, in a room in the Western Block, the other by Mr. Pim in a doorway of the Government Workshops. Many other very interesting insects might be noted, of which one is *Aletia argillacea*, Hubn., the cotton-moth, which appeared frequently during the early part of October, as it also did in 1880. Some beetles were obtained from fungi as late as 10th November. To my own collection of of coleoptera of the vicinity, I added during the season about one hundred new species, the majority of which are as yet unnamed. In concluding this report, I would respectfully ask you to endeavour by all means in your power to impress upon the members the importance of the study of Entomology, a branch of Natural History offering to students more opportunities for original research and valuable work than many of those which are now so popular.

W. H. HARRINGTON,

Leader of the Entomological Branch.

REPORT OF THE ORNITHOLOGICAL AND OOLOGICAL BRANCH

For the Season of 1881.

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

When at the beginning of the present year leaders were appointed for the various branches those of the members of the Club who were already interested in the study of Ornithology and Oology lost no time in putting themselves in communication with the leaders named for those branches, and in endeavouring to persuade as many others as possible to take up these studies. The following Report, however, is confined principally to work done in Oology, as that was the special study of the greater number of the members of the branch. Sub-excursions in this branch were organized once or twice a week during the latter half of May and the greater part of June, at which the most interesting localities in the vicinity of the City were visited. One of these was Wakefield Cave, an object of great interest in its self and situated in a locality most favourable for the study of all the branches of Natural History. It has been suggested that if too far for a general excursion of the Club, sub-excursions, similar to the one mentioned, might be organized next spring by the leaders in the different branches to visit this interesting spot; when it is confidently hoped good results would follow. On this excursion which was held about the 21st of May, we succeeded in discovering on one of the many small lakes near the cave a nest of the Common Gull (Larus argentatus, Brunn.) but we were unfortunately too late, as not only were the eggs hatched, but the young had already left the nest; from this fact it is probable that with this species the period of incubation is

very early in the season. The nest, which was very shallow, was built almost altogether of dried moss, and was placed on the top of a small rock, which extended about a foot and a half out of the water, towards one end of the lake.

About the same date Messrs. L. Brophy and R. Bauset visited Lake Wilson in the vicinity of the Pêche, P. Q.; and succeeded in making two valuable finds. The first of these was the nest of a Black Duck (Anas obscura, Imelin) containing six large greyish green eggs blotched with dull yellow. The nest, which was of moss, was built on the ground in the centre of a clump of trees on a small wooded Island in the Lake. The second was the nest of a Great Northern Diver or Loon (Columbus torquatus, Brunn) containing two eggs, olive green rather thickly marked with large and distinct dark spots. They also saw, in the crown of a very tall snag on one of the Mountains near the Lake, the eyry of a White Headed Eagle (Halialtus Leucocephalus, Savigny,) but not having climbing irons with them they were unable to reach it.

Among a number of nests of the Crow Black Bird (Quiscalus purpureus, Lechtenstein) which were examined near Chelsea, two deserve special mention. The first of these contained two eggs similar in size and shape to the ordinary ones of that species, but the colour of the ground work was lighter and more delicate, and, while one was thickly covered with light brown spots, the other was besprinkled with dull purple ones. In another nest an egg was found which nature had apparently meant especially for the leader of the Oological Branch, for on one side of it was drawn as distinctly and as neatly as if done with pen and ink, a large "W" with inside of it a smaller "L" and "S." The egg was stamped by nature with his monogram, all ready to be placed in his collection.

On one of our excursions the nest of a Peewee Flycatcher (Sayomis fuscus, Baird) was taken containing five eggs, four of which were marked with small brown spots. Although it is very unusual for the eggs of the Peewee to be spotted in this manner, yet the fact of their being so is noticed by many writers. A set of eggs of the Sand Martin (Cotyle riparia, Boie) was obtained which were also spotted, a peculiarity that as far as could be learned has never been recorded.

Among the many birds which, returning year after year to gladden us with their joyous carols, grow to be familiar friends about our houses, there are some which apparently depend entirely on the habitations of man for a place in which to build their nests. Of these are the Chimney Swallows, (Chætura pelasgia, Stephens); Eave Swallows, (Petrochelidon lunifrons, Cabanis); White Bellied Swallow, (Tachycineta bicolor, Coues); Purple Martin, (Progne purpurea, Boie), and many others. That these birds however, may and sometimes do find a substitute for eaves, sheds and bird houses, is proved by the fact that some half dozen pairs of white bellied swallows were observed building in deserted woodpeckers' nests in a tall tree situated on the banks of the Rideau River not far from Billings Bridge. The nest of the Wood Peewee (Contopus virens, Cabanis), besides being rare is extremely neat and curious, and therefore deserves a special description. One which was taken on one of our excursions was saddled upon an old moss-grown and decayed limb in a horizontal position, about 20 feet from the ground and was so remarkably shallow and so thoroughly incorporated with the bough that had the female not been on the nest it would certainly have escaped detection. The outside of the structure was built of lichen of exactly the same colour as that growing on the branch itself; it was lined with coarse grass and contained three eggs of a yellow cream colour, sparingly spotted towards the large end with light and dark brown.

Several large colonies of cliff or eave swallows (Petrochelidon lunifrons, Cabanis) have been observed in this vicinity. The nest of this species is very odd. It is constructed of small pellets of mud; and in its most perfect form it resembles a gourd; but when well protected by the overhanging eave of a building, the neck and sometimes part of the body of the nest is dispensed with.

The markings of the eggs of the cliff swallow vary considerably, the spots on some specimens being fine and light yellow, while those on others are large and of a dark brown colour.

On one of the excursions the nest of a Brown Thrush (Harporhynchus cinereus, Baird,)—rather a rarity in this locality—was discovered, but too late to obtain specimens of the eggs as the young were already hatched.

Besides those already mentioned, a few of the rarer eggs secured on our excursions were those of the following birds:

American Redstart (Setophaga ruticilla, Swainson), Rose Breasted Grosbeak (Goniaphea Ludoviciana, Bowdich), Yellow Bellied Woodpecker (Sphyrapicus varius, Baird), Belted Kingfisher (Ceryle alcyon, Boie), Yellow Bellied Fly-catcher (Empidonax flaviventris, Baird), Whip-poor-will (Antrostomus vociferus, Bonapart), Night Hawk (Chordeiles Virginianus, Bonapart). It might also be mentioned that a nest of the Nashville Warbler (a great rarity) containing four eggs, was found on the 13th July last year in a secluded thicket in the corner of Dow's Swamp, a peat bog about a mile from the City. The nest was built of moss with a little hair inside, and was situated in the side of a small mound rising a few inches above the wet sphagnum moss by which it was surrounded.

The following is a list of birds, giving the dates at which they arrived in this vicinity in 1881:—

Golden-eyed Duck (*Bucephala clangula*,) 17th March; American Robin (*Turdus migratorius*, Linnaeus) 31st March; Blue Bird, (*Sialia sialis*, Haldeman,) 9th April; Song Sparrow (*Melopiza melodia*, Baird,) 14th April; White Crowned Sparrow (*Zonotrichia leucophrys*, Swainson,) 14th April; White Bellied Swallow (*Tachycineta bicolor*, Cones,) 14th April; Meadow Lark (*Sturnella magna*, Swainson,) 20th April; Fish Hawk or Osprey (*Pandion Haliaetus*, Savigny,) 22nd April; Purple Martin (*Progne purpurea*, Boie), 22nd April; Belted Kingfisher (*Ceryle Alcyon*, Boie,) 26th April; Spotted Sandpiper (*Tringoides macularius*, Gray,) 5th May; American Sparrow Hawk (*Falco sparverius*, Linnæus,) 5th May; Ruby Throated Humming Bird (*Trochilus colubris*, Linnæus,) 9th May.

About the latter date the following warblers also arrived, Blue Yellow-backed, Maryland Yellow Throat, Black and White Creeper, Black Throated Green, Black Throated Blue, Yellow Rump, Bay Breasted, Blackburnian, Chestnut-sided, Yellow, Pine, Black and Yellow, and Red Start.

Rose Breasted Grosbeak (*Goniaphea Ludoviciana*, Bowdich,) 14th May; Night Hawk (*Cordeiles Virginianus*, Bonapart,) 20th May. The Blackbirds and Sparrows had eggs in their nests on the 9th of May.

In conclusion it is sincerely hoped that next season the number of those taking an active part in the development of such interesting and important branches of Natural History as Ornithology and Oology may be largely increased and that the work done may grow proportionately in extent and utility.

GEO. R. WHITE,
W. L. SCOTT,

Leaders of the Ornithological and Oological Branch.

APPENDIX.

List of Birds found in the vicinity of Ottawa City, specimens of which have been shot within the last few years.

("C." means common; "r.c." rather common; "r." rare. The numbers opposite to the species refer to Coues' Check-List of the Birds of North America.)

CLASS AVES.—BIRDS.

SUB-CLASS I. AVES AEREÆ OR INSESSORES, AERIAL BIRDS OR PERCHERS.

ORDER PASSERES, PERCHERS PROPER.

TURDIDÆ, THRUSHES.

1. *Turdus migratorius*, Linn. Robin, c.
4. " *pallasii*, Cab. Hermit Thrush, c.
6. " *fuscescens*, Steph. Wilson's Thrush, c.
9. *Mimus Carolinensis*, Gray. Catbird, c.
10. *Harporhynchus rufus*, Cab. Brown Thrush or Thrasher, r. c.
12. " *cinereus*, *Bd.* Cinereous Trush, r.

SAXICOLIDÆ, STONE-CHATS AND BLUEBIRDS.

16. *Sialia sialis*, Hald. Eastern Bluebird, c.

SYLVIIDÆ, SYLVIÆ.

21. *Regulus calendula*, Licht. Ruby-crowned Kinglet, c.
22. " *satrapa*, Licht. Golden-crowned Kinglet, c.
23. *Polioptila cærulea*, Sclater. Blue-gray Gnatcatcher, r.

PARIDÆ, TITMICE.

31. *Parus atricapillus*, Linn. Black-capped Chickadee, c.
34. " *rufescens*, Townsend. Chestnut-backed Chickadee, r.

SITTIDÆ, NUTHATCHES.

38. *Sitta Carolinensis*, Gmelin. White-bellied Nuthatch, c. (winter and summer).
39. " *Canadensis*, Linn. Red-bellied Nuthatch, c. (winter and summer).

CERTHIIDÆ, CREEPERS.

42. *Certhia familiaris*, Linn. Brown Creeper, c.

TROGLODYTIDÆ, WRENS.

49. *Troglodytes ædon*, Vieillot. House Wren, c.
50. *Anothura troglodytes*, Coues. Winter Wren, r.

ALAUDIDÆ, LARKS.

53. *Eremophila alpestris*, Boie. Horned or Shore Lark, c.

MOTACILLIDÆ, WAGTAILS.

55. *Anthus Ludovicianus*, Licht. Brown Lark, Titlark, Wagtail, Pipit, c.

SYLVICOLIDÆ, AMERICAN WARBLERS.

57. *Mniotilta varia*, Vieillot. Black and White Creeper, c.
58. *Parula Americana*, Bp. Blue, Yellow-backed Warbler.
67. *Helminthophaga ruficapilla*, Baird. Nashville Warbler, r.

SYLVICOLIDÆ—AMERICAN WARBLERS.—*Continued.*

70. *Dendrœca æstiva*, Baird. Blue-eyed Yellow Warbler, Golden Warbler, Summer Yellowbird, c.
71. " *virens*, Baird. Black-throated Green Warbler, c.
76. " *cærulescens*, Baird. Black-throated Blue Warbler, c.
78. " *coronata*, Gray. Yellow-rumped Warbler, Yellow-crowned Warbler, Myrtle Bird, c.
80. " *Blackburniæ*, Baird. Blackburnian or Hemlock Warbler, r.
81. " *striata*, Baird. Black-poll Warbler, r.
82. " *castanea*, Baird. Bay-breasted or Autumnal Warbler, c.
83. " *Pennsylvanica*, Baird. Chestnut-sided Warbler, c.
84. " *maculosa*, Baird. Black and Yellow or Magnolia Warbler, c.
90. " *palmarum*, Baird. Yellow Red-poll or Palm Warbler, r.
91. " *pinus*, Baird. Pine or Pine-creeping Warbler, c.
92. *Seiurus aurocapillus*, Swain. Golden-crowned Thrush or Oven-bird, c.
97. *Geothlypis trichas*, Cab. Maryland Yellow-throat, c.
103. *Myiodioctes Canadensis*, Aud. Canadian Flycatcher, c.
104. *Setophaga ruticilla*, Swain. Redstart, c.

TANAGRIDÆ—TANAGERS.

107. *Pyranga rubra*, Vieillot. Scarlet Tanager, c.

HIRUNDINIDÆ—SWALLOWS.

111. *Hirundo horreorum*, Barton. Barn Swallow, c.
112. *Tachycineta bicolor*, Coues. White-bellied Swallow, c.
114. *Petrochelidon lunifrons*, Cab. Cliff or Eave Swallow, c.
115. *Cotyle riparia*, Boie. Bank Swallow, Sand Martin, c.
117. *Progne purpurea*, Boie. Purple Martin, c.

AMPELIDÆ—WAXWINGS, ETC.

118. *Ampelis garrulus*, Linn. Bohemian Waxwing, r. (Transient in latter part of winter.)
119. " *cedrorum*, Baird. Cedar or Cherry bird, c.

VIREONIDÆ—VIREOS OR GREENLETS.

122. *Vireo olivaceus*, Vieillot. Red-eyed Vireo, c.
132. " *pusillus*, Coues. Least Vireo, c.

LANIIDÆ—SHRIKES.

134. *Collurio borealis*, Baird. Great Northern Shrike, Butcher Bird, v. c.

FRINGILLIDÆ—FINCHES, ETC.

137. *Pinicola enucleator*, Vieillot. Pine Grosbeak, c. (First part of winter.)
139. *Carpodacus purpureus*, Gray. Purple Finch.
142. *Loxia leucoptera*, Wilson. White-winged Crossbill, r.
143. " *curvirostra*, L. var *Americana*, Coues. Red or Common Crossbill, c.
146. *Ægiothus linarius*, Cab. Red-poll Linnet, c.
149. *Chrysomitris tristis*, Bp. American Goldfinch or Thistle-bird, c.
152. *Plectrophanes nivalis*, Meyer. Snow Bunting, c. (winter.)
161. *Pooecetes gramineus*, Baird. Bay-winged Bunting, Grass-finch, c.
162. *Coturniculus passerinus*, Bp. Yellow-winged Sparrow, c.
168. *Melospiza palustris*, Baird. Swamp Sparrow, c.
169. " *melodia*, Baird. Song Sparrow, c.
174. *Junco hyemalis*, Sclater. Snow-bird, c.
177. *Spizella monticola*, Baird. Tree Sparrow, c.
178. " *socialis*, Bp. Chipping Sparrow, c.
179. " *pusilla*, Bp. Field Sparrow, c.

FRINGILLIDÆ—FINCHES, ETC.—*Continued.*

182. *Zonotrichia albicollis*, Bp. White-throated Sparrow or Peabody-bird, c.
183. " *lencophrys*, Swain. White-crowned Sparrow, c.
187. *Passer domesticus*, Linn. English Sparrow, c.
193. *Goniaphea Ludoviciana*, Bowditch. Rose-breasted Grosbeak.
199. *Cyanospiza cyanea*, Baird. Indigo Bird.

ICTERIDÆ—AMERICAN STARLINGS.

210. *Dolichonyx oryzivorus*, Swain. Bobolink, c.
211. *Molothrus pecoris*, Swain. Cow-bird, c.
212. *Agelæus phœniceus*, Vieillot. Red-winged Black-bird, c.
214. *Sturnella magna*, Swain. Meadow Lark, c.
216. *Icterus Baltimore*, Dandin. Baltimore Oriole, c.
225. *Quiscalus purpureus*, Licht. Purple Grackle.

CORVIDÆ—CROWS, JAYS, ETC.

226. *Corvus corax*, Linn. Raven.
228. " *Americanus*, Aud. Crow, c.
234. *Cyanurus cristatus*, Swain. Blue Jay, c. (summer and winter resident.)
239. *Perisoreus Canadensis*, Bp. Canada Jay, Whiskey John (summer and winter resident.)

TYRANNIDÆ—FLYCATCHERS.

242. *Tyrannus Carolinensis*, Baird. King-bird, Bee-bird, c.
247. *Myiarchus crinitus*, Cab. Great-crested Flycatcher, r.
252. *Sayornis fuscus*, Baird. Peewee, Peewit, Phœbe, c.
255. *Contopus virens*, Cab. Wood Pewee, r.
258. *Empidonax minimus*, Baird. Least Flycatcher.

ORDER PICARIÆ—PICARIAN BIRDS.

CAPRIMULGIDÆ—GOATSUCKERS.

265. *Antrostomus vociferus*, Bp. Whip-poor-will, c.
267. *Chordeiles Virginianus*, Bp. Night Hawk, c.

CYPSELIDÆ—SWIFTS.

271. *Chætura pelasgia*, Stephens. Chimney Swift, c.

TROCHILIDÆ—HUMMING BIRDS.

275. *Trochilus colubris*, Linn. Ruby-throated Humming-bird, c.

ALCEDINIDÆ—KINGFISHERS.

286. *Ceryle alcyon*, Boie. Belted Kingfisher, c.

CUCULIDÆ—CUCKOOS.

290. *Coccyzus erythrophthalmus*, Baird. Black-billed Cuckoo, c.
291. " *Americanus*, Baird. Yellow-billed Cuckoo, c.

PICIDÆ—WOODPECKERS.

294. *Hylotomus pileatus*, Baird. Pileated Woodpecker, r.
298. *Picus villosus*, Linn. Hairy Woodpecker, c.
299. " *pubescens*, Linn. Downy Woodpecker, c.
300. *Picoides arcticus*, Gray. Black-backed Woodpecker, c. (in winter.)
302. *Sphyrapicus varius*, Baird. Yellow-bellied wookpecker, c.
309. *Melanerpes erythrocephalus*, Swain. Red-headed Woodpecker, c.
312. *Colaptes auratus*, Swain. Golden-winged Woodpecker, High-hole, Flicker, c.

ORDER RAPTORES—BIRDS OF PREY.

STRIGIDÆ—OWLS.

317. *Bubo Virginianus*, Bp. Great-horned Owl, r.
323. *Syrnium nebulosum*, Gray. Barred Owl, c.
325. *Nyctea nivea*, Gray. Snowy Owl, c.
326. *Surnia ulula*, Bp. *var. Hudsonica*, Ridg. Hawk Owl, c.
328. *Nyctale Acadica*, Bp. Acadian or Saw-whet Owl.
329. *Glaucidium passerinum, var, Californicum*, Ridg. Pigmy Owl, r.

FALCONIDÆ—DIURNAL BIRDS OF PREY.

333. *Circus cyaneus*, Lacep. *var. Hudsonius*, Cs. Marsh Harrier, c.
337. *Nauclerus furcatus*, Vigors. Swallow-tailed Kite, r.
338. *Accipiter fuscus*, Bp. Sharp-skinned Hawk, r.
340. *Astur atricapillus*, Bp. Goshawk, r.
346. *Falco sparverius*, Linn. Sparrow Hawk, c.
360. *Pandion haliætus*, Savigny. Osprey, Fish Hawk, c.

ORDER COLUMBÆ—COLUMBINE BIRDS.

COLUMBIDÆ—PIGEONS.

370. *Ectopistes migratorius*, Swain. Wild Pigeon.

SUB-CLASS II.—AVES TERRESTRES OR CURSORES—TERRESTRIAL BIRDS.

ORDER GALLINÆ—GALLINACEOUS BIRDS.

TETRAONIDÆ—GROUSE, ETC.

380. *Tetrao Canadensis*, Linn. Canada Grouse or Spruce Partridge, r. c.
385. *Bonasa umbellus*, Stephens. Ruffed Grouse, Partridge, c.

ORDER GRALLATORES—WADING BIRDS.

CHARADRIIDÆ—PLOVER.

395. *Squatarola Helvetica*, Cuvier. Black-bellied Plover, Whistling Field-plover, c.
396. *Charadrius fulvus*, Gm. *var. Virginicus*, Cs. Golden Plover, c.
397. *Ægialitis vociferus*, Cassin. Kildeer Plover, r.
398. " *Wilsonius*, Cassin. Wilson's Plover, r.
399. " *semipalmatus*, Cab. Semipalmated, Ring or Ring-necked Plover

HÆMATOPODIDÆ—OYSTER-CATCHERS AND TURNSTONES.

406. *Strepsilas interpres*, Ill. Turnstone, Brown Bird, Calico-back, r.

PHALAROPODIDÆ—PHALAROPES.

409. *Steganopus Wilsonii*, Coues. Wilson's Phalarope, r.

SCOLOPACIDÆ—SNIPE, ETC.

412. *Philohela minor*, Gray. American Woodcock, Bog-sucker, c.
414. *Gallinago Wilsonii*, Bp. American or Wilson's Snipe, c.
415. *Macrorhamphus griseus*, Leach. Red-breasted or Grey Snipe, Brown-backed Dowitcher, r.
417. *Ereunetes pusillus*, Cass. Semipalmated Sandpiper, Peep, c.
418. *Tringa minutilla*, Vieillot. Least Sandpiper, Peep, c.

SCOLAPACIDÆ—SNIPE, ETC.—*Continued.*

420. *Tringa maculata*, Vieillot. Pectoral Sandpiper, c.
424. " *Alpina*, Linn. *var. Americana*, Cass. Dunlin, Oxbird, c.
427. *Calidris arenaria*, Ill. Sanderling, Ruddy Plover, c.
429. *Limosa Hudsonica*, Swain. Black-tailed Godwit, c.
432. *Totanus melanoleucus*, Gmelin. Greater Tell-tale, Greater Yellow-shanks, c.
433. " *flavipes*, Gmelin. Lesser Tell-tale, Yellow-shanks, c.
435. " *solitarius*, Wils. Solitary Tattler, c.

ARDEIDÆ—HERONS.

449. *Ardea Herodias*, Linn. Great Blue Heron, c.
458. *Nyctiardea grisea*, Stephens, *var. nævia*, Allen. Night Heron, Qua-bird, c.
460. *Botaurus minor*, Gmelin. Bittern, Indian Hen, c.
461. *Ardetta exilis*, Gray. Least Bittern, r.

RALLIDÆ—RAILS, ETC.

468. *Porzana Carolina*, Vieillot. Carolina or Common Rail, c.
470. " *Jamaicensis*, Cass. Black Rail, c.
474. *Fulica Americana*, Gmelin. Coot, c.

SUB-CLASS III.—AVES AQUATICÆ OR NATATORES—AQUATIC BIRDS SWIMMERS.

ORDER LAMELLIROSTRES, ANSERINE BIRDS.

ANATIDÆ—GEESE, DUCKS, ETC.

485. *Branta Canadensis*, Linn. Canada Goose, c.
488. *Anas boschas*, Linn. Mallard, c.
489. " *obscura*, Gmelin. Dusky Duck, Black Duck, c.
490. *Dafila acuta*, Jenyns. Pintail, Sprigtail, c.
493. *Mareca Americana*, Stephens. American Widgeon, Baldpate, c.
495. *Querquedula Carolinensis*, Gmelin. Green-winged Teal, c.
496. " *discors*, Stephens. Blue-winged Teal, c.
499. *Aix sponsa*, Boie. Summer Duck, Wood Duck, c.
500. *Fuligula marila*, Stephens. Greater Scaup Duck, Raft Duck, c.
501. " *affinis*, Eyton. Lesser Scaup Duck, c.
502. " *collaris*, Bp. Ring-necked Duck, r.
503. " *ferina*, Swain, *var. Americana*, Coues. Redhead, Pochard, c.
504. " *vallisneria*, Stephens. Canvas-back Duck, r.
505. *Bucephala clangula*, Gray. Golden-eyed Duck, Garrot, c.
507. " *albeola*, Baird. Buffalo-headed Duck, Dipper, c.
508. *Harelda glacialis*, Leach. Long-tailed Duck, c.
516. *Œdemia Americana*, Swain. American Black Scoter, c.
517. " *fusca*, Swain. Velvet Scoter, c.
518. " *perspicillata*, Fleming. Surf Duck, r.
519. *Erismatura rubida*, Bp. Ruddy Duck, c.
521. *Mergus merganser*, Linn. Merganser, Goosander, c.
522. " *serrator*, Linn. Red-breasted Merganser, c.
523. " *cucullatus*, Linn. Hooded Merganser, c.

ORDER LONGIPENNES—LONG-WINGED SWIMMERS.

LARIDÆ—GULLS, TERNS, ETC.

547. *Larus argentatus*, Brunn. Herring Gull, Common Gull, c.
554. " *atricilla*, Linn. Laughing or Black-head Gull, r. (only one specimen shot.)
555. " *Franklinii*, Rich. Bonaparte's Gull.

ORDER PYGOPODES—DIVING BIRDS.

COLYMBIDÆ—LOONS.

605. *Colymbus torquatus*, Brunn. Great Northern Diver, Loon, c.

PODICIPIDÆ—GREBES.

608. *Podiceps occidentalis*, Law. Western Grebe r. (a pair shot at the mouth of the North Nation River. Unfortunately the skins cannot now be produced, but there is no doubt as to their identity.)
609. " *cristatus*, Latham. Crested Grebe, c.
611. " *cornutus*, Latham. Horned Grebe, r.
614. *Podilymbus podiceps*, Law. Pied-billed Grebe, Dab-chick, Dipper, c.

From the above List it will be seen that 169 species of birds, belonging to 120 genera and 39 families, have so far been found in the vicinity of the City of Ottawa. Many names, however, will probably be added to the List in ensuing seasons.

SECOND SOIRÉE.

FRIDAY, DECEMBER 9TH, 1881. ON THE GEOLOGY OF THE OTTAWA PALÆOZOIC BASIN. BY ALFRED R. C. SELWYN, LL.D., F.R.S.

Having undertaken to say a few words, this evening, on the Geology of the country around Ottawa, I must preface these by stating that, never having myself more than locally and superficially examined the district, I can do little more than lay before you the results, so far as I understand them, of the investigations of others, and chiefly of those of my predecessor, Sir W. E. Logan, as described in the *Geology of Canada*, and as depicted on the Maps exhibited, and which are further illustrated by the collection now being arranged and exposed in the Geological Museum.

Though the *Geology of Canada* is accessible in a large number of the libraries of the colleges, schools, and public institutions of Canada, it is unfortunately now very difficult to obtain, and a new and enlarged edition is much needed. Whether regarded from an economic or from a scientific standpoint, this great work of Sir W. Logan and his colleagues must be considered a priceless gift to Canadian Geologists. Apart from theoretical deductions relating to structure, some of which will require to be changed or modified to accord with the result of more extended investigation, and our consequent more detailed knowledge of facts, it contains a mass of information, scientific and practical, which, however much future researches may enable us to supplement it, will always remain as a solid foundation on which the superstructure of Canadian geology must be built by

succeeding generations. The geological map of Canada, which illustrates Sir W. Logan's work, is unfortunately even less widely known and distributed. It is rarely to be met with in any public institution, and I doubt whether more than 100 or 150 copies have ever found their way to Canada. Under these circumstances, and as there is not very much to be said in regard to the general palæozoic stratigraphy immediately around Ottawa, it will, perhaps, be more interesting if I attempt this evening to give a brief explanation of the main stratigraphical features of eastern Canada, as shown on the map, and point out some of the questions which seem to require for their final solution more careful and systematic investigation than they have yet received, work which must be done, however, not in the museum but in the field. If my observations are somewhat desultory I must ask you to bear in mind that I am not giving a lecture, but only an informal geological talk, and that I would much prefer not to have all the talk to myself, but to hear any remarks, observations, or suggestions that it may occur to the members of the Club to interpolate. With your permission I propose first to make some remarks on the subject of geological nomenclature, and to explain the sense in which I use certain terms, such as formation, system, series, &c., and also the use I propose to adopt in future for the names *Cambrian* and *Silurian*. The former, though perhaps the older of the two, is scarcely recognized by a large number of American geologists, and its use by the British Geological Survey has been restricted to certain strata, which probably correspond to the base of the Atlantic Coast series of Nova Scotia, and to the lowest of the palæozoic formation of the Ottawa valley. In January, 1836, Sir Roderick Murchison, in a communication to the Geological Society of London, gave an account of the origin of the terms Cambrian and Silurian. In 1836, the term Cambrian included all the formation below what Murchison had called Llandeils (*Calciferous* and *Chazy*), and he and Sedgwick supposed that the rocks of North Wales and south-western South Wales, which the latter was then studying, were older than the Llandeils, and to these the name Cambrian was assigned by Sedgwick; but later much of what had been included in Sedgwick's Cambrian turned out to be really not older than the Llandeils (Silurian of Murchison), and in this way came about the undue extension of the term Silurian, and the equally undue extinction of the term Cambrian. However, so long as we understand what is meant by the names when used the object is served, but it is very perplexing when every geologist uses them in a different sense, according as they are partizans of the one or the other of the eminent authors of the name. I am desirous, therefore, that in Canada at least some definite, and if possible uniform action should be established in this respect and also in the colours and notations of the Geological Survey, and with this object in view I have constructed the Index Chart which you see here, with some brief explanatory notes to accompany it. I propose to leave copies of these for reference by members of the Club, and if there are no very weighty objections against the proposed scheme, I hope it will be adopted in future by Canadian geologists, and I also hope that anyone who has objections to urge will come forward and state them, and in doing so will also be prepared to suggest the way in which the objection can be met and the scheme improved.

In speaking of the Ottawa valley I must not be understood to refer to the whole of the vast region, some 80,000 square miles, drained by the Ottawa and its tributaries, but only to the slightly undulating area, about 6,250 square miles, extending from the longitude of Montreal westward to Calumet, which is bounded on the north by the hills and ridges that form the southern slopes and spurs of the Laurentide Mountains, and on the south by the much more elevated peaks of the Adirondacks in the State of New York. These two hilly regions, entirely composed of ancient crystalline rocks, are connected on the south-west by a low ridge across which the St. Lawrence has found a passage from Lake Erie into the Ottawa valley and which now forms the picturesque scenery of the Thousand Islands. Proceeding eastward, to the vicinity of the Lake of the Two Mountains.

we find they are connected by a similar ridge, but the rocks of which are here only exposed at the surface over a limited extent in the rear of the Indian Reserve at Oka, while the rest of this old ridge is concealed by a covering of flat lying strata of sandstone. Within these limits 125 miles long and about 50 miles wide lies what may be geologically described as the Ottawa Valley Palæozoic Basin.

This basin must, for immense periods of time have been occupied by the water of the ancient lower Palæozoic sea; whether continuously or with intervening periods of dry land is uncertain. Portions of it, however, were certainly, in its earlier stages, either shore lines or shallow tidal flats dry at low water, as evidenced by the tracks of animals and wind ripple marks, all of which you can see fine examples of in the Geological Museum. Slowly and gradually, however, the basin became filled by successive layers of sedimentary matter, pebbles, sand, mud, lime, forming the sandstone, shales and limestones which make up the so called Cambrian or Cambro-Silurian systems and formations.

Almost every layer of these ancient rocks is to the industrious geologist, aided by pick and hammer, as it were the pages of a voluminous work in which he can study and decipher the history, life habits, and surroundings of successive generations of animals and plants, similar though in no case identical with those which now inhabit our seas and continents.

The portions of this voluminous old manuscript which are presented for our perusal and study in the Ottawa Valley may be designated:

Vol. C.—Chapter 1 and 2.
Vol. D.—Chapter 1, 2, and 3,

otherwise known as:

C.—Cambrian System—Potsdam and Calciferous Formations.
D.—Cambro-Silurian System—Chazy: Black River; Trenton: Utica and Hudson River Formations.

The seven volumes from E to L inclusive, in which are written the records of millions of centuries, and of many generations of animals and plants, appear never to have been placed in the Ottawa Valley library, or else they have since been lost, stolen, or destroyed. Vol. M. the last of the series, is, however, to be found there in excellent preservation and offers many interesting and instructive pages, though its widespread occupation of the shelves often proves a serious hindrance to the study of the earlier volumes, and makes one wish it had shared the fate of the seven missing volumes referred to.

The names given to the formation are all taken from the localities in the State of New York where they were first studied by American geologists, and the names have been adopted by Sir W. Logan for Canada, with the addition, however, of three new and purely Canadian names, Levis, Lauzon, and Sillery, making what he has called the Quebec Group, at the same time stating that it represented the Calciferous and Chazy formations. Each of the formations I have named and which have together filled in the Ottawa basin to a depth in some parts of perhaps 1,500 or 2,000 feet, is supposed to be characterised by a peculiar and distinctive assemblage of life form, and the discovery of any of the individual species of these groups in an outcrop is sometimes held to be sufficient evidence for determining the formation to which the outcrop belongs. Such evidence is doubtless an invaluable aid to stratigraphy, but we must bear in mind that it is at best negative evidence, and it may be that some fossil which we have for a long time considered to be characteristic of a peculiar formation may suddenly be discovered in the strata either much higher or much lower in the series, and more especially is this likely to occur in new and only imperfectly examined regions. Too much reliance on imperfect palæontological evidence has, I think, led to many grave errors and complications in Canadian stratigraphy, and to needless multiplication of formations and groups, the introduction of which tends to complicate stratigraphical work. Often such formations represent only

the locally varying character and conditions of deposition, and the consequent local differences in the life grouping within the areas in which the strata, notwithstanding their often great lithological diversity, were simultaneously laid down either along shore lines or in the bordering deeper waters. A formation which in one area is a limestone, in another not far removed, may be entirely formed of sand, or clay, or pebbles, and as a consequence, or from being a shallow or a deep water formation, contain an almost entirely different assemblage of fossils, and thus neither palæontology nor mineralogy, nor lithology, without careful and accurate stratigraphical work, will serve to determine the relative age of formations. All these local changes should, however, be carefully observed and noted, as they are often both practically and scientifically important, but they must be very cautiously used in the determination of the age of formations. Many amateur geologists go into the field, collect a number of specimens of the rock and fossils, some of them perhaps loose, and then on the evidence these afford attempt to determine the geological structure of the region examined. Dips and strikes are not recorded on a map, overlaps are mistaken for unconformity, and faults or folds causing repetition of strata are not observed, and thicknesses in consequence often greatly over-estimated. Again, not unfrequently theories are formed and facts carefully sought to support these, while the plain meaning of others adverse to the theories are either ignored or supposed to mean the very reverse of what they indicate. Though in a general way the structure of the Ottawa valley is pretty well known, there are many palæontological and structural details which remain to be worked out, and which offer in a comparatively limited and easily accessible area a highly interesting field of investigation, and it is to be regretted that the most essential requisite for the accomplishment of this work, viz., an accurate map on a sufficiently large scale, does not exist.

One most interesting question is that of overlap or unconformity, and which of these has produced the distribution of the formations as now observed in the Ottawa Valley. Overlap is frequently met with along the margin of formations deposited in tracts which were undergoing gradual submersion. As the land sank successive zones would be submerged, and the later deposits on the sea bed would be prolonged further and further beyond the limits of the earlier ones. This appears to have been the case in the Ottawa valley. But further careful investigation is required to enable us to determine how far the relation of the several formations from the Potsdam to the Hudson River are the result of faulting, of unconformity, or of overlap. Several considerable faults have already been indicated by Sir W. Logan. In an overlap the strata are parts of one continuous unbroken series the formation of which does not appear to have been interrupted by any great physical disturbance, only a quiet and equal subsidence of the land. But where the accumulation of a set of beds or strata has been succeeded by its elevation, exposure, and denudation, the next group of rocks laid down are said to lie unconformably on it. Now, in cases where the older rocks have been equally upraised and again after having been exposed to denudation, have been equally depressed, without being folded or tilted, and a newer set of rocks deposited on them, it is often exceedingly difficult to distinguish between this kind of unconformity and an overlap.

An unconformity is of the highest importance in the geological structure of a district, because it marks one of the greatest gaps or intervals in its history, and the observer should therefore spare no pains in collecting all available evidence of the existence of such a structure. Sir W. Logan says (in 1863) the Lower Silurian of Canada may be separated on palæontological grounds into two districts—an upper and a lower, or, as I propose to call them, a Cambrian and a Cambro-Silurian, and he puts the line or break at the base of the Black River—and, mark, not apparently on stratigraphical grounds, but on palæontological evidence, which was then imperfect. Stratigraphically there is no apparent unconformity between the Chazy and Black River, or between it and the Trenton. Later (in 1866) Mr. Billings says,

but still reasoning entirely on palæontological evidence, "the Lower Silurian of America can be divided into two principal groups, one above the break at the base of the Chazy, and the other below. The former includes the Chazy, Black River, Trenton, Utica, and Hudson River formations. The lower comprises a series of formation which are only now begining to become known." Further, Mr. Billings says: "From the top of the Hudson River down to the base of the Black River limestone there is no break, but all is occupied by a single immense, highly characteristic and compact fauna. The lower, middle, and upper portions of this series or group, as I should call it, may be easily recognized by species peculiar to each, but the abundant and dominant forms are found throughout."

Between the Black River and Chazy there is a gap. These two formations are connected by about twenty-three (23) species. Now, as there are, according to Billings, only two species common to the Chazy and the Calciferous, therefore, on palæontological grounds, the break must be placed at the base of the Chazy. As I have already said, there is no stratigraphical break at the base of the Black River. What the structure indicates as between the Chazy and the Calciferous I am not prepared to say as I have never examined the junction line of these two formations. One of these lines appears to run from Grenville on the Ottawa in an irregular line to Coteau Landing on the St. Lawrence, and another from Gloucester and Metcalfe south of Ottawa to the vicinity of Edwardsburgh on the St. Lawrence, but apparently much uncertainty exists as to the precise nature of the junction of these two formations, and it would be both interesting and useful to have the two indicated boundaries carefully traced out and studied.

In my investigation of Canadian geology it has seemed to me most unfortunate that such a stratigraphical expert and careful observer as Sir W. Logan most undoubtedly was should have allowed his work to be so much influenced by chemico-mineralogical theories and imperfect palæontological evidence. Had he firmly held to the maxim of my old friend and colleague, J. Beete Jukes, late Director of the Irish Geological Survey, to the effect, as he expressed it, that if "the fossils did'nt agree with the rocks so much the worse for the fossils," he would probably have made no mistakes in the interpretation of the structure and the affinities either of the palæozoic rocks of Lake Superior or of the Quebec group, which latter, as it now stands depicted on the map, most certainly includes, not only parts of the whole of the Cambro-Silurian and Cambrian formations as developed in Eastern Canada, but also a very large area of strata which cannot be otherwise regarded than as of pre-Cambrian or Archæan Age, probably Huronian. I have roughly sketched out on this map the main structural features of the Quebec group region, but much laborious and careful work in the field is still needed before the probable limits and distribution of the several formations of the Cambrian and Cambro-Silurian systems can be laid down here as they have been on the north-west side of the St. Lawrence valley. This region, however, extending from the Vermont boundary to Gaspe, offers an inexhaustible field of study in all the most intricate problems of dynamical and of stratigraphical geology, and I hope some of our young geologist will, to use an expressive Americanism, "go for it." Another very interesting question is to be found in the determination of the limits of the ancient palæozoic sea, in which the deposits of the Ottawa valley were formed, and to what extent subsequent denudation has removed the records of its existence over the Laurentian high lands to the north of us. We already know of quite a number of small and now isolated patches or outliers. Lake St. John, Lake Abittibe, and the Allumette Islands, fifty miles up the Ottawa, and there may be a great many more in his great northern unexplored region. These should be carefully sought for, and we may yet find evidence to show that the now widely separated palæozoic basins of Winnipeg, Hudson Bay, and the St. Lawrence were once connected across the Laurentian Axis. At any rate, in theorising on these intricate questions we must constantly bear in mind the unstable nature of what we call the earth's

crust, and in studying the results of *formation* and *deposition*, we must not ignore or forget the equally potent agencies of *denudation* and *destruction* without which latter the former could have no existence. These marvellous changes which the solid crust of our planet has undergone are graphically described in Tennyson's lines :

> "There rolls the deep where grew the tree;
> O Earth, what changes hast thou seen!
> There, where the long street roars, hath been
> The silence of the central sea.
>
> The hills are shadows, and they flow
> From form to form, and nothing stands,
> They melt like mist, the solid lands
> Like clouds they shape themselves and go."

The Secretary read a communication from Mr. H. M. Ami, entitled : "Notes on an exposure of the Potsdam Formation at Buckingham Basin, Lièvre River, Quebec," of which the following is a brief abstract :

After referring to the paucity of exposures of the Potsdam in this neighbourhood the paper described an outcrop occurring about one mile from the mouth of the Lièvre River, and consisting of a series of strata with a S. E. dip and a N. E. and S. W. strike, the angle of the dip being about 15°. The rock is a finely grained, or coarse sandstone or quartzite ; many of the strata containing small rounded pebbles of quartz, especially abundant at the divisional planes. Some of the strata are of considerable thickness and may be valuable as building stone ; the remainder are thin and disintegrate rapidly. They vary in colour from white to chocolate and blood-red. The total thickness of the section is estimated at about 44 feet, but of this only about 29 feet are visible, the remainder being below the water line. The series rests upon a bed of very coarse quartzite conglomerate, constituted of large smooth pebbles embedded in a matrix of *detritus* from the adjoining Laurentian rocks. There is little or no evidence of the presence of organic remains in these strata, except small cavities on the surface planes which are supposed to have sheltered sponge-like organisms. Even *scolithes*, so common in the Potsdam, was not found here. The surface of the exposure shows striæ, resembling those made by glaciers, having a S. by W. or S. S. W. direction, and ripple marks also occur in some places.

THIRD SOIRÉE.

FRIDAY, JANUARY 13, 1882.—FILTERINGS FROM THE WATER SUPPLY OF THE CITY OF OTTAWA. REV. A. F. KEMP, LL.D.

The water supply of cities and towns has everywhere become of the greatest importance to the public health. Water is not only a necessity of life, in its pure and simple state, but it may become the subtle medium of disease and death. It is a chemical solvent of many pernicious things, and even when most translucent may contain innumerable microscopic forms and germs of plants and animals that may become the virus of the most fatal diseases. It is well known that zymotic diseases are due in a great measure to the impurities in water, and that they become epidemic through water more than in any other

way. The supply of pure water for public uses is thus a matter of first importance to every community.

It is now certain that wells, no matter how constructed and whether in city, town or country, cannot be depended on for purity. Surface drainage will, more or less, find its way into them and the more numerous the houses the more certain they are to be polluted. Hence the propriety of closing by law city and town wells and of obtaining by public works water of the maximum purity from large rivers or lakes. Where this has been done the public health has been promoted and the death rate diminished.

The purity of water may easily be determined by chemical analysis in so far as it depends on chemical elements, but something more than this is necessary to ascertain the precise character of its solid contents in which hurtful ingredients, may lurk. This is the work of the Naturalist, and until he has subjected these to minute examination we cannot be certain as to the character of our water supply. The water of the Ottawa River, from which this City obtains its supply, has been carefully analysed by the public Analyst, and his report, we are happy to know, so far as chemistry can determine, is very satisfactory. He informs us that it has a slight yellow colour and peaty odour, contains no Calcium or Chlorides or Phosphoric acid or Nitrates or Hydrates, a little Ammonia, only three and a half grains in the gallon of solids in solution and four and a half grains of solids in suspension with a fraction of Microcisms. Altogether we have an exceptionally good water, which ranks superior to what, in England, is reckoned as first class.

What we further want is a more particular knowledge of the solids in suspension and of the Microcisms. They amount, in the six samples examined, to about 4½ grains to the gallon of 70,000 grains; a small proportionate amount certainly and might be thought scarcely worth notice. But when we consider that most people use half a gallon of water every 24 hours and some a great deal more, it is obvious that the amount of its solid contents which we receive from day to day amounts to something, especially when we know that they may have great potency as deleterious germs. It may therefore be important to discover their precise character. This can only be done by the aid of the microscope, as, for the most part, they are quite invisible to the naked eye.

The simplest way to obtain this material is by attaching a bag of ordinary cotton cloth to the water tap and allowing the water to run freely through it for a few hours. The cloth is then washed in a conical glass and the solid matters allowed to settle. A great part of the water is then poured off leaving only sufficient for moisture. The material can then be easily transferred to strips of glass and covered for inspection. These filterings require to be frequently gathered, more particularly in spring and summer. Winter filterings contain few living forms and are chiefly remarkable for fragments of rotted leaves and frustules of diatoms. It was late in the summer before I began to take filterings; the best time was consequently past, and I suspect I have only secured a fraction of what might be got. On the whole I have noted about 140 forms of animals and vegetables, some being very abundant and some rare. The animals belong to the sub-kingdoms of the Articulata and Protozoa. My largest catch was a Hirudo medicinalis, or common leech, about 1½ inches long. Of the family of the Brachionæa there are three species, and curious creatures they are. They have a lorica like a turtle with horns and forked feet, a single rudimentary eye, and a kind of nervous system; also teeth, and a mouth with long ciliæ or bristles which when in rapid motion have the appearance of a wheel. They are male and female, have one kind of egg for the male and another for the female, and a third or resting spore for the winter.

Of Rotifers I found five different species. Eugena viridis were abundant with crowds of minute vibratile spores doubtless of both plants and animals, but impossible to determine. Specially to be noted were the numerous and beautiful silicious spicules of the Spongidæ, which I reckon to belong to three distinct

species. These curious animals are very abundant in the quiet bays of the Ottawa, especially where there are decayed logs or wood of any kind. They are neither pleasant to smell nor taste and are accused of giving the Croton water of Boston a peculiar cucumber flavour. Happily so far as we know they are not poisonous, although they readily become putrid; but as there is so much flow in our river its water is not likely to be affected either with their odour or taste. They are wonderful creatures; their development from the spore to the perfect form and the formation of their curious spicules are among the mysteries of nature. They constitute a colony of what is called flagellato-ciliated monads.

Passing now to the vegetable kingdom, the sub-kingdom of the Algæ and the family of the Diatomaceæ demands the first attention. These remarkable and beautiful forms lie on the borders of the two kingdoms animal and vegetable. They float free and have no roots; most of them are solitary but many are social. I have found fifty different species and suppose that three times fifty might easily be obtained. Most of them I have been able to identify and they comprise species of over twenty genera, none of them uncommon, but the individuals of some are very numerous.

The beautiful bright green Desmidiaceæ were also numerous; Cosmarium and Pediastrum, occurring in their various brilliant forms, most of which I have been able to identify.

Of the Algæ proper I have noted about 50 species of the globular and filamentous kinds, Oscettariæ, Confervæ and Conjugatæ being very abundant. The smaller species of this order that border on the fungus tribe and can scarcely be distinguished from them are not wanting, such as Bacteria, Bacillus and Vibrios, the species of which are doubtful and indeterminate. They are however the *mauvais sujets* of the Kingdom, accused of poisoning our blood, infecting us with deadly diseases, acidulating our milk, converting cider and wine into vinegar, sweet must into bad whiskey, and with moisture hastening the destruction of all animal and vegetable tissues. The living sporules of these useful and pernicious plants swim in our waters, infest our teeth, grow like a forest in our throats, and like invisible agents of the wicked one play on us fantastic tricks.

Finally I have found fragments of all sorts of leaves mashed into indistinguishable pulp, and frequently covered with parasitic algæ; also quantities of silicious dust and some fragments of marble, with some fantastic things for which I have no name.

What effect these things have on the salubrity of our water it is hard to say. That they are impurities that it would be better without, is certain. Many of them are not in themselves hurtful, only they might afford favourable conditions for the development of hurtful things. They make it manifest however that water, even in its best obtainable form, is an agent by which invisible and even indiscoverable germs of potent poisons may be transmitted from place to place and from great distances, to the detriment of human life. The Naturalist who traffics among these atoms of life can say with a warning voice that he finds the most favourable conditions for their existence and increase in waters polluted more or less by sewage, and putrid animal and vegetable matters. If citizens and statesmen will listen to the voice of Science, they will do their utmost to prevent the pollution of the sources of our water supply. Cities, towns and villages, and even farms on the banks of great rivers and lakes, should, under pains and penalties, be prevented from draining sewage into them. The immense quantity of sawdust and chips that are thrown into the Ottawa, along a great part of its course, are undoubted sources of pollution, and furnish favourable conditions for the development of various ferments. How to keep sewage and waste out of our rivers is a puzzling problem. It is taxing the wits of the best men in England, and it will puzzle us too. We may be awakened to the necessity of it when it is too late. The maximum purity of our water will not save us from the injurious effects of the living things that infest it.

LIST OF FINDINGS.

ARTICULATA.

Hirudinea.

Hirudo Medicinalis, a common Leech.

Phytozoa and Protozoa.

Euglenia viridis.
Vorticella microstoma.
" rotatoria.
Nassula elegans.
Brachionus militaris.
" dorcas.
" urceolaris.
Scaridium longicauda.
Cyctoglena lupus.
Euchlanis triquetra.
Rotifer vulgaris.

CRYPTOGAMIC VEGETATION—ALGÆ.

Desmidiaceæ.

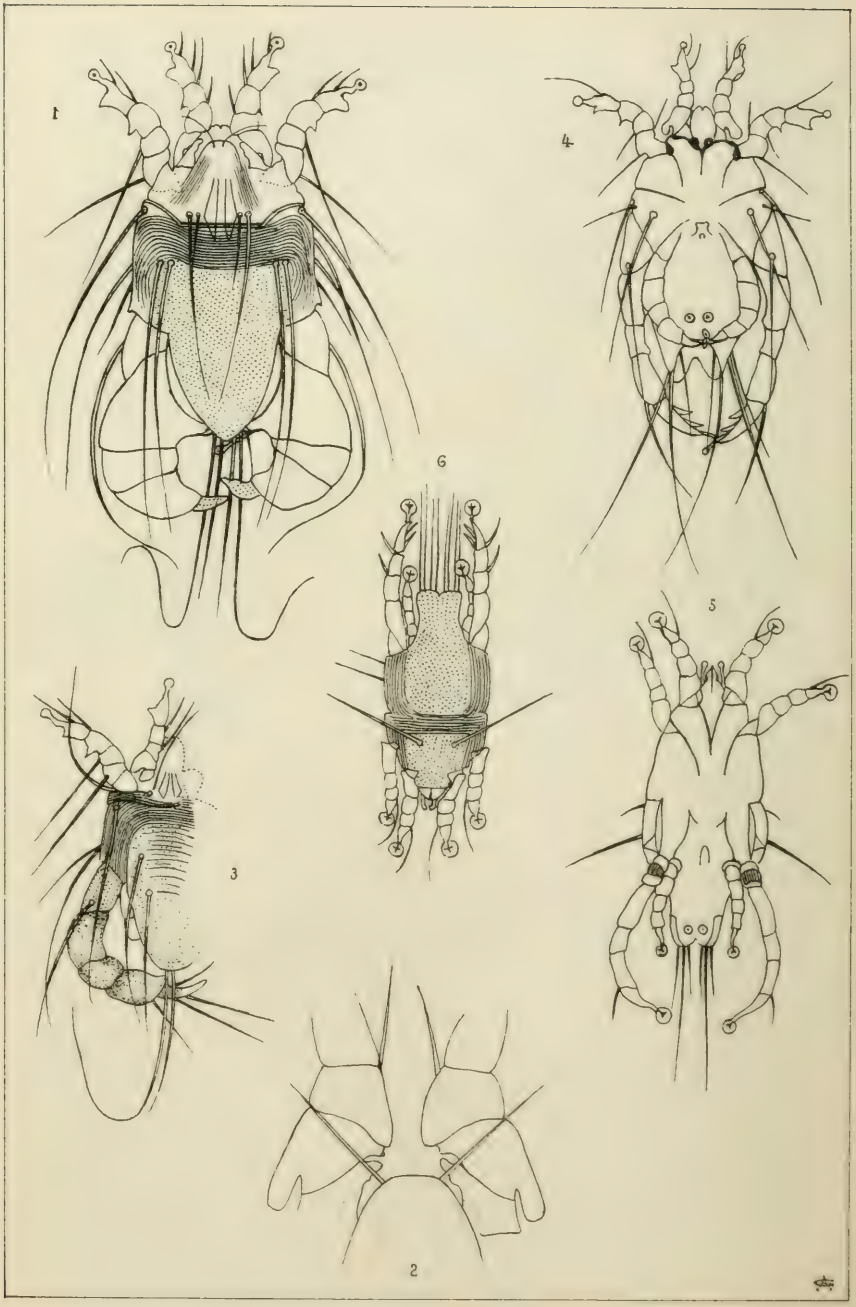
Desmidium Swartzii.
Cosmarium parvulum.
" cucumis.
Closterium rostratum.
Pediastrum tetras.
" rotula.
" selenæa.
" boryanum.
" Ehrenbergii.

Diatomaceæ.

Epithemia sorex.
" turgida.
" gibba.
" granulata.
Cymbella cuspidata.
" gastroides.
Amphora costata.
Cocconeis Placentula.
Cyclotella Rotula.
" operculata.

Diatomaceæ.—Continued.

Surirella ovata.
Tryblionella angustata.
Nitzschia linearis.
" tenuis.
Amphipleura pellucida.
Navicula cuspidata.
" serians.
" ambigua.
Pinnularia major.
Synedra ulna.
" radians.
" acicularis.
" obtusa.
Gomphonema constrictum.
" acuminatum.
" apiculatum.
Odontidium tabellaria.
" mutabile.
" Harrisonii.
Fragillaria capucina.
" mutabilis.
" undata.
" virescens.
Achnomthidium coarctatum.
" lanceolatum.
Striatella unipunctata.
Tetracyclus lacustris.
Diatoma vulgare.
" hyalinum.
" granda.
" elongata.
Tabellaria flocculosa.
" fenestra.
Melosira ovichalcea.
" sulcata.
Orthosira punctata.
Asterionella formosa.
Stephanodiscus ægypticus.
Raphanus rhombus.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FOURTH SOIRÉE.

FRIDAY FEBRUARY 10, 1882.—HOUSE-FLIES—W. H. HARRINGTON.

A Paper descriptive of the appearance and habits of the Common House-fly (Musca domestica), in its various stages.

ON SOME CANADIAN ECTOPARASITIC SARCOPTIDÆ—J. B. TYRRELL, B.A.

The species described in the following paper were collected by my brother' Mr. H. E. Tyrrell, and myself, from some of our common Canadian birds.

M.M. Ch. Robin and Meguin give the following general characters for the Sarcoptidæ :*

"Animals greyish or reddish, very small (varying in length from one-tenth of a millimetre to about a millimetre), body soft, without a dorsal shield, and without eyes or respiratory stigmata ; with a rostrum provided with very small unarmed jaws, carrying lateral, often large maxillary palps with three joints, furnished with from one to three hairs, joined along a part of the inner border to a membranous lip, which is shorter than the mandibles and carries two hairs on its lower surface, and a lance-like little tongue on its upper. The five-jointed feet arranged in two groups of two pairs each, placed, the one near the head, the other after a considerable intervening space near the abdomen, the tarsus terminated by a cup-like cushion furnished with claws, or by a sucker with or without a claw, at least on the anterior feet, and these (suckers) may be pedicelled or not, though they are wanting in the adult females of some species."

The family above described includes among others the ectoparasitic forms of which we are treating. They were originally included by Koch in his genus Dermaleichus, which now, however, ranks as a sub-family, including some ten or twelve genera within its bounds.

We might here run over shortly the structure of the animals belonging to this group.

The general outline of the body is oval or oblong, more or less elongated, with the rostrum projecting from the anterior end. This latter, as has been lately shown by Dr. G. Haller † is composed of the following parts : an epistome, which is simply a prolongation of the skin of the dorsal surface stretching forward and bending downwards on each side, thus covering the other mouth-parts above and on the sides. Beneath this are situated the triangular unarmed mandibles, which project a little beyond the front of the epistome. Under, and stretching behind the mandibles into the body cavity, are seen the first pair of maxillæ, bearing on their outer and upper side the three jointed palps. The rudimentary second pair of maxillæ lie under the first, and under them lies the lower lip, sometimes considerably extended. The alimentary canal commencing at the mouth runs backwards for a short distance, then dilates into quite a wide stomach, again contracts and runs backwards as a rather narrow tube to open by an anus at the posterior end of the body. Salivary glands are situated on each side of the œsophagus and open by ducts into the front of the gullet between the mandibles. Dr. Haller considers that some of the cells of the stomach serve the purpose of a liver, but otherwise no distinct liver has been detected. The nervous system consists of a ganglion situated above the œsophagus, but up to the present I have not been able to make out any nerves coming from it, though no doubt such exist.

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* *Journal de l'Anat*, 1877, *p.* 213.
† Zeit. fir Wissen. Zool., Band xxxvi.

The male sexual organs consist of a pair of testicles lying in the body between the insertion of the fourth pair of extremities; from these proceed vasa deferentia, which carry the spermatozoa to a vesicula seminalis, situated between the testicles; beneath this lies the genital plain, bounded in front, as a rule, by a strong curved band of chitin and bearing a penis, which may be long or short, and either soft or chitinous. As accessory reproductive organs may be mentioned the copulatory suckers on the ventral surface of the abdomen, and in some genera the enlarged third extremities, which are then used as claspers.

The female sexual organs consist of a post-anal opening leading by a tube into a receptaculum seminis which opens into the anterior end of the oviduct. The ovaries are two irregular masses lying near the posterior end of the body, and opening at their anterior end immediately into the wide oviduct, which is very often seen to contain a relatively large egg. The oviduct opens between or in front of the insertion of the third pair of extremities by a longitudinal slit which is protected by a thin chitinous plate on each side, and in front by a dark brown chitinous bow called the shemit or lyra.

The surface of the body is covered with a thin chitinous cuticle which on the belly and sides and across the middle of the cephalo-thorax is marked with fine folds like those seen on the palm of the hand. The back in adult specimens, in some species, with the exception of the part above mentioned, is covered by two slightly darker, finely granular plates, one over the anterior portion and jaws, the other over the abdomen and hinder part of the cephalo-thorax. The epimera, as the dark brown bands of chitin are called which run in from the insertion of the feet and support them, constitute the whole skeleton. Chitinous hairs and bristles are scattered regularly over the body, being disposed as anterior and posterior dorsals, laterals, and anals, together with others on the body and extremities. As they appear to be of definite number, size, and position, in the different forms they are of great importance in defining the species. The extremities are in two pairs on each side, the anterior being situated on the anterior end of the body, and alike in males and females. The third and fourth pair, on the contrary, are situated rather far back, and usually different in the two sexes. In some of the genera the third pair of extremities is greatly enlarged, forming large claspers, and they are then no longer used for locomotion but only in copulation.

The different stages of growth are as follows: First the egg, about twice as long as thick, and rounded at each end. Second, the hexapod larva, and, as shown by M.M. Robin and Meguin,* it is, curiously enough, the third and not the fourth pair of legs which has not yet appeared. Third, after the larval state these little animals acquire the possession of eight legs, but otherwise are much the same as before, no sexual organs up to this time being developed. This condition has been called the nymph stage. Fourth, after the next moult the males assume their mature form; the females have to pass through another stage before they come to sexual maturity. In this stage they are a little larger than the nymphs, but otherwise differ very slightly from them. Fifth, In females the complete sexual development, an egg being usually seen to be present in the oviduct. It is only in the mature stages that the plate on the dorsal surface of the abdomen is present in those species which possess it; in the earlier stages it is always absent.

Habitat.—They live among the feathers of most of our birds, being found on the wings in living and recently killed specimens, but on birds that have become stiff and cold generally close to the body, where they may sometimes be found for four or five days after death.

ANALGES, Nitzsch, 1819.

General form of the body very different in the two sexes, the third pair of extremities being greatly enlarged and terminated by strong claws. The fourth

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* *Journal de l'Anat et de la Physiol.*, 1877, *p.* 233.

extremity is comparatively small and inserted towards the median line from the third. The first pair has a strong olecranon process on the postero lateral angle of the second joint, and this may or may not be present on the corresponding joint of the second pair of legs ; also, strong thorn-like spines project from the outer side of the fourth and fifth joints of these two pairs of legs. The abdomen, which in males is much narrower than the cephalo-thorax, has its posterior border simply rounded.

Analges passerinus, De Geer. This species has been found on Dolichonyx oryzivorus, Junco hyemalis, Spizella socialis, and Sayornis fuscus.

Analges fringillarum, Koch., has been found on Goniaphia ludoviciana, and Empidonax flaviventris.

Analges tridentulatus, Haller., on the Horned Lark, Eremophila alpestris.

Analges digitatus, Haller, on Dendrœca striata and Sitta Carolinensis.

ANALGES LONGISPINOSUS, n. sp.

Figs. 1 & 2, Plate I.

Male.—The general shape of the body is long ovate, with the obtuse end turned towards the front. A chitinous band runs across the back almost immediately behind the second pair of legs. The side of the body between the insertions of the second and third pairs somewhat longer than the width of the abdomen, the length of which is considerably less than the distance from the base of the rostrum to the insertion of the third pair of extremities.

On the first extremity, on the second joint, the olecranon process is largely developed, and the anterior angle of the inner side projects forwards and inwards, meeting the downwardly projecting posterior angle of the fourth joint, and forming with it a nipper-like organ as shown in fig. 2. On the second extremity it is scarcely noticeable. The external process on the fourth joint in both is small and directed backwards, but on the fifth it is quite large and strong. The enormous third extremities, however, are what first attract the attention. The first joint or haunch is large and separated by an oblique line of junction from the second, which is very large, bearing on its inner side a long curved blunt process which forms with the fifth joint a powerful nipper. The last joint or tarsus is small and bears on the inner side at its base a little blunt tooth which runs out into a fine hair.

The fourth extremities are inserted on the ventral surface towards the centre line from the point of attachment of the third, and lie in a longitudinally striated groove under the border of the abdomen, reaching considerably beyond its posterior end when stretched out to their full extent.

The bristles are mostly long and stout. The anterior laterals are a little distance behind the insertion of the second pair of legs, with the anterior dorsals towards the middle line from them, two in number, one on each side, the inner one being very small. The posterior dorsals are large, two on each side, with the posterior laterals near them on the edge of the body. End bristles three in number on each side, the centre one being much the largest. Length of body ·45 mm., breadth ·26 mm.

The female is considerably larger than the male, the relation of the length to the breadth being about 12 to 5. The posterior pairs of extremities are small and situated about the middle of the lateral surface of the body.

This species is closely allied to *A. Nitzschii*, Haller. It is found in considerable numbers on the Snow Bunting—Plectrophanes nivalis.

ANALGES TYRRANNI, n. sp.

Fig. 3. Pl. I.

Male.—General shape more or less obovate, with a length of ·32 mm. and a breadth of ·19 mm. ; abdomen a little longer than the side of the cephalo-thorax,

and about two-thirds as long as its width. The chitinous band across the back bends round at the sides, and on the belly runs backwards and inwards, reaching down almost to the sexual opening, which has a peculiar guard formed by the sternite or chitinous bow in front of the sexual plate, joining at both ends with the epimera of the fourth pair of extremities. The epimera of the first pair join in a point behind the rostrum.

The first pair of extremities has the olecranon process on the second joint large, the spine on the fourth aborted, that on the fifth well developed. On the second extremity the olecranon is absent, the spines on the fourth and fifth joints strong. The first joint is something the shape of an equilateral triangle, an angle barely reaching the outer side of the leg. The third extremity is long, with the first four joints of about equal width, the fourth being, perhaps, slightly the widest; the fifth is small but bears a long curved claw. The finger-like process present in the closely allied species A. *digitatus* is here absent. The fourth pair of extremities long, stretching when extended considerably beyond the posterior end of the abdomen.

The position of the two long posterior dorsal bristles is peculiar. Instead of arising close beside each other, as in most species, they are inserted one behind the other, about ·06 mm. apart, the hinder one being a little nearer the middle line of the body than the other and immediately between the points of insertion of the fourth pair of extremities. The posterior bristles are present three in number on each side, the two inner ones on each side being rather long.

Female.—Larger than the male, being ·38 mm. long and ·17 broad. It can easily be distinguished by the strong olecranon process on the first extremity and by the eight comparatively strong bristles on the dorsal surface. It is found on the King bird—Tyrannus Carolinensis.

DIMORPHUS, Haller, 1878.

"Third pair of feet enlarged, always without claws, but with sucking disks; the first two pairs but seldom with olecranon process, always with more or less projecting spiny processes. Abdomen with the posterior end always deeply indented."

Dimorphus aculeatus, Haller. This species was found on the Bluejay—Cyanurus cristatus.

Dimorphus Tyrellii, Haller., was found on the Catbird—Mimus Carolinensis.

Dimorphus gladiator, Haller., was found on our common wild pigeon—Ectopistes migratorius.

Dimorphus forcipatus, Haller., was found on the spotted sandpiper—Tringoides macularius, and on the white-rumped sandpiper—Tringa Bonapartei.

Dimorphus pici majoris, Buchholz, was found on the Big Sapsucker—Picus villosus.

DIMORPHUS ALBIDUS, n. sp.

Fig. 4. Pl. I.

Male.—General shape of the body somewhat oval with a length of ·38 mm., and a breadth of ·19 mm. The abdomen about as long as the breadth of the body, and about three times as long as the distance between the second and third extremities. The epimera are long and strongly coloured, those of the first pair of extremities joining very near the front and running back in a long point; between the fourth pair the inconspicuous sexual opening is situated. The copulatory suckers are situated a little more than half way back on the abdomen, which is rather deeply indented, the hindermost part appearing as a clear film. On each side are five bristles, the second and third from the middle being much the largest.

On the first pair of extremities the olecranon process on the second joint is long and stout. The spine on the fourth joint is small, that on the fifth large. The third extremity is long and rather slender, the first joint being the broadest and armed about the middle of the under side with a long fine hair. The postero-lateral angle of the fourth joint is extended into a long strong bristle and another though somewhat weaker one arises from about the middle of the inner side of the same joint. The fifth joint is slightly longer than the fourth, bending inwards and tapering to a point which bears a sucking disk. On its inner side are present two blade-like bristles, one behind the other, very much as in *D. gladiator*, but on the short fourth extremity the blunt knobs or teeth so conspicuous in the latter species are here absent.

The female is about as large as the male, being ·39 mm. long and ·17 mm. broad. Its shape is somewhat oblong oval, the anterior part of the body being much the same as in the male.

It is found on the White-breasted Swallow—Tachycineta bicolor.

PTERONYSSUS, Ch. Robin, 1877.

Body elongated; sides straight with a marked indentation between the second and third pairs of feet. A little way in front of the third extremity, a long lateral hair takes its origin, with a short bristle just behind it.

The anterior pairs of feet are without either olecranon process or spines. The third pair in males is enlarged, and the abdomen is small and only slightly indented at its posterior end. In the females also, as in the two genera already mentioned, the abdomen is undivided, and is without appendages other than hairs.

Pteronyssus simplex, Haller, is found on the Red-headed Woodpecker—Melanerpes erythrocephalus.

PTERONYSSUS SPECIOSUS, n. sp.

Fig. 5, Pl. I.

Male.—The general shape is that of a long oval with the dark brown chitinous epimera standing out in strong relief on the light coloured body, those of the first pair of legs meeting some distance behind the rostrum at an acute angle. The body is about ·54 mm. long and ·22 mm. broad. The abdomen is short, about ·12 mm. long, which is about half as long as the side of the body between the second and third pairs of legs.

On each side, running from the notch on the side of the cephalo-thorax to the insertion of the third extremity are two strong dark brown bands of chitin, the outer one bearing about the middle of its length a small dagger-shaped bristle; laterally from this again a fine, rather long, hair takes its origin.

The posterior end of the abdomen is in the shape of two small semi-circles meeting in the middle line, and each bearing three bristles, the middle one on each side being about half as long as the body. The copulatory arches are situated close to the posterior end.

The first extremity is situated on the anterior end of the body close beside the rostrum, and is slightly stouter than the second, which is inserted toward the side from, and about ·03 mm. behind, it. The third is long, with the first four joints of about equal thickness; and the fifth conical, with the sucking disk attached slightly outwards from its point. The fourth extremity is about half as long as the third and inserted immediately toward the middle line from it. All are provided with very large sucking disks.

The female is of a very regular long-oval shape slightly truncated at the posterior end, and of about the same size as the male, but with the third and fourth extremities of nearly equal size and inserted about ·09 mm. apart.

Lyra situated just behind the line joining the notches on the sides of the cephalo-thorax, large and of a more or less square form.

This species is closely allied to *Pt. oblongus*, Buchholz. It is found, along with other forms, on the Big Sap-sucker—Picus villosus.

PTERONYSSUS FUSCUS, n. sp.

FIG. 6, PL. E.

Male.—The body is of a somewhat rectangular shape, contracted at the insertion of the third pair of extremities, so that the abdomen is only about half the breadth of the thorax. The total length is about ·38 mm, breadth ·19 mm., length of abdomen ·11 mm., distance between the second and third pairs of feet ·15 mm.

The two anterior pairs of extremities are rather slender and of about equal diameter throughout. The first joint is triangular, and the second articulated to one of the sides by its inner surface, leaving the truncated posterior end of the joint free, thus giving a peculiar shouldered appearance to these two front pairs of legs.

The third extremity is long, with the second, third and fourth joints of about equal diameter, the first slightly thicker, and the fifth in the shape of a somewhat bent cone with the sucker attached a little to the outside of the point. Two short blade-like bristles are attached, one behind the other, on the inside of this joint, very like those in *Dimorphus albidus*. The fourth extremity is simple and a little longer than the abdomen.

The epimera of the first pair of legs converge, but do not meet in a point. The bristle in front of of the insertion of the third extremity is rather slender, and assumes almost the appearance of a hair. The abdomen is rather deeply indented and furnished on each side with four end bristles. The copulatory suckers are close to the posterior end.

The female is considerably larger than the male, being about ·46 mm. long and ·18 mm. broad. It is of a somewhat oblong-oval shape, truncated at the posterior extremity.

It is found on the White-breasted Swallow—Tachycineta bicolor.

FIFTH SOIRÉE.

FRIDAY, MARCH 10, 1882.—NOTES ON THE OTTAWA UNIONIDÆ. F. R. LATCHFORD.

The family of lamellibranch mollusks known as the Unionidæ is represented in every part of the world, but with a very irregular distribution. While only ten species are found in Europe, fewer still in Africa and about eighty in Asia and the Islands of the Pacific, over five hundred have been described from North America. More than a hundred of these occur in the drainage of the Ohio alone; and in Georgia, the Carolinas, Alabama, and the Southern and South-Western States in general, almost every stream has its peculiar forms. Towards the north and east the species become fewer and fewer, until only eleven are found in Massachusetts. In Canada a much greater number has been met with by Messrs. D'Urban, Bell, Billings and Whiteaves, including several species introduced from the Western States through the great lakes and other avenues of water communication. In a paper read before the Field-Naturalists' Club in 1880, Mr. Heron noted twelve species from the vicinity of Ottawa, but at least twice as many are to be met with here, within a radius of forty miles. The very low state of the water in 1881 afforded me for collecting specimens of the Unionidæ

facilities of which I had ample leisure to avail myself during the midsummer vacations. I have in my spare time since then studied carefully these humble creatures; and, not content with my own determinations, have take much pains to have the species collected identified by the best authorities. All have been checked or named by such eminent conchologists as Mr. Arthur F. Gray, of Danversport, Mass, Mr. Geo. W. Tryon, of the Academy of Sciences, Philadelphia, and Prof. J. F. Whiteaves, F.G.S., of the Geological Survey of Canada. I am therefore morally certain that, except perhaps in one or two instances, the shells which I found have been correctly determined.

The species met with belong to the genera *Unio*, *Margaritana*, and *Anodonta*. These are distinguished from one another more by the conformation of their shells than by any peculiarities of the animals themselves. Hence it is of the shells alone that most works on the *Unionidæ* treat; and from this course it is not my intention to depart at present. The shell itself will always enable the student to distinguish one species from another. But the soft parts are by no means undeserving of attention. In species of the same group they are very much alike. In species of different groups, for instance in *U. rectus* and *U. occidens*, they are so dissimilar that the least practised eye can perceive differences in their form and arrangement. In all cases they present the same admirable ordination of structure to purpose that we see elsewhere throughout the works of nature's God. Even the distribution of the Unionidæ is provided for, by their young being for a time endowed with hooks by which they can attach themselves to contiguous objects, often a fish or a water-bird, and be transported far from their place of birth. In the winter and spring the young, having already well formed shells, are extruded from the branchial uterus of the females in hundreds of thousands and even millions. According to a computation made by Dr. Isaac Lea, of Philadelphia, who has during fifty years studied the Unionidæ, and described almost half the species known, a large specimen of *U. Multiplicatus*, Lea, contained upward of three millions of embryonic young. Nearly all perish early in their free life, being devoured by fishes, crustaceans and the larvæ of many kinds of insects. Few, accordingly, attain maturity, which is reached in from six to ten years. Their food consists of animalculæ, which the water flowing in through the branchial orifice coveys to the mouth, at the same time that it supplies oxygen to the lamelliform gills.

Of the species found in the vicinity of Ottawa the first to be noticed belong to the genus *Unio*. Shells of this genus are readily distinguishable from those of the genera *Margaritana* and *Anodonta*, by their having both cardinal and lateral teeth. The genus, according to Jeffrys, was established by Phillippson in 1788; but it is generally attributed to Retz, who was chairman of the meeting at which Phillippson read his essay *sistens Nova Testaceorum Genera*.

Unio complanatus, Solander, is abundant in almost all our streams and lakes, and is subject to much variation in size and colouring. What may be regarded as the typical form is common in the Rideau everywhere and in the Ottawa above the Chaudière Falls. It is a moderately thin, brown, depressed, sub-rhomboidal shell, with a nacre of different and often of exceedingly beautiful shades of purple The average dimensions of ten shells, five from each river, are as follows: length 3·5 in., height 1·7, diameter 0·8.

In company with the typical form, I found near Skead's Mills, in 1880, a specimen of a small variety which is of considerable interest. Although presenting every appearance of maturity, it is only an inch in height by two and a half in length. For its size it is very thick and regularly inflated. I am informed that a similar variety occurs in some streams in Western New York.

A form almost as small is found in the cold and limpid waters of Meech's Lake. But it is a thin and not a thick shell; not inflated but depressed. Its colour is a very light brown.

About half a mile from Meech's Lake, on the creek through which it finds an outlet, are a few shallow ponds, with a bottom of coarse sand and gravel washed down from the surrounding hills. In the warmer water of these ponds, where food also must be more abundant, *U. complanatus* is three times as large as in the neighbouring lake. It differs moreover in being proportionately less depressed, and more equally rounded at both extremities. Its colour is a rich dark brown with a silken lustre, and, not unfrequently, a tinge of bright orange along the umbonial slope.

Near Kettle Island there occurs a form of much interest on account of its curious angular inflation. How extraordinary this is for a species whose most constant characteristic is its flatness, may be inferred from the fact that a representative specimen whose height is 1·6 in. measures 1·5 in. in diameter. The inflation is greatest near the dorsal margin behind the hinge-ligament, where a section of the shell would be an almost perfectly equilateral triangle with the base and the angles at the base slightly rounded. A specimen found by Mr. Poirier is 3 in. high, 4·9 long, and weighs 7¾ oz. Ten of the shells from Meech's Lake weigh only 3 oz.

At the same locality is found a still more remarkable variety and one of no little beauty. In some respects it resembles *U. Raleighensis*, Lea, from North Carolina, and in others *U. turtuosus*, Sowerby, from Maryland. It is like the former in shape and in the numerous prominent rays which diversify its surface; and like the latter in the strange peculiarity that its valves meet at the ventral margin not in a straight but in a sinuous line. A correspondent writes that under Dr. Lea's treatment it would be entitled to rank as a species. Whether a variety of *U. complanatus* or a distinct species, it is a most unique and interesting shell.

Unio gibbosus, Barnes, appears to be rare, having occurred to me only in the Ottawa near Gilmour's Mills and at Templeton, always in deep water. It is a brown, elongated shell, attenuated posteriorly, and with the dorsal margin regularly curved. It bears a slight resemblance to some forms of *U. complanatus;* but may always be distinguished by its heavier shell, the deeper purple of its nacre, and especially by the great thickness of the lamellar tooth in the right valve.

Unio ellipsis, Lea, is not uncommon on sand bars below Kettle Island, but does not seem to occur in the Rideau or in the Ottawa above this City. It differs from all other species here observed in having the beaks very near the anterior end of the shell, where the muscular impression is of great depth and the shell itself of great thickness. The cardinal teeth are paralled to the lateral teeth and not at a right or oblique angle to them as in our other species. The nacre of many specimens is beautifully iridescent, displaying the colours of the prism and rainbow, chastened, softened, and made perpetual.

Unio rectus, Lamarck, which is easily recognized by its dark colour and elongated form, is found in considerable numbers in the Rideau near Billings' Bridge, but is comparatively rare in the Ottawa. The ground colour of the epidermis, which at first sight appears black, proves on closer examination to be yellow, profusely rayed with broad lines of very dark green. Young shells occasionally have a purple nacre, but in mature specimens only a trace of this is seen along the lateral teeth and in the cavity of the beaks. In the Rideau it is not unusual to find *U. rectus* almost six inches in length, and I have observed it quite as large in the Ottawa near Arnprior. Though smaller in the Ottawa here, it compensates for its inferior size by its finer form. The mantle of the animal is fringed with long and delicate vibratile cilia more beautiful than the richest lace.

Unio radiatus, Lamarck, is common almost everywhere in the Ottawa above the Chaudière. At the foot of the rapids near Mechanicsville are a number of islets along whose shores may be seen large heaps of shells, of which this species constitutes no inconsiderable part. The muskrat lives chiefly on the *Unionidæ;*

and these heaps are the remains of his nightly repasts. To the collector they should generally serve only to point out that living specimens occur in their immediate vicinity; still, by presenting to him larger suites from which to choose than he could possibly obtain by dredging, they may sometimes afford good and even rare shells. I have obtained from them some of my best specimens of *U. radiatus*. It seldom attains a greater length than three inches, and is a very flat, obovate shell, of a green, olive or reddish color, with numerous narrow rays.

Unio luteolus, Lamarck, abounds in the Rideau Canal from the Sappers' Bridge upward, and is not uncommon in the Rideau River. Its color is from a yellowish green to a dark olive, with distinct dark green rays. In shape it varies much more than in color. Some shells are so inflated as to be almost cylindrical; others so depressed that they cannot, when the beaks are eroded, be distinguished by any external character from *U. radiatus*. Having probably studied only the exterior of the two species, a western correspondent writes that they merge into one another in Toronto Bay. Now they cannot possibly be more alike in Lake Ontario than they are sometimes here; and however great their outward resemblance, I find that they always differ internally, especially in the form of the cardinal teeth. In *U. radiatus* these are short, erect, and triangular. In *U. luteolus*, they are long, curved, compressed and oblique.

Unio cariosus, Say, occurred to me near Black Bay, Eardley, Quebec, where I was searching for nodules and fossils in the Champlain Clays, which there form the north shore of the Lac des Chênes. It is a thin, small, ovate, inflated shell, of a yellowish color, with a few indistinct rays. Some specimens of an accompanying species of *Leda*, which lived when the clays were deposited in the post glacial period, would be taken for recent shells, so well have they preserved their thin, delicate epidermis and fragile teeth through the many thousand years that have elapsed since then.

Unio occidens, Lea, is quite abundant in the Ottawa, near the mouth of the Gatineau, and along the sandy shores of Kettle Island. Its shape is remarkably uniform, varying only with the sex. It is an ovate and very much inflated shell, with large prominent umbones and closely approximate recurved beaks. The females are more broadly inflated than the males and are of an almost triangular shape, on account of which peculiarities they are liable to be considered forms of *U. ventricosus, Barnes*.

For beauty and diversity of coloring, there is not probably found in the world a fresh water shell which surpasses the *Unio occidens* of the Ottawa River. When young it is of soft and varied shades of yellow, green and red, the primary spectral colors, and sometimes of all three together, producing an effect of chromatic harmony that a painter might study with advantage. Mature specimens are rich as an autumn landscape in tints of yellow-brown and olive-green. All—but especially the young shells—have a porcelain-like lustre, which is seen at its best, when on a sunny day they lie on the clean, white sand, with just enough water to cover them. Then they shine and glow like opals in the fluent light. Moreover, their changeful colours are so differently combined with rays, sometimes few and sometimes many, fine as a hair or broad almost as an iris leaf, that, among hundreds of specimens collected, no two were alike in every respect. Each is, accordingly, a *unio*, in the sense that Pliny tells us the word was coined to express—a unique production—"from the circumstance,' he says, "that no two *uniones*—pearls—are ever found alike." The barbarians who found the pearls called them *margaritæ*.

That *U. occidens*, under exactly the same conditions of life, should secrete in almost infinite variety so many different pigments is a fact which challenges attention.

Unio subovatus, Lea, which is found in the Rideau Canal and River and in the Des Chênes Lake, is chiefly remarkable for the large size to which it some-

times attains, a specimen from the canal beyond Hartwell's Locks measuring 5·5 in. in length, 3·4 in height, and 2·2 in diameter. It bears some resemblance in outline to *U. occidens* of which Say considered it only a variety. His opinion on this point is now held by very few; and I hardly think that anyone who compares the two as they here occur would care to pronounce them specifically identical. *U. subovatus*, is less inflated than *U. occidens*, and less approximate at the beaks, while with respect to beauty there is no comparison between them.

On the valves of this and other large species in the Rideau River I have observed—besides the curious spiral follicle of the larva of a phryganaceous insect, *Helicopsyche arenifera*, which was first described as a mollusk of the genus *Valvata*—a small isopod crustacean, which is worthy of note as being probably the best living, though degenerate, representative of the trilobites that once abounded here on the low tidal flats of the Silurian seas. It is I think the species described by De Kay as *Fluvicola Herrickii*.

Unio alatus, Say., was found here by Mr. Heron in 1880, and was recorded from this vicinity twenty years ago, by Mr. Whiteaves in a valuable paper published in the Canadian Naturalist. There are a few specimens in the museum of the Ottawa Literary and Scientific Society, which were probably collected by the late E. Billings, the palaeontologist. As I have not met with it on my many excursions, I think it must be rare, or at least restricted to a small area. It is the only species found here in which the wing rises higher than the right line of the hinge margin. It occurs from Georg a to Vermont and westward to Nebraska and Manitoba. Certain other species as *U. spinosus, Lea.*, and *U. Shepardianus, Lea*, are confined within narrow limits to one stream.

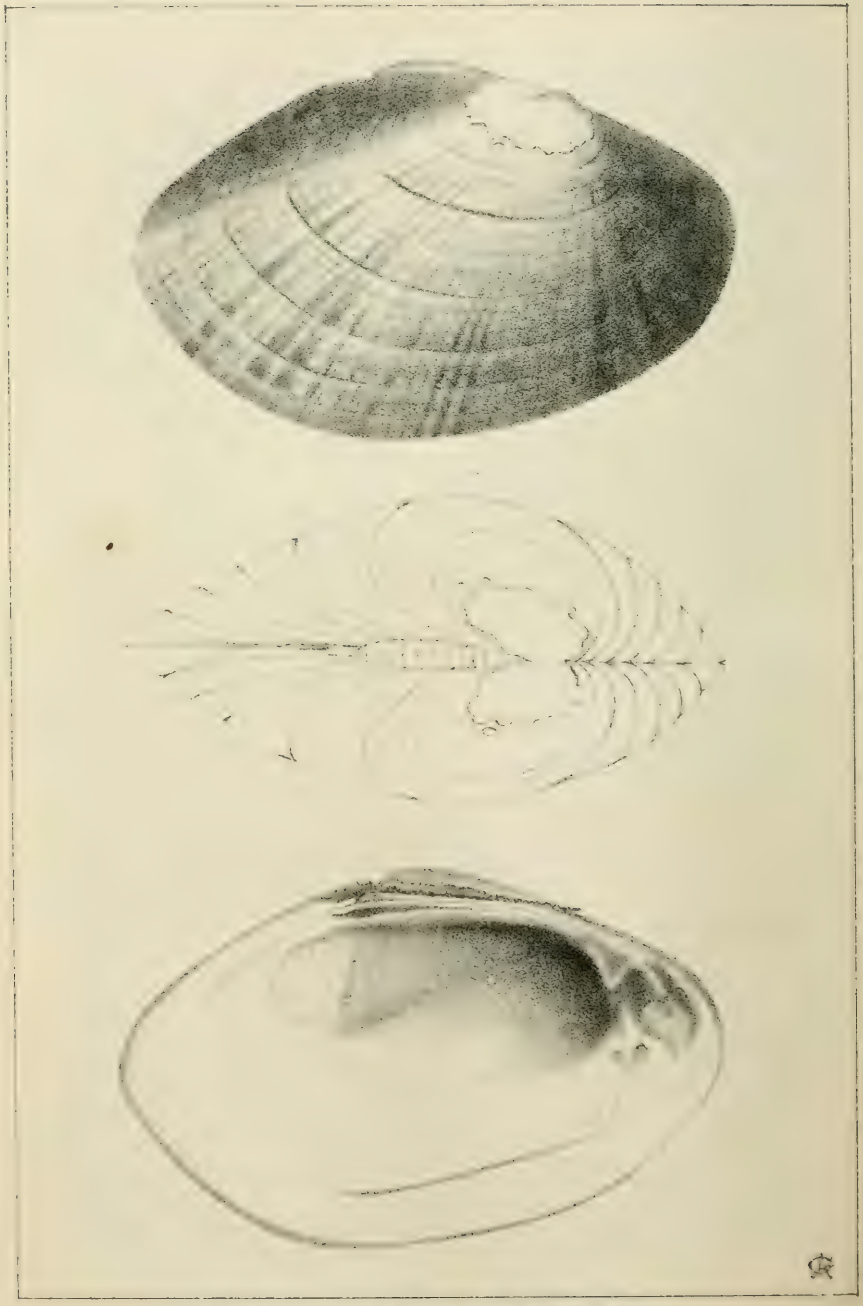
Unio gracilis, Barnes, is another winged species which has not, till now, I believe, been recorded from any locality in Canada east of the Welland Canal. It is not at all common, Mr. Poirier and myself having found only five or six specimens during the summer. These were collected on sand bars near Kettle Island. It is an exceedingly thin and fragile, depressed, sub-triangular shell, of a greenish yellow color. The hinge margin is straight and prolonged into a large wing, uniting the two valves. It may be distinguished from *U. alatus*, by its greater fragility, lighter color, both inside and out, and by its differently formed wing.

Unio pressus, Lea, was found by Mr. Tyrrell, of the Geological Survey, in the Rideau near the Rifle Range. Only one specimen was met with, and that he has with great kindness presented to me. It is but little more than two inches in length, very much flattened, and the hinge margin is straight with a slight alated projection. The beaks are finely undulated. Its form, its internal and external color, together with the shape of its cardinal teeth, seem to connect it with the *margaritanæ*.

Unio Canadensis, Lea, was originally described from the St. Lawrence near Montreal. Both Mr. Tryon and Mr. A. F. Gray have referred to this species some shells which I collected in Nepean Bay. Mr. Gray writes: "It seems to agree well with the characters of *U. Canadensis*, and with Dr. Lea's figure. From these data, and without a typical shell with which to compare it, I am justified, I think, in referring it to that species." Mr. Tryon says: "I regard a shell which you sent me from Nepean Bay as the true *U. Canadensis*." It appears to be rare, only a few specimens having been found. It is of an oval shape and dark olive colour, with indistinct rays.

Unio borealis, A. F. Gray, is a new species. It occurs in the Ottawa, from the mouth of Brigham's Creek to Templeton, and probably much farther down. Although common, it is very seldom met with in good condition.

I first submitted this shell to Mr. Tryon, but the only specimens I had to send were so badly eroded that they could not be determined. A second lot,



UNIO BOREALIS.—A. F. GRAY.

little if any better, led him to think it doubtfully referable to *U. luteolus*, * from some forms of which the females are not easily distinguishable. Three out of four shells sent to a conchologist in Cincinnati were referred to *U. radiatus*, while the remaining one was considered a specimen of *U. luteolus*. The shells were really not in a condition to admit of being properly determined. Not until October of the past year did I succeed in collecting specimens which had the undulations of the beaks well preserved. I was led to go out so late in the season by a letter from Mr. A. F. Gray, relating to the shell in question, of which I had sent him specimens a short time previously. He regarded as correct my views that it differed essentially from both *U. luteolus* and *U. radiatus*, but thought that further study and comparisons might prove it to possess affinities with some other described species, and expressed a wish to see a large series of the best shells I could obtain. On my next holiday I went down the river to Duck Island and collected a number of male and female shells, including a few in fine condition. I despatched these to Mr. Gray on the day following, but heard nothing more about them, until February 28th, when I received the pleasing, though not unexpected information that the shell was undoubtedly a new species. The names *U. bellus* and *U. borealis* were suggested as appropriate. The latter seems the more fitting, and the species shall accordingly be known as *Unio borealis, A. F. Gray*. A description, promised at my request, has not yet been received, and I do not wish to describe the shell to-night, lest I should in any way interfere with the priority of my friend's description. The right of naming *U. borealis* belongs, to Mr. Gray, as he was the first to recognize its specific distinctness from any described *unio*.

[Mr. Gray's description was received some time after the reading of my paper and is here given in full:

UNIO BOREALIS,—A. F. GRAY.

Shell smooth, broken only by numerous ridges of growth; obovate, very much inflated in the female form, the male more compressed, very inequilateral, obtusely angulated behind and rounded before, the basal or ventral margin rounded, beaks badly eroded and but slightly raised; ligament thick, moderately long and dark brown; umbonal slope flattened, and but slightly carinated; epidermis variable, some specimens dark olivaceous brown with broad obscure rays of dark green, others yellowish green with numerous fine rays of a brighter green, cardinal teeth rather large, somewhat compressed and corrugate; lateral teeth thick, slightly curved, and with crenulate margins; anterior cicatrices distinct, that of the adductor muscle very deeply impressed; dorsal cicatrices posterior to the centre of the cavity of the beaks; posterior cicatrices confluent and but slightly impressed; cavity of the shell deep and rounded; cavity of the beaks obtusely rounded and deep; substance of shell very thick, thickest before; nacre usually white, occasionally rosy, and sometimes a beautiful pink, and beautifully iridescent.

Transverse diameter, 3·15 inches; altitude, 1·95 inches; lateral diameter, 1·65 inches. These measures are from a large female. A male shell measures: transverse diameter 3·15 inches; altitude, 1·90 inches; lateral diameter, 1·35 inches.

For this beautiful shell, and the privilege of describing it, I am indebted to Mr. F. R. Latchford, from whom I received quite a large series of this *Unio*, which belongs to the group of which *Unio luteolus* of Lamarck may be considered the type. It differs from that species in being shorter transversely, in having a much thicker shell and having the beaks badly eroded. In its outline it bears a

* After the above was writen, I sent some young specimens of *U. borealis, A. F. Gray*, to Mr. Tryon, and they have convinced him, he informs me, that the species is new.

close resemblance to *Unio radiatus*, Lam., but is more inflated and has a heavier shell. It occurs in the Ottawa River at Duck Island; it has also been found in Leamy's Lake, near Hull, in the Province of Quebec.

The variety with pink nacre has a bright orange-brown epidermis with fine rays of dark green.

A young specimen is more elongated transversely, has perfect umbones which show four well developed folds, and has a rugose posterior slope similar to *Margaritana rugosa*, Barnes.

The soft parts have not been preserved; in consequence, their arrangement cannot be described.]

GENUS MARGARITANA, *Schumacher.*

The shell of this genus differs from that of *Unio* in having no lateral teeth. These, however, are not always entirely wanting in *M. margaritifera*, the celebrated pearl mussel of Great Britain and the North Atlantic and Pacific border regions of America. From the interior continental basin it is absent: and although common eastward in Quebec, it has not yet been found in this vicinity. How even a mollusk may affect the destinies of a nation may be inferred from the statement of Seutonius, that it was the hope of obtaining pearls from *M. margaritifera* which led to the invasion of Britain by Julius Cæsar.

Margaritana marginata, Say, occurs sparsely in the Rideau and Ottawa in rapid water, which, indeed, is the favourite habitat of our other species also. It is small, seldom of greater length than two and a half inches, moderately thin and transversely wedge shaped. In colour it ranges from a dusky green to a deep brown, with indistinct dark rays. The shells found here are much inferior in size and colouring to specimens of the same species received from the Mohawk River, New York.

Margaritana undulata, Say, is rare in the Rideau and is not common in the Ottawa, where the least unproductive locality that I know of is above the Little Chaudière along both shores of the river. In Meech's Creek it is quite plentiful, especially near the abandoned rubber factory. It is smaller than *M. marginata*, proportionately more inflated, brighter in colour, often so bright as to be really beautiful. The distant concentric and prominent waves on the umbones from which it derives its specific name, are seldom apparent except in young shells. Many old specimens are as thick and strong anteriorly as a *U. ellipsis* of the same size, while towards the posterior margin they are as thin and fragile as the most delicate *anodonta*; and thus, as well as by having cardinal and no lateral teeth, *M. undulata* unites in itself two of the most distinctive characters of the genera between which, in the plan of creation, *Margaritana* has been assigned its place.

Margaritana rugosa, Barnes, the largest we have of the genus, is abundant at many points along the Rideau, but is quite rare in the Ottawa. As found in the former stream it resembles the typical *U. complanatus* in shape but is of a greener colour, and may, morever, be easily distinguished from that shell both by the wrinkles which are situated along the post lateral margin up to the hinge ligament, and, of course, by the absence of lateral teeth. A shorter truncated form is occasionally met with in the same river.

I observed a few large and exceedingly fine specimens of this *margaritana* at the Chats Rapids, where I found them in a mixed company of *uniones* and *anodontæ*, thirty three in number by actual count, which were living together in apparent harmony in an open space between the rocks but little if any more than a square foot in extent. They were green in colour, and had the characteristic wrinkles prominently developed. One shell exhibited in a marked degree the strange deformity that its valves did not meet in a straight line, but, an inch or more from the posterior end, were bent sharply aside about forty degrees. I have noticed a few less striking instances of similar distortion in the same

species from the Rideau. They are probably due to injuries received when young through coming into violent contact with a rock or pebble. To such a mishap the young of this species must often be exposed in the rapid water they frequent.

GENUS ANODONTA, *Bruguières.*

The transition from *Margaritana* to *Anodonta* is by no means abrupt: *nihil in natura per saltum.* It is made easy by a shell found here, which was first described by Say, and placed by him in the former genus—or rather in the genus corresponding to it that he had instituted, *alasmodonta,*—but which is at present universally referred to the latter. This species is now known as *Anodonta edentula,* Say. Although its name as it now stands expresses what may be called the reduplication of toothlessness, the shell is slightly exceptional to the best marked character of the genus—the absence of both cardinal and lateral teeth.

Anodonta edentula, Say, like its relatives the *margaritanæ,* is to be found in water flowing rapidly over a rocky bottom. The best localities along the Ottawa that I have met with are the Little Chaudière and Chats Rapids. A capital place for collecting it and seven or eight other species of the *Unionidæ* is the snye, as the lumbermen call it, between Mason's Mill and the opposite island. It is a comparatively thick shell, generally of a dark olive colour; but when the rays are few or narrow, the ground tint, a light brown, predominates. In the left valve of many specimens there is a short though well defined cardinal tooth with a small notch in it analogous to the deep cleft in the primary tooth of the left valve of *Unio* and *Margaritana.*

In the narrowest and most rapid parts of Meech's Creek, and not in the ponds into which it often expands, or the lake from which it flows, there occurs a fine form of this shell which appears to be identical with the variety of *A. edentula* described by DeKay, and called by him, after the river in New York in which it is found, *A. Unadilla.* It is more inflated than the *A. edentula* from the Ottawa, often very much larger and of a lighter colour.

Anodonta undulata, Say, is found in the Rideau near Billings' Bridge, and in the Ottawa at Kettle Island. It resembles the preceding species so much that many have thought the two identical. *A. undulata* is however a thinner shell more obscurely rayed and more angularly inflated. Additional and far more distinctive characters are revealed by the microscopic examination of the young of both species. Botanists, as Mr Fletcher told us two years ago, cannot always by the leaves and blossoms alone distinguish *Drosera longifolia* from *Drosera rotundifolia,* but their minute seeds present characteristics which place the specific distinctness of the parent plants beyond all doubt. So also with the embryonic young of these two species of *anodonta.* I have not examined them myself; but Dr. Lea's figures show that they differ in outline, and that while the hooks of *A. edentula* end in three points, those of *A. undulata* end in one.

Anodonta subcylindracea, Lea, which I have met with only at the Chats, is one of the most widely distributed shells of the genus, extending hence through the middle and western states as far south as Louisiana. Our shell in its ordinary form is identical with Dr. Lea's type. It is small, thin, inflated, almost elliptical in outline, and olive green in colour, with indistinct rays. Old shells are generally abnormal. They are so constricted along the basal margin opposite the hinge, and so much elongated that instead of being elliptical they are kidney shaped. This reniform appearance is observable in old shells of many species of the *Unionidæ, U. complanatus,* for instance, and notably *M. margaritifera.* An examination of the lines of growth will show that after a certain age the shell does not increase symmetrically. It grows rapidly in the direction of the umbonial slope, slowly in front, and scarcely at all opposite the hinge. The change produced in this way in the form of shells is very remarkable.

Anodonta Benedictii, Lea, occurs in several localities near the city, but nowhere in great numbers. I have found it at the Chats, and in a small lake on

Meech's Creek. Mr. Fletcher collected a few fine specimens of the typical form in the Ottawa near the outlet of Leamy's Lake. It is a trapezoidal, slightly compressed, horn-coloured shell. The dorsal margin is nearly straight and is extended behind, where it forms a well marked wing.

Anodonta Lewisii, Lea, occurred to me in the Mississippi at Almonte, where it appears to be abundant. It has a much smaller wing than *A. Benedictii*, which it resembles, is more elongated, and somewhat less inflated. The beaks in perfect specimens have sharp prominent tubercles, which are arranged in a manner characteristic of the species.

Anodonta implicata, Say, is a species of which only a single living specimen has been obtained. It was found in a deep pool near the upper end of the old Chats Canal, after a search of an hour's duration, which I was led to engage in by seeing on the shore a few broken valves of an *anodonta* not previously met with. It is a large, thick, olive-brown, elongated, cylindrical shell, with a salmon-coloured nacre.

Anodonta Footiana, Lea, is not uncommon at the Chats. It is a thin, inflated, oblong, brownish species, obscurely radiated, and tinged with yellow posteriorly. A darker and less elongated form from Meech's Creek is said to be "identical with shells determined by Dr. Lea as his *A. Footiana*," which are now in Mr. Gray's cabinet.

Anodonta lacustris, Lea, inhabits lakes in the County of Ottawa. It is brown when aged, but young shells are greenish yellow. The tubercles on the beaks are arranged in close, concentric waves. Every specimen found in September, 1881, in a small lake in Masham, was infested by hundreds of mites, probably of the species found in *U. luteolus* and *A. fluviatilis* in the Rideau Canal. The same lake, which is about thirty miles from Ottawa, contains a plant, *Eriocaulon septangulare*, not recorded in the "Flora Ottawaensis" of Mr. Fletcher.

Anodonta fragilis, Lamarck, is common in Meech's Lake, near the outlet. It is an elongated, thin, depressed shell of a yellowish colour, with a straight dorsal margin, and pearly iridescent nacre. That the form regarded as *lacustris* is distinct from this appears to me somewhat doubtful.

Anodonta fluviatilis, Dillwyn, occurs in great numbers in McKay's Lake, New Edinburgh, and in the Rideau Canal; but is rare in the Ottawa, where it is found only in bays in which there is little or no current. In colour it ranges from a bright grass green to an olive-brown, with concentric yellow bands, and innumerable narrow, obscure rays. Sometimes it attains a length of six inches, but is generally about a third smaller. Its large size and brilliant colouring conspire to make it the finest *Anodonta* we have.

Repeated microscopic examinations of the young of this shell lead me to believe that the only observations which I find published on the young of the *Unionidæ* are not altogether correct. In his "Descriptions of the embryonic forms of thirty-eight species of the *Unionidæ*," Dr. Lea, says: "The base in all the species always presented the anterior and the posterior margins equal, which is not the case with any of the species when fully grown. That is, if a perpendicular line be raised from the middle of the basal margin to the middle of the dorsal line, *the right and the left divisions will be exactly symmetrical*." Now, I thought that precisely the contrary was evident when the young of *A. fluviatilis* were observed under a high power; and Mr. Tyrrell and Mr. Fletcher, whose attention was called to the matter, thought so too. Dr. Lea, however, to whom I sent some of the young, wrote that on carefully examining them, he failed to notice the asymmetrical difference which I described. The venerable patron of the *Unionidæ*, now in his ninety-first year, kindly presented me at the same time with the work previously referred to on "Embryonic Forms," and with several other of his valuable publications. Here was observation opposed to observation. To ascertain whether I was right or wrong, I made use of the fine solar microscope of the College of Ottawa, which gives a magnification of two thousand diameters.

As the outline of shell after shell was cast upon the screen, each was observed to be decidedly asymmetrical and unequally curved on the sides. The young of *U. luteolus* and *U. borealis* proved also to be inequilateral; and I have little doubt that the same want of symmetry obtains in the young of almost all other species. It seems, therefore, that Dr. Lea was mistaken in describing and figuring as symmetrical the embryonic forms of many species of the *Unionidæ*.

With *A. fluviatilis* closes the record of the species so far observed here. Extended as it is, for a place so distant from the metropolis of the *Unionidæ* in the Ohio Valley, it does not in my opinion include all the forms that occur in this vicinity. *A. plana, Lea,* and *A. Ferussaciana, Lea,* probably occur here; and when the numerous lakes and streams around our city are more diligently searched, they will, I feel confident, furnish very material additions to the present li t of the Ottawa *Unionidæ*.

Report of the Conchological Branch.

For the Season of 1882.

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

The undersigned beg leave to report that in this branch of the Club, nine members have been engaged in active work during the season, and that the researches made, (particularly by Mr. Latchford,) have been of a most thorough nature and have resulted in additions to the list of shells already recorded in this locality, and the discovery of some which may prove new to Canada itself; of these, a list is appended in which all are mentioned of which the identity has been proved without doubt. Descriptive notes of twenty-seven species embraced by the family *Unionidæ* will be given by Mr. Latchford, in a paper which he is preparing on that subject to be read before the Club.

H. B. SMALL,
P. B. SYMES,
Leaders of the Conchological Branch.

APPENDIX.

Descriptive notes of shells found in the vicinity of Ottawa during the summer of 1881, not before recorded on the Club list:—

1. *Amnicola limosa, Say.* This shell is abundant in ponds near St. Louis Dam. In Mr. Heron's collections (presented by him to the Ottawa Literary and Scientific Society,) it is marked "*A. porata*, Say." The true *A. porata* of Say is, however, quite a different shell; but the *A. porata* of Gould is a synoym of *A. limosa*, Say. The true *A. porata* Say is to be found in several lakes in Ottawa County. It is larger and more globose than *A. limosa*, Say, to which it is allied, and has a more distinct umbilicus. Its distribution too is more limited, being confined to the Northern States and Canada.

2. *Amnicola decisa, Haldeman.* Specimens of this shell have been found in Leamy's Lake. It has the labium more appressed than in any of the other species of the genus found in this locality; the form too is more elongated. It was found by Mr. Heron subsequent to the publication of his list.

3. *Pomatiopsis Cincinnatiensis, Lea.* (*Amnicola Sayana, Anthony.*) A few specimens of this species have been found in Dow's Swamp. This is the first record of it having been found in Canada. This shell must not be confounded with *Amnicola Cincinnatensis, Anthony.*

4. *Limnæa megasoma, Say.* This beautiful and distinct species was first found in Meech's Lake by Mr. Latchford, in September, 1880, and a good series was secured during the past season. This species is the largest of the *Limnæidæ.* In beauty it is surpassed only by such exceptionally fine forms of *L. stagnalis* as occur here in the Rideau Canal. *L. megasoma* is easily distinguished from all other American species by its ovate form, thick shell, and rich chestnut-brown interior. Haldeman has made it the type of his sub-genus *Bulimnæa.* It is a northern species ranging from Vermont to Lake Superior, near which it was first found by Dr. Bigsby. It was once abundant in a pond on Nun's Island, in the St. Lawrence, opposite to Montreal, but of late years it appears to have become almost extinct in that locality.

5. *Limnæa lanceata, Gould.* Three specimens of this species were found by Mr. Fletcher, in Dow's Swamp in September last; previous to this no one but Agassiz appears to have observed it either in Canada or elsewhere. As late as 1865, the date of Binney's monograph on the American *Limnæidæ,* there was only a single specimen in the cabinet of the Smithsonian Institute at Washington. The locality of the shells found by Agassiz, and named by his friend Dr. Gould, was "Pic Lake" to the north of Lake Superior. The shell of *L. lanceata* is very fragile and slender. It not a little resembles *L.* (*Acella*) *gracilis,* Say.

6. *Limnæa caperata, Say,* var. *umbilicata, Adams.* By some authors this shell is regarded as merely a variety of *L. caperata, Say;* Adams, however, with others, claims that it is a distinct species and calls it *L. umbilicata.* According to Binney, who, following Haldeman, favours the former view, "It is found along the northern tier of States to Michigan; has been quoted from Louisiana; catalogued by Adams from Jamaica, and placed by Poey in the synonymy of *L. cubensis, Pfr.*" It would appear, therefore, to be a very constant variety, if, indeed, it be not a distinct species. Adams acknowledges that it resembles *L. caperata, Say,* but observes that in Say's species "the aperture is but one-half the length (in "*umbilicata* it is three-fifths) the revolving lines are raised, more distinct and "numerous, the *umbilicus* is rather less, and there is one more whorl." In this locality Say's species is abundant, but Adams' is very rare—only three specimens having been obtained so far. They were found in the Rideau River at the Rifle Range by Mr. Latchford. They were sent to Mr. Tryon for examination and returned marked "*L. caperata, Say,* var. *umbilicata.*"

7. *Limnæa emarginata, Say.* There once existed considerable doubt with respect to this variable shell and its identity with *L. catascopium.* Specimens in Mr. Heron's collection bear the latter name. It is now, however, very generally regarded as a distinct species. *L. emarginata* is a thicker, larger, and considerably wider shell than *L. catascopium.* It is a common shell near rapid water in the Ottawa and Rideau Rivers; very fine specimens are to be found about a mile above Billings Bridge. The true *L. catascopium* is less frequently found, being noted only from Brigham's Creek, Nepean Bay, and at the Chats Rapids, near Arnprior.

8. *Limnæa lepida, Gould.* One of the most interesting additions to the list is the above named shell which was found in Meech's Lake by Mr. Latchford in September. The naming of Mr. Latchford's specimen has been checked by Mr. Tryon and found correct. The specimen found differs from Binney's figure only in the slighter convexity of its whorls. Its size is exactly that of the shells described by Dr. Gould, $\frac{3}{5}$ inch by $\frac{1}{4}$ inch. *L. lepida* has heretofore been found only in Oregon. It is very rare.

9. *Physa gyrina, Say.* This widely distributed species differs from *P. heterostropha* in having a more elongated spire and a less deeply indented suture. It is found plentiful during the spring months, in ponds near the Canada Pacific Railway at Mechanicsville.

10. *Ancylus parallelus, Haldeman.* This fresh water limpet has been found in the Ottawa River and Rideau Canal, adhering to the submerged leaves of water

plants and to other shells. Its favourite quarters are the inner sides of the valves of dead *Uniones* and *Anodontæ*, from which, if disturbed in the least, it is very difficult to detach them without breaking the shell. This species has been observed in New York and the Eastern States, but its range is more restricted than that of *Ancylus rivularis*.

11. *Zonites minusculus, Binney.* A few specimens of this minute Helix were found by Mr. Latchford in Eardley, Que., in September, and it has been reported as found near Toronto by Mr. Brodie. It has probably escaped notice in other localities on account of its small size.

12. *Vertigo milium, Gould.* A single specimen of this species was found by Mr. Latchford in Billing's Bush. It is remarkable as being the smallest species of the genus.

13. *Unio luteolus, Lamarck.*	See Mr. Latchford's paper.
14. " *cariosus, Say.*	
15. " *occidens, Lea.*	
16. " *gracilis, Barnes.*	
17. " *pressus, Lea.*	
18. " *Canadensis, Lea.*	
19. " *borealis, A. F. Gray.*	
20. *Anodonta edentula, Say.*	
21. " *subcylindracea, Lea.*	
22. " *Benedictii, Lea.*	
23. " *Lewisii, Lea.*	
24. " *implicata, Say.*	
25. " *Footiana, Lea.*	
26. " *lacustris, Lea.*	
27. " *fragilis, Lamarck.*	

28. *Sphærium truncatum, Linsley.* This species resembles *S. securis, Prime*, and might at first sight be confounded with that shell. It differs, however, in being much less inflated, less inequilateral, and lighter in colour. Its post margin is more nearly a straight line, giving the shell the appearance of having been cut short—*truncatum*. This species is found in the St. Louis Dam pond. Unlike *S. rhomboideum* and *S. sulcatum*, it is very active. Specimens kept in confinement are almost always in motion. With the syphonal tube protruding behind they will extend the foot in front more than half an inch, attach it to the side of the vessel, and then contracting it will pull the shell forward. By this means they move in every direction with ease.

Pine Life.—H. Beaumont Small, M.D.

There are few of our members who have not noticed the remaining venerable specimens of *Pinus strobus, L.*, in the woods bordering the Bank Street road, just outside the city limits. The finest of these, and the one with which all were most familiar, stood at the edge of the road, guarding the bridge over Patterson's Creek; and I am sure all must have experienced a feeling of regret when the decree for its destruction went forth. Towering majestically above the surrounding growth, it was the landmark eagerly sought by the tired naturalist returning from a day's outing, and its prominence made it a fitted rendezvous for many sub-excursions of this Club. The greatest height of its double trunk was two hundred and thirty feet, and its circumference at four feet above the surface measured sixteen feet. This, judging from the size of other stumps in the neighbourhood—from the remains of prostrate trees—and from logs floated down

the Ottawa from distant forests, is much above the average size of our large trees, now so rapidly disappearing before the forest fire and lumberman's axe. The rings visible on a transverse section numbered two hundred and seventy-one. In exogenous growth, you are aware the increase of tissue does not occur throughout the stem, but, the sap ascending from the soil, is elaborated in the leaves and, descending in the inner bark, forms a layer of new tissue on the circumference of the stem, around the growth of former years. At the close of the season, when life becomes dormant, the surface of the new wood hardens and when the next season's growth occurs, the denser layer becomes conspicuous as a well defined circle. In this climate, where growth continues steadily throughout the summer, ceasing only with the advent of cold, these rings indicate each year's progress, which knowledge applied to our tree, tells us that it has experienced the cold of two hundred and seventy-one winters, at least. This rule, so exact in our country, is not to be depended upon everywhere. In the tropics, where the variations of temperature are not so excessive, but more frequent, growth may cease and begin again twice or more often in a single year, a corresponding number of rings being formed. Some more advanced observers attempt to determine the weather of past seasons by the same means: a moist warm summer producing a large increase, a cold one preventing the formation of new tissue. To them the section of a tree presents not only a record of age, but also a weather chart of past years.

Many, I have no doubt, look upon such trees much as they look upon a huge boulder or other such surface conformation; it was there when they came, and there it will remain, unless destroyed by some physical force. In this simple way is the question of longevity settled, a question which has attracted much attention during the past few years. Unfortunately, the time required to verify facts, and the difficulty in obtaining trustworthy information, has prevented any important results being yet obtained. However, enough has been proven to show that each species of the vegetable kingdom has its special period of life, and the time allotted to some greatly exceeds that of others. Among the annuals and biennials this law is very evident, but among perennials, especially the long lived trees, it is obviously much more obscure. We know that the ash and yew live longer than the willow and poplar, and the pine much longer than the apple or plum, but no trustworthy table of the average life of each has yet been prepared. Numerous stories are told of ancient trees, but they are generally legendary and not to be depended upon. In England oaks and yews are standing, supposed to be eight hundred and twelve hundred years old; in Jerusalem the age of certain olive trees is placed at twelve hundred years, while the famous sacred Bo-tree in Ceylon has a record older than the Christian era. I find the age of pines variously given in works upon the subject, the greater number favouring one thousand years as about the average, but the record furnished by our tree would place it at a much lower figure, and I think we are justified in looking upon it as an example of the ordinary life of a white pine. Every member of the animal kingdom has its allotted age, but it is difficult to compare animal and vegetable life. In the former there is a continual formation and destruction of tissue; at first a period when the formation process predominates, then a period when the forces are equalized, to be followed by decline, when the balance of power is reversed and the body gradually fails to sustain life. In the vegetable kingdom there is no destructive agency at work. The tissue once formed always remains; but a time comes, a time peculiar to each species, when the central and oldest cells become dense, hard, and gradually cease to perform their function. It is the early setting in and rapidity of this process that determines the duration of the tree, which, as this hardening progresses become more brittle and liable to destruction. The years of a tree may be greatly affected by surroundings; for instance, one exposed to the influence of wind and weather would be much shorter lived than one sheltered by

others growing in its neighbourhood, as also would one growing in a dry, sandy soil, as compared with another furnished with an abundant supply of moisture: but probably the variations are not greater, in comparison, than those occurring in the animal kingdom. In addition to their claim upon you as scientists, these few pines are well worthy of your interest. They are some of the oldest living things about us, they have witnessed one savage race overpower another, and the white man supplant them both; they are the remnants of a forest that began life at a time when Pioneers first reached this region, and were at least five years old when Champlain made his first voyage up the Ottawa.

The Utica Slate.—By Henry M. Ami.

Mr. Ami being absent from the city, this paper was read by the Secretary. It has since been revised and somewhat condensed by the author.

The Utica Slate formation derives its name from the town of Utica, N. Y., on account of the occurrence of an exposure of rock in the vicinity of that place, which American geologists have adopted as typical of the series.

It is further called a "slate" formation on account of the eminent slaty cleavage which the rock possesses; this generally corresponds with and is parallel to the divisional planes of stratification, but somtimes occurs cutting these planes at various angles. Instances of the latter may be observed at Montreal, on the mountain side, or near Ottawa in a quarry on the Montreal Road; such cleavage is due to lateral and other pressure, acting at various angles on the beds.

The term "Utica Shale" has also been frequently applied to rocks of this formation and may be said with greater accuracy to designate the character of the rock than the term "Utica Slate" does.

Until quite recently the Utica Slate has received very little attention at the hands of geologists and palæontologists. In the Geology of Canada, (1863), however, we find that a considerable amount of valuable work has been done, including researches into the palæontology, stratigraphy and lithology of the formation.

NATURE OF THE ROCKS.

To ascertain the nature of the rocks constituting these beds we must refer to some typical representative of the formation. In addition to the series at Utica, in the United States, which has been taken as the type of this formation, we have also, here in Canada, a good exposure situated near the mouth of the River Ste. Anne, Montmorenci, P.Q.

In the Geology of Canada (1863), there is a tabulated description of this series. The beds consist of a brittle black or brown, more or less bituminous shale, of much the same nature throughout. At the base of the section are two bands of yellow weathering (probably magnesian) limestone, and at the summit a thin band or two of sandstone and grit are found.

ORIGIN AND MODE OF DEPOSITION.

At the close of the Trenton formation, whether from subsidence of the northern part of this continent, or from the Arctic Seas having broken through their southern barriers—the Laurentian Hills—there seems to have come from the north, cold and muddy waters which carried down finely divided clay and sand and deposited them over the whole central plateau and synclinal hollows in various parts of the continent. Layer after layer was thus deposited, which, under the action of subsequent heat, pressure and other physical agencies, as-

sumed their present character. Such a change of circumstances from those existing during the deposition of the Trenton formation also led to a change in th fauna of these Utica Seas; the *Graptolites*, which in olden times had swarmed the seas, during the deposition of the Calciferous and Chazy, now finding a suitable *habitat* returned in such abundance that the presence of these fossils may be considered a chief characteristic of this formation. *Trilobites* also, of forms diverse from those of the Trenton now made their first appearance in these turbid waters. It is no doubt owing to the great prevalence of these two types of life in that period of the earth's history that the rock owes its bituminous character.

This change which occurred at the close of the Trenton, was at first quite gradual, for, as may be clearly seen, the upper strata of that formation are for the most part separated from each other by thin bands of shale and argillaceous schists, indicating the oscillatory movements which then begun, foretold the complete disruption in the northern seas.

CHEMICAL COMPOSITION.

Several careful analyses of the rocks of this formation have been made by Messrs. Chandler & Kimball for Prof. Whitney, who have published them in the Geology of Wisconsin, and mention of which is made in the Geology of Canada, 1863. Of these analyses, chiefly of specimens from various parts of Canada, one from the Gloucester beds, in this neighbourhood, is noticed as yielding an especially large percentage of magnesia. The dolomitic nature of these beds is further shown by the appearance of their weathered surfaces, which assume a brownish-yellow colour.

Very little can be said as to the existence of minerals in these rocks, for they are so few, and, with the exception of *bitumen*, there are none of any importance. The occurrence, however, of a considerable percentage of this mineral in the shale at Collingwood, induced a company some few years ago, to start operations and extract the oil; but before much was accomplished the discovery of the same mineral in much greater abundance in the Hamilton shales, of Devonian age, caused the operations at Collingwood to be suspended; these, however, may prove of considerable value at some future date.

At the village of Windsor there is also said to be a valuable deposit of bitumen belonging to the Utica Slate. Other minerals occur sparingly, as *iron pyrites* (*pyrite or marcasite*) which is generally found replacing entirely or lightly coating fossils, particularly *trilobites* and *orthoceratites*. *Selenite*, or the hydrated sulphate of lime, also occurs in fine scales disseminated over the divisional planes of the strata, or, partly coating organic remains.

GEOLOGICAL DISTRIBUTION.

The remarks made will be in special reference to Canada; but in tracing out the belt along its line of outcrop, it will, of course, be necessary to notice parts of the United States. Beginning then with the deposit in its most easterly extension, it is found occurring near the mouth of the Ste. Anne River, Montmorenci, P.Q., where a portion of the rock exposure there shows 318 feet in thickness of Utica Slate. Proceeding thence in a westerly direction it forms a belt, at times interrupted, along the northern shore of the St. Lawrence, with a general south-easterly dip, sometimes concealed beneath the waters of the river, at other times cropping out at the summit of various anticlinals and on the superior axes of disturbed areas, whilst large tracts of it lie hid beneath the soil or drift. Thus, the belt proceeds till it reaches the city of Montreal, where several exposures can be seen on the Mountain side, at St. Helen's Island, Point St. Charles, and other places in that locality, the rock being much altered and hardened on account of the numerous plutonic dykes that traverse it. Hence the belt bends to the south-east, and then again to the south till it reaches Lake Champlain, where the formation can be traced beneath the waters of the lake by means of the islands

which are almost entirely made up of rocks belonging to this formation. Proceeding southward and turning in a westerly direction round the base of the great Adirondack region, we find the formation for a considerable way completely obliterated. In the vicinity of Adams, N.Y., it again crops out, but gradually becomes narrower until the rocks of the Hudson River age conceal it; after this, proceeding in a course almost due west, it dips beneath the waters of Lake Ontario, and reappears again on the Canadian shore—a wide belt reaching from Port Newcastle to Canton near Whitby—at which latter place some very fossiliferous strata occur. This extensive belt crosses the Province of Ontario through the counties of Durham, Ontario, York and Simcoe, reaches Collingwood and there disappears. Subsequently following a north-westerly course beneath the waters of Georgian Bay, and striking points and capes of the Great Manitoulin Island, as well as many of the North Channel Islands, this belt narrows in gradually, diminishes likewise in thickness, crosses St. Joseph's Island, and again reaches the mainland, where, after a few miles of outcrop, it is lost sight of beneath the more recent overlying rocks and is not traceable further west.

Besides this continuous belt of the Utica Slate, there also occur isolated "patches" or "outliers" in other parts of Canada and of the United States. Along the Hudson River Valley there are many fine exposures, some of which give a total thickness of four hundred feet, (Dana). It also occurs in Virginia, Alabama, Tennessee, Ohio and Wisconsin, besides its probable recognized existence in Nevada by Dr. C. A. White (Walcott). Returning to Canada, not an unimportant outlier is that which we find in the immediate vicinity of Ottawa city. Indeed, it may be said that the deposits of Gloucester and Ottawa will give the diligent searcher many new and interesting forms of life peculiar to this formation, and as yet unrecorded in Canada. The Gloucester beds, as they are called, are pretty extensively developed, stretching out for several miles south and east of this city.

At Cumberland, Clarence and North Plantagenet, more of these outliers occur and have been recorded. There are also beds of shale belonging to this formation in the neighbourhood of L'Orignal, Ont. Another outlier, very remote from these, but of much importance is found in the immediate vicinity of Lake St. John, P. Q. This locality has yielded some very fine fossils, chiefly graptolites and trilobites. On the Islands of Anticosti and Orleans there are rocks and boulders belonging to this formation that have been drifted thither but do not occur *in situ*, as belonging to those islands.

From these facts, it may be safely predicated that the Utica seas must have occupied pretty generally the whole central portion of the North American Continent, bounded on the north by the *Laurentian Hills*, and on the east and west by the *Appalachian* and *Rocky Mountain* Ranges respectively.

THE OTTAWA AND GLOUCESTER BEDS.

These beds have proved a rich hunting ground to the palæontologist. From them the late Mr. E. Billings obtained and described many new and interesting species, and doubtless the careful collector will be well repaid for his labours in the same field. To the east of the city along the Rideau River the Utica Slate formation is particularly well developed and very rich in fossils. It also occurs at Rochesterville but the rock is brittle and almost destitute of fossils. By the Rideau we have several exposures each of which gives us a different horizon, with its characteristic set of fossils. Their stratigraphical relations are more or less obscure, yet with a little attention they can be tolerably well ascertained.

The exposure taken as representing the lowest of the series is that which is found at low water along the Rideau River at the Rifle Range.

These beds are very fossiliferous and abound especially in specimens of *pygidia* and *glabellae* of *Asaphus Canadensis*, Chapman, also *Triarthrus Becki*, Green; and crinoid stems associated with numerous specimens of *Leptæna*

sericea, Sowerby, *Lyrodesma pulchellum*, Hall, *Orthoceras lamellosum*, Hall, and species of *Orthis* and *Strophomena*, etc. It is immediately overlying this exposure that we find cropping out several bands of yellow-weathering magnesian limestone, probably similar to those found at the St. Anne River, Montmorenci. In these bands are several specimens of *Conularia Trentonensis*, Hall, *Orthoceratidae* and *Calymene callicephala*, Green, etc. The beds here dip at a small angle to the east, across the river, where, a little above and in the vicinity of the rapids, beds overlying these are seen which present new forms such as *Modiolopeis modiolaris*, Conrad, *M. anodontoides?* Hall, another *Modiolopsis*, probably a new species, associated with *Avicula insueta*, Conrad, and a few graptolitic fragments. Following the line of outcrop down the river we come to Cummings' Bridge where a very interesting deposit occurs. Here the remains of *Triarthrus spinosus*, (Billings), are abundant, some very fine and probably perfect specimens having been obtained. *T. Becki*, (Green), also occurs there, and with it very numerous specimens of *Orthoceras lamellosum* of Hall, which are often found completely pyritized. The trilobites also are often coated over with pyrites.

Graptolites occur in this deposit, but not in a very good state of preservation. With these, are also associated numerous minute linguloid shells of the genus *Leptobolus*, most of which are referable to *L. insignis* of Hall, (24th Annual Report, N.Y. State Cabinet).

The total thickness of the exposure is about ten feet, the beds presenting much fission and crumbling. The next deposit worthy of note, and but recently noticed, is that which lies beyond the track of the St. Lawrence and Ottawa Railway, to the north-east of the last mentioned deposit. The chief characteristic of this is the abundance of graptolites. Very little has been done here as yet, and it has yielded *Graptolithus pristis*, (Hisinger?) *G. flaccidus*, (Hall.) *G. annectans* (Walcott). *G. sagittarius*, (Hall). *G. quadrimucronatus*, (Hall).

The graptolites in this bed are in a very perfect state of preservation, their condition greatly facilitating the identification of the different species.

Exposures of more or less importance also occur in the village of New Edinburgh and on the Montreal Road. At New Edinburgh, during the excavations made for water-works purposes, some very interesting forms were obtained by His Excellency Lord Lorne, among which may be mentioned *Ceraurus pleurexanthemus*, (Green).

On the Montreal Road, about two miles from the Rideau River, and resting almost at the summit of an axis of disturbance in a Trenton anticlinal, we find another exposure some fifteen feet thick, consisting chiefly of *brown, brittle, and highly cleavable rock*, but very unpromising as to fossils.

Now, taking these exposures severally, in order, and observing their stratigraphical arrangement as constituting different horizons, marked respectively by different sets of fossils, and looking at them likewise in their lithological character, we obtain a series of beds, though scattered about, giving us a total thickness of probably not less than forty feet.

Notes on Some of the More Interesting Fossils from the Ottawa Beds.

1. *Conularia Trentonensis*, (Hall). Several specimens of this Pteropod have been found, as mentioned above, in the deposit at the Rifle Range. It was at first thought to be *C. Hudsonia* of Emmous, but after referring it to Principal Dawson, he writes thus:—"After careful examination I cannot make your *Conularia* distinct from *Trentonensis*. There are two species described from the Utica, *C. Hudsonia*, of Emmons, and another, but yours does not agree with either." This species has not been previously recorded as occurring in the Utica Slate either of Canada or of the United States.

2. *Triarthrus spinosus*, (Billings.) Very fine and perhaps perfect specimens of this species have been found in the Cummings' Bridge deposit. Some new

features with respect to this fossil may be worthy of being placed on record. The specimens from which Mr. Billings described and figured this species were either young and imperfectly developed, or else imperfectly preserved. The individuals besides attaining to greater dimensions, possess spines which differ in some respects from those represented. For instance, the spine said to be attached to the eighth thoracic segment, in well developed individuals, attains a total length of some twenty milimetres; in other words, is almost equal in length to the whole body of the trilobite and has a furrow or groove running throughout its entire length. In a few specimens collected at the Cummings' Bridge deposit, a spine is attached distinctly to the ninth instead of to the eighth thoracic segment as is generally the case. In addition, that spine, which is attached to the *occipital* or *neck segment*, projecting backwards over the six anterior thoracic segments, and about one-third the length of the other spine, often exhibits a similar longitudinal groove, whilst these spines often appear quite rounded or cylindrically attenuated, when completely pyritized. These spines, as well as the remaining two attached to the posterior angles of the cephalic shield, likewise grooved, and also the whole surface of the trilobite, present, under a low power of the microscope, some interesting features. There are minute tubercles scattered over the whole surface of the body and spines; on the latter they are somewhat larger in dimension. These give an appearance of striation to the spines when looked at with a lens.

Of the furrows on the glabella, besides the usual two pairs, we have a single one running in a direction transverse to the others. On each side of this furrow two crescent shaped depressions occur, similarly situated on the anterior part of the glabella and parallel to the two pairs of furrows. The precise function of these, and their place in the anatomy of the creature, the writer has not as yet been able to ascertain. Another feature about this curious little trilobite is the tubercle or short spine, (akin to those on *Triarthrus Becki*, Green, when adult) situated about the central portion of the occipital segment, immediately in front of the spine attached to this segment. Further investigation will no doubt determine the precise number of spines this species possessed; for the present, we are satisfied with stating that it possessed at least more than four spines.

Orthoceras lamellosum, (Hall). Numerous specimens of this species occur in the Cummings' Bridge deposit. These were at first referred to the genus *Endoceras* of Hall, and the species *E. proteiforme;* but after, several perfect detached septa of this species were found showing the position of the siphuncle very clearly, as being but very slightly eccentric, its nature as being that of a true Orthoceratite was revealed, only one siphuncle being evident.

Appended is a list of the fossils which have been found about Ottawa by the writer, and others, the names of whom are given opposite the fossils in the case where the writer has not also found specimens. In conclusion, my acknowledgments are due to Principal Dawson of McGill College, and Mr. J. F. Whiteaves of the Geological Survey, for assistance in naming specimens and for other information contained in this paper; and my thanks are also due to Mr. C. D. Walcott, of the United States Geological Survey, for a copy of his valuable memoir on the Utica Slate of the United States.

List of the Fossils found in the Utica Slate, in the Neighbourhood of Ottawa.

GENERA AND SPECIES.	REFERENCES.
Ptilodictya acuta.	Hall, 1847, Pal. N.Y., I. p. 74.
" recta.	Hall, Pal. N.Y., I. pl. 26, fig. 1.
Diplograptus pristis.	Hisinger ?; G. pristis, Hall.
Climacograptus bicornis.	Hall, Pal. N.Y., I. pl. 73, fig. 2.
Diplograptus mucronatus.	Hall, Pal. N.Y., I. pl. 73, fig. 1.

GENERA AND SPECIES.	REFERENCES.
Graptolithus quadrimucronatus.	Hall, Dec. II. Can. Org. Rem. pl. 13, figs. 1–10.
" flaccidus.	Dec. II. Can. Org. Rem. pl. 2, figs. 17–19.
" annectans.	Walcott, Fossils of the Ut. Sl. pl. 1, 2. 2 *a*.
Lingula Daphne.	Billings, Pal. Fossils, vol. 1, p. 47.
" quadrata.	Eichwald, (Hall, Pal. N.Y., I. p. 96.)
" obtusa.	Hall, Pal. N.Y., I. p. 98.
Schizocrania filosa.	Hall, (*Orbicula filosa*,) Hall, Pal. N.Y., I. pl. 30., fig. 9.
Leptobolus insignis.	Hall, XXIV, Ann. Rep. N. York State Cabinet.
" occidentalis.	Hall, XXIV, Ann. Rep. N. York State Cabinet.
Leptæna sericea.	Sowerby, Murch, Sil. System.
Strophomena deltoidea.	Conrad, (Hall,) Pal. N.Y., I. p. 106.
" alternata.	" " " " " 102.
Orthis testudinaria.	Dalman, Hall, Pal. N.Y., I. p. 117.
" subquadrata.	Hall, Pal. N.Y., I. pl. 32, figs. 1*a*–0.
Zygospira Headi.	Billings, Pal. Foss. p. 47.
Avicula insueta.	Conrad, (Emmons, Geol. Rep , p. 399.)
" Trentonensis.	Conrad, 1842, Jour. Acad. Nat. Sc., III. p. 240.
Modiolopsis modiolaris.	Conrad, Pal. N.Y., I. p. 294
Lyrodesma pulchellum.	Hall, Pal. N.Y., I. p. 302.
Orthodesma parallelum.	" Pal. N.Y., I. p. 299, (*Orthonota parallela.*)
Conularia Trentonensis.	" " " p. 222.
" Hudsonia.	Emmons, Amer. Geol. p. 208. (Found by F. R. Latchford.)
Bellerophon bilobatus.	Sowerby, Murch. Sil. System.
Trocholites ammonius.	Conrad, Geol. Rep. N.Y., p. 119.
Endoceras proteiforme.	Hall, Pal. N.Y., I. p. 209.
Orthoceras coralliferum.	" " " " 312.
" lamellosum.	" " " " 209–210.
Serpulites dissolutus.	Billings, Pal. Foss. I. p. 56.
Asaphus canadenis.	Chapman, Can. Journal, 1856, p. 236.
" platycephalus.	Stokes, (*Isotelus gigas*, Dekay.)
Calymene Callicephala.	Green, Monogr, p. 30.
Ceraurus pleurexanthemus.	Green, Monogr. p. 84.
Triarthrus Becki.	" " p. 87.
" spinosus.	Billings, Rep. Prog. Can. Geol. Surv. 1857, p. 304.
" glaber.	Billings, Can. Nat. Geol. IV. p. 382.

In addition to the above, it may be well to mention the following found in this locality, but so far not identified with certainty.

(*a*.) *Monticulipora*.—Several specimens referable to two species of this genus.

(*b*.) *Crinoidal stems*.—Probably those of the genus *Heterocrinus*.

(*d*.) *Modiolopsis*.—Showing both concentric lines of growth and numerous radiating lines proceeding from the anterior extremity of the shell, and extending to its margin, allied in some respects to *M. cancellatus* of Walcott, but specifically distinct from it. Only two specimens of this shell have been found. When more are obtained it may prove to be a new species.

(*e*.) *Pleurotomaria*.—Allied to *P. subconica*, (small sp.)

(*f*.) *Leperditia*.—Probably *L. cylindrica*, Hall.