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March, 1888.

THE  
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Of the  
\* Ottawa Field-Naturalists' Club \*

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## ON UTICA FOSSILS FROM RIDEAU, OTTAWA, ONT.

By HENRY M. AMI, M.A., F.G.S.

*(Read 19th January, 1888.)*

As a natural consequence of the recent annexation of the vice-regal suburb of New Edinburgh, or Rideau, to the municipality of Ottawa, this new ward has had extensive operations performed within its limits during the past summer. Rideau, for the most part, exhibits throughout its entire area the bare strata of the Utica and Trenton formations, seeing that the newer Post-Tertiaries have been almost completely swept away and denuded in times subsequent to the deposition of the "boulder clays," "Leda clay" and "Saxicava sands," which at some period covered the valley of the Rideau River. An extensive series of trenches were opened and a system of pipes laid for water supply in the various streets, to such an extent that an excellent opportunity was afforded the members of the Ottawa Field-Naturalists' Club and others of examining not only the stratigraphy of the rocks occurring there, but also of making collections in the highly fossiliferous measures brought to view and of obtaining not a few fossils of rare occurrence, many of which have proved new to the locality and a few new to science. These latter, it is hoped, will shortly be described, and communicated at one of the Club's Soirées.

Detailed sections of the strata were obtained at various points along Crichton Street and elsewhere, and these may prove valuable for both palaeontological and stratigraphical purposes. In order to give satisfactory notes on the distribution of the fossils of the Utica here as in other quarters, it is deemed advisable to insert these sections, giving the sequence of strata and the precise horizon at which most of the species mentioned in the lists to be given hereafter properly belong. In the description of the strata, their lithological character as well as the thickness of the beds and the fossil remains entombed within them and so well preserved, are given in more or less detail according as the facts were presented to the writer in the field work.

## SECTION OF UTICA ALONG CRICHTON STREET, RIDEAU.

STRATA HORIZONTAL.—IN DESCENDING ORDER.

Superficial deposits, road metal, &c. (RECENT).	4 inches.
UTICA FORMATION.	
Band of impure nodular argillaceous limestone belonging to the Utica formation.	Impure limestone, 3 inches.
Series of thin and soft brittle shaly strata, with occasional rounded concretionary masses of various sizes distributed in the softer material.	Soft, brittle shales, 14 inches.
Band composed almost exclusively of impure nodular limestone, arranged in irregular masses separated by shaly or argillaceous material.	Impure limestone, 8 inches.
Shaly strata, apparently destitute of nodular or concretionary masses, cleavage planes in the shales at right angles to the planes of stratification.	Shales, 11½ inches.
Band of partially disintegrated nodular limestone.	limestone, 6 inches.
Series of very soft earthy strata, most probably shaly at one time; but deprived of its cementing materials.	Soft, earthy strata, 10½ inches.
Band of dark-grey, hard, compact, impure limestone, not so bituminous as beds in lower part of this section, nodular and concretionary in certain portions which are probably so disintegrated as to point out the lines of conchoidal fracture in which the beds would break. Rhombohedra of calcite are rather abundant in numerous veins. Bed holding <i>Asaphus Canadensis</i> , Chapman; <i>Triarthrus Becki</i> , Green; <i>Leptæna sericea</i> , Sby; <i>Orthis testudinaria</i> Dalman; <i>Leptobolus</i> and <i>Lingula</i> , &c.	Impure limestone, 6 inches.
Dark brittle and bituminous shales, very thin and fissile, holding abundant remains of the ubiquitous shell <i>Leptæna sericea</i> , Sowerby.	Brittle shales, 3 inches.
Band of light-weathering, dark, bituminous limestone, in which were found the remains of <i>Bucania expansa</i> , Hall, and <i>Leptæna sericea</i> , Sowerby (a rugose variety of the latter).	Bituminous limestone, 10½ in., (plus).
NOTE.—Proceeding in a northerly direction, along the same street, the above bed, of which only ten and a half inches are exposed at the bottom of the trench where the section was taken, may be seen to crop out on the surface of the ground, opposite house No. 101, where the following section was observed:	
Additional five inches of dark, impure, bituminous limestone similar to above, disintegrating in certain portions of the band.	5 inches.
Hard, compact, dark, impure, bituminous shales or shaly limestone, holding abundant fossil remains: <i>O. testudinaria</i> , Dalman; <i>Leptæna sericea</i> , Sowerby; <i>Endoceras Proteiforme</i> , Hall, &c., &c.	Imp. shales or limestone, 2 ft. 1 in.
Series of black, bituminous shales teeming with fossils, typical of the Utica formation: <i>Leptæna sericea</i> , Sowerby; <i>Strophomena alternata</i> , Conrad; <i>Orthis testudinaria</i> , Dalman; <i>Zygospira Headi</i> , Billings; <i>Lyrotesma pulchellum</i> , Hall; <i>Endoceras Proteiforme</i> , Hall; <i>Asaphus Canadensis</i> , Chapman, &c., &c. (base of section).	Bituminous shales, 4 inches, (plus).

Between the *stratum* last mentioned (*supra*) and the next mentioned, there are a few inches of bituminous limestones and shales which connect them without break, and the section is thus continued in descending order :

Dark, impure, bituminous limestone band, holding <i>Leptena sericea</i> , Sowerby; and other fossil remains.	Bituminous limestone, 9 inches.
Soft, friable, purplish black, disintegrating, fossiliferous shales—very characteristic in its mode of occurrence and distributed in other portions of Ottawa City and elsewhere—holding abundance of white weathering fossil remains, amongst which were recognized: <i>Orthis testudinaria</i> , Dalman; <i>Leptena sericea</i> , Sowerby, and <i>Asaphus Canadensis</i> , Chapman.	Soft, friable shale, 8 inches.
Band of unevenly bedded, impure, bituminous limestone with <i>Asaphus Canadensis</i> and <i>Orthis testudinaria</i> .	unevenly bedded limestone, 7 inches.
Soft, friable shales, holding abundance of fossils; very similar to and evidently deposited under exactly similar conditions as the one-and-a-half inch band below: <i>Leptena sericea</i> , Sowerby, and varieties with elongate-mucronate lateral extremities, also <i>Orthis testudinaria</i> , Dalman, are present in large numbers.	Soft, friable shales, 2½ inches.
Band of light-gray, impure limestone, bituminous, and holding: <i>Orthis testudinaria</i> , Dalman; <i>Leptena sericea</i> , Sowerby; <i>Conularia Trentonensis</i> .	Bituminous limestone, 4 inches.
Thin, irregular and unevenly bedded, soft, friable, earthy shales, disintegrating rapidly, when exposed, and teeming with fossil remains. These fossils often appear on the unearthened surfaces white in colour on the brownish-gray shales. <i>Orthis testudinaria</i> , Dalman, and <i>Leptena sericea</i> , Sowerby, seem to be the two forms most prevalent, and are often so preserved as to show characteristic internal and external markings.	Soft, earthy shales, 1½ inches.
Black, bituminous, impure limestone band, with <i>Leptena sericea</i> , Sowerby; <i>Orthis emacerata</i> , Meek, and <i>Asaphus Canadensis</i> , Chapman.	Bituminous limestone, 8 inches.
Black and bituminous shales, holding abundance of organic remains, especially those of the characteristic <i>Asaphus Canadensis</i> , Chapman, of which the numbers present are exceedingly great.	Bituminous shales, 14 inches.
Band of impure, highly bituminous limestone, yielding a strong odour of petroleum, when struck with a hammer; black in colour, with irregular, sharp, splintery and conchoidal fractures, in which occur the remains of <i>Asaphus Canadensis</i> , Chapman; <i>Strophomena alternata</i> , Conrad, &c.	Impure, bituminous limestone, 11 inches.
Black, bituminous and somewhat splintery brittle shales, holding the following fossils: <i>Leptograptus flaccidus</i> , Hall; (?) <i>Sagenella ambigua</i> , Walcott; <i>Leptobolus insignis</i> , Hall; <i>Schizocrania filosa</i> , Hall; <i>Leptena sericea</i> , Sowerby; <i>Conularia Trentonensis</i> , Hall; <i>Eudoceras Proteiforme</i> , var <i>tenuistriatum</i> , Hall; <i>Asaphus Canadensis</i> , Chapman; <i>Leperdia</i> , sp. allied to <i>L. cylindrica</i> , Hall.	Bituminous shales, 7 inches.

These sections taken together give a total thickness of *fourteen feet ten inches*, so far as examined in 'Rideau,' which, with the fair

allowance of a few inches of strata, which may be styled passage-beds or beds of transition, constitute the lowest portion of the Utica formation, as it is developed at Rideau, where it overlies, perfectly conformably, the black, nodular and impure bituminous limestones of the Trenton formation, which begins immediately below these sections, and which at the northern end of Crichton street are clearly observed as thick bedded limestones, characterised by the presence of *Murchisonia bellicincta*, Hall, *Strophomena alternata*, Conrad, *Leptaena sericea*, Sowerby, monticuliporoid corals, (probably *Prasopora Selwyni*, Nicholson), etc., all eminently Trenton in *facies*.

From these beds of the Utica formation in Rideau the following species of fossils were obtained during the summer of 1887, which illustrate the palæontology of the rocks in question and indicate the fauna which swarmed in the old Ordovician or Cambro-Silurian sea about Ottawa.

#### I. RHABDOPHORA :

1. *Leptograptus flaccidus*, Hall.
2. *Orthograptus quadribrachiatus*, Hall.†
3. ?? *Sagenella ambigua*, Walcott.

#### II. POLYZOA :

4. *Helopora* sp.\*
5. *Batostoma erraticum*, Ulrich.

#### III. BRACHIOPODA :

6. *Lingula obtusa*, Hall.
7. " *Cobourgensis*, Billings.
8. " *Daphne*, Eillings.
9. *Leptobolus insignis*, Hall.
10. *Leptaena sericea*, Sowerby.
11. *Strophomena alternata*, Conrad.
12. *Orthis bella-rugosa*, Hall.
12. " *testudinaria*, Dalman.
14. " *emacerata*, Meek.
15. " sp (cf. *O. pectinella*, Conrad.)
16. *Zygospira* Headi, Billings.

## IV. LAMELLIBRANCHIATA:

17. *Ambonychia* sp. nov.\*  
 18. *Modiolopsis curta*, Hall.\*  
 19. " *anodontoides*, Conrad.\*  
 20. *Lyrodesma pulchellum*, Hall.

## V. PTEROPODA :

21. *Conularia Trentonensis*, Hall.

## VI. GASTEROPODA :

22. *Bellerophon bilobatus*, Sowerby.  
 23. *Bucania expansa*, Hall.  
 24. *Pleurotomaria subconica*, Hall.  
 25. *Metoptoma* n. sp.

## VII. CEPHALOPODA :

26. *Endoceras proteiforae*, Hall (type).  
 27. " " var. *tenuistriatum*, Hall.  
 28. *Trocholites ammonius*, Conrad.

## VIII. CRUSTACEA :

29. *Triarthrus Becki*, Green.  
 30. *Asaphus megistos*, Locke (= *Isotelus gigas*, Dekay.)  
     *vel platycephalus*, Stokes.  
 31. " *Canadensis*, Chapman.  
 32. *Calymene senaria*, Conrad.

## IX. ANNELIDA :

33. *Serpulites dissolutus*, Billings, var.

## X. OSTRACODA :

34. *Leperditia cylindrica*, Hall.  
 35. " *minutissima*, Hall.

† Also a species of *Diplograptus* besides other obscure forms.

\* Species marked with an asterisk are new to this locality.

NOTES ON GEOLOGICAL WORK DURING THE SUMMER  
OF 1887.

—  
MR. JOHN STEWART.  
—

(Read 19th January, 1888.)

During the past season, from May to September, the following places were visited by W. R. Billings, T. W. E. Sowler, and myself, and in addition to these, individual outings were made:—

Hull, May 14th, 19th, 24th, June 29th, July 1st, August 27th; New Edinburgh, May 21st, 24th, 28th, June 25th, July 9th, 23rd, September 17th; Aylmer, June 9th, 21st, July 1st; Hogsback, July 2nd; Division Street, May 29th, June 29th, July 17th, 24th, August 7th, 14th, 21st; Mount Sherwood, June 5th, 26th; Little Chaudiere, Sept. 24th; Paquette's Rapids, September 5th to 12th.

To avoid repetition, it is not considered necessary to mention all specimens found during these pleasant trips, but only such as are new, either to the locality, or to the formation under which they are mentioned, or to science, although many interesting, beautiful and instructive finds were made in addition to the following:—

TRENTON FORMATION.

CRINOIDS.

LOCALITY.

Taxocrinus, N. Sp. ....	Hull.
Carabocrinus, N. Sp. ....	Division Street.
Anomalocrinus, ? N. Sp. ....	Hull.
One species each of two new genera of Crinoids. ....	Hull.

BLASTOIDS.

A species of a new genus of Blastoids. ....	Division Street.
---	------------------

GASTEROPODS.

Fusispira terebriformis. ....	Hull.
Metoptoma erato. ....	Hull.

BRACHIOPODS.	LOCALITY.
<i>Camerella panderi</i> .....	Hull.
<i>Lingula riciniformis</i> .....	Hull.
do <i>kingstonensis</i> .....	Hull.
<i>Orthis borealis</i> .....	Division Street.
<i>Orthis pectinella</i> .....	Division Street.
<i>Orthis plicatella</i> .....	Between G and H, Con. C, Nepean.

### UTICA FORMATION

#### BRACHIOPODS.

<i>Lingula cobourgensis</i> .....	New Edinburgh.
<i>Strophomena camerata</i> ? or <i>Imbrex</i> ?.....	New Edinburgh.

### POST TERTIARY.

Nodules containing the following new species have been obtained from Green's Creek and Ottawa River:—

3 Starfish, 1 Leaf, 1 Small plant.

### CHAZY FORMATION.

Several undetermined species of <i>Lophospira</i> , <i>Scalites</i> , <i>Ctenodonta</i> , <i>Lingula</i> , <i>Rhynchonella</i> and <i>Leperditia</i> , which Mr. Sowter is now studying.	} Hogsback and Aylmer.
---	---------------------------------

Mr. Billings, Mr. Sowter and myself have had the honor of sending to Professor Charles Wachsmuth of Burlington, Iowa, specimens of Crinoids from our collections for purposes of illustration in the valuable monograph on the Palæocrinoidæ of North America which he is engaged in writing. This is a loss to the literature of the Club, as these new species and genera would under other circumstances have been described by Mr. W. R. Billings. The trip to Paquette's Rapids from September 5th to 12th was a much enjoyed period of the season's work, and although outside the ordinary limit of the Club's field of operations, this section of workers considers that the enlargement of the scene to include this favored spot, on account of the exceedingly beautiful specimens obtained there,—if for no other reason, and there are many others—would be a step in the right direction.

## REPORT OF THE GEOLOGICAL BRANCH FOR THE SEASON OF 1887.

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

In presenting this the seventh annual Report of the Geological Branch of the Club, the leaders have much pleasure in stating that a continued and increasing activity has characterized the past season's work, and that in many instances rare and interesting discoveries have been made in the strata of rocks so developed in and about Ottawa. This region, in which there has been a considerable number of workers in geology for years past, nevertheless contains abundance of material as yet unfound, and only awaiting the keen and observant eyes of the members of this Club.

As years go on this branch of the Club's work appears to develop more and more, so that whilst a goodly number of our members are actively engaged in working up the "Geology of Ottawa" in its interesting details, the field is so vast and the materials so plentiful and near at hand that there is room for a small army of geologists, such as our city, from its natural position, could well produce, all of whom would find ample scope for specialties in different lines of enquiry.

Appointed by your Council, last spring, to lead the various parties interested in geology at the excursions and sub-excursions of the Club, your leaders have striven to do their utmost in furthering the aims of the Club in this direction, so that scarcely a single one of these excursions was undertaken and conducted without one or other of the leaders being present.

Certain years often present advantages for working up definite formations, and whilst the season of 1886 was particularly favorable to the students of the Post-Tertiary, from the fact that the streets of our city were excavated to depths ranging from eleven to eighteen feet for sewage purposes, thereby exhibiting the glacial and post-glacial deposits, the season of 1887 has seen the vice-regal ward opened up and cut through to a considerable depth, exposing in a beautiful manner the perfectly conformable contact of the Utica and the Trenton formations. The former consisting of bituminous shales and alternating limestones, is replete with exquisitely preserved fossil remains, many of which were collected and proved new to this locality.

From the 7th of May to the 18th of November, inclusive, *i. e.* from the time when the ground was first rid of its proximate winter covering to the time when a few inches of snow had already fallen, sub-excursions and excursions were held to various objective points. On such occasions, the leader who happened to be present usually addressed the members, giving in a general way the summary of the day's outing and results in geology. These have already been reported upon in the OTTAWA NATURALIST, which each member has received every month.

It is gratifying to record that during the past season ladies interested in geology joined the geological section, and were at various outings, and actively engaged in collecting specimens.

On several occasions members had the pleasure of going out on excursions or sub-excursions with distinguished men, non-residents of Ottawa, actively engaged in geological research. This year Mr. G. F. Matthew, of St. John, N.B., Prof. L. W. Bailey, of the University of New Brunswick, Fredericton, and Mr. N. Saint Cyr, of the Department of Public Instruction, Quebec, were amongst those who visited us, and were shown to places of interest where collections were made and named by one of the members.

In this year's report it has been deemed advisable not to publish the results of the season's work under the various formations, notwithstanding the undoubted usefulness of that scheme, but in the form of "Notes," or contributions to THE NATURALIST, and to be read at the winter soirées by the individual workers.

In conclusion, the leaders are confident, judging from the very encouraging season's work just closed, that there is every prospect of progress in the elucidating in the years to come of the various formations about Ottawa. The want of a good topographical map, however, has long been felt, and if there were such one the geological boundaries of the various formations as known at present could be laid down, with a view to forming a basis for further study, as this region is considerably faulted and disturbed at many points which are of great interest.

January, 1888.

HENRY M. AMI,  
C. F. MARSAN, O.M.I.,  
JOHN STEWART, } Leaders.

\* Abstract of Meteorological Statistics at Ottawa, June 1886 to May 1887, inclusive.

	MONTHS.												Year.
	1886.												
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	
Average height of barometer at 32° and reduced to sea level.....	29.908	29.887	29.925	30.045	30.134	29.908	30.106	29.982	30.171	29.975	29.974	30.016	30.003
Highest barometer.....	30.183	30.186	30.277	30.454	30.586	30.460	30.716	30.746	30.882	30.917	30.622	30.288	30.917
Lowest barometer.....	29.368	29.681	29.638	29.608	29.328	28.996	29.200	29.255	29.068	29.376	29.163	29.577	28.966
Monthly annual ranges.....	0.815	0.495	0.639	0.845	1.260	1.461	1.516	1.511	1.824	1.541	1.429	0.721	1.921
Average temperature of the air.....	62.64	67.14	65.19	56.15	45.81	31.61	10.66	4.33	11.74	17.16	24.14	62.62	39.10
Difference from average (12 years).....	-3.28	-2.77	-2.05	-1.77	+0.53	+2.03	3.87	-5.02	+0.94	-4.62	-4.28	+7.24	-1.44
Highest temperature.....	76.5	89.1	85.6	85.4	75.3	65.2	35.3	38.4	41.9	36.3	59.2	80.6	80.6
Lowest temperature.....	40.2	44.0	46.2	30.0	20.3	-0.1	-23.3	-31.6	-17.2	-13.2	-9.8	34.3	-31.6
Monthly range.....	36.3	45.1	39.4	55.4	55.0	65.3	60.6	70.0	59.1	49.5	62.0	55.3	121.2
Average maximum temperature.....	69.10	73.95	72.85	65.34	56.34	38.20	19.38	15.07	22.13	26.42	42.55	74.57	.....
Average minimum temperature.....	51.65	55.94	55.09	46.33	35.27	23.37	1.75	-7.71	1.28	8.81	24.21	47.07	.....
“ daily range.....	17.45	18.01	17.74	18.84	21.07	14.83	17.63	23.68	20.85	17.58	18.34	26.50	19.38
Average pressure of vapour.....	0.455	0.518	0.498	0.376	0.261	0.153	0.076	0.064	0.081	0.098	0.174	0.374	0.261
Average humidity of the air.....	80	79	80	82	83	89	127.	90	94	94	86	66	84
“ temperature of the dew point.....	58.4	60.0	58.9	51.3	41.4	28.0	12.7.	8.7	13.7	18.0	31.0	51.0	41.4
Amount of rain in inches.....	2.11	6.77	3.47	3.09	1.79	0.35	R	0.25	0.00	0.00	2.88	0.39	23.00
Difference from average 12 years.....	+0.91	+4.13	+1.35	+0.96	-0.75	-0.96	-0.65	-0.33	-0.16	0.65	+1.78	-2.33	+2.62
Number of days of rain.....	19	17	11	17	11	4	1	1	0	0	1	4	88
Amount of snow in inches.....	.....	.....	.....	.....	S	14.7	23.5	38.5	67.2	36.0	0.5	.....	182.4
Difference from Average (12 years).....	.....	.....	.....	.....	-1.4	+4.2	-27.2	+15.4	+48.2	+19.4	-6.7	.....	+52.0
Number of days of snow.....	.....	.....	.....	.....	2	11	10	15	11	9	1	.....	59
Percentage of sky clouded.....	61	43	47	50	70	50	50	61	58	46	43	41	51
Average velocity of wind.....	4.44	3.90	3.47	4.22	4.86	6.94	4.53	5.62	7.35	7.44	5.03	3.84	5.14
Auroras.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

\* *NOTE*.—This Abstract has been kindly furnished by Prof. Cymprup, Director of the Meteorological Service of Canada.

## SOIREES.

FOURTH.—On Wednesday, the 2nd February, Mr. Henry M. Ami contributed a note on the "Sequence of Geological Formations about Ottawa," after which Mr. James Fletcher read a very interesting and valuable paper on "Vegetable Parasites." As these papers will appear in future numbers of THE OTTAWA NATURALIST, it is not necessary to give any abstract of them here. They were followed by a lengthy discussion, principally upon the degree of parasitism which might be correctly attributed to *monotropa* and *comandra*. Prof. Macoun considered that those present had listened to a paper of unusual interest and clearness of statement, and supported Mr. Fletcher in his views on the parasitism of the above named plants. Dr. Baptie on the other hand was of the opinion that *comandra* was capable of existing quite independently of any other plant, as it was well supplied with roots, while the attachments to the roots of other plants were few in number. Prof. Macoun said that this plant belonged to the order next to that in which the mistletoe was placed, and in his opinion was at least semi-parasitic. He found it impossible to dry this plant green, and this fact would, as mentioned by the lecturer, point to the absence of true chlorophyll. With reference to *monotropa*, Dr. Baptie held that it was not parasitic, or that at least there was no evidence of parasitism, and he thought that the intermediary stage suggested by Mr. Fletcher, had as yet no grounds for acceptance. No connection of *monotropa* with the roots of any plant had yet been recorded, and no person had ever seen the underground root-growth which had been suggested. Mr. Fletcher in reply said it would be almost impossible for any one to observe this stage, on account of the growth being entirely underground, but he trusted attempts would be made to grow the plant from seed, and so definitely settle the question. Mr. R. B. Whyte supported the idea that the plants mentioned were in a greater or less degree parasitic, according as they showed the presence or absence of chlorophyll. A short discussion then followed on the paper which had been read by Mr. Ami, chiefly with reference to the prospects of natural gas being found near Ottawa in quantities available for economic purposes. Mr. J. Stewart, Rev. Prof. Marsan, Prof. Macoun and Mr. Harrington joined in this discussion, as well as Mr. Ami. A fine series of the parasitic plants mentioned in Mr. Fletcher's paper was exhibited by Prof. Macoun.

## AFTERNOON LECTURES.

FIRST.—On Monday, 9th January, Prof. Macoun gave the first of a course of Afternoon Lectures arranged—as in former years—for the purpose of introducing the study of the several Branches of Natural History to the members of the Club, and also to any persons desiring to profit by the instruction offered gratuitously by the Club. The subject discussed was Ornithology, and the wider principles of the classification of birds were presented in a clear and interesting manner. Specimens of the skins of well-known species were exhibited in illustration of the structural differences pointed out. The address was followed by an instructive discussion on the food habits of certain species.

SECOND.—Mr. Ami was to have delivered the lecture on Monday, 16th January, taking as his subject Geology, but as he was unfortunately prevented by sickness from being present, his place was taken by Prof. Macoun, who gave a most agreeable address upon the same subject. He outlined in a graphic manner the supposed formation of the earth, passing from the gaseous, through the liquid condition, until by cooling, the mineral substances were precipitated, and the land, water and air were formed. The appearance first of plant life, and then when the atmosphere had been freed from its carbonic acid gas—the carbon being deposited in the form of coal—of air breathing animals was briefly sketched, and the geological evidences of their development noted. The importance of geology in this connection was thus forcibly shown, and the necessity for its careful study made apparent. In the discussion that followed Mr. Ballantyne expressed himself as fully believing in the theory of evolution of species, as opposed to that of specific creations.

THIRD.—On Monday, 23rd January, Mr. Henry M. Ami gave a most interesting address on the study of Geology: This science he stated dealt with the origin of our planet, the formation, rise and fall of continents. It was the physical history of our earth, as well as the physical geography. He then briefly considered the advent of life on earth; its progress in time; the characteristic floras and faunas of different epochs; the time when certain types were introduced, and the periods of their abundance and decay. The economic minerals deposi-

ted during the different geological epochs were next discussed, and the origin, mode of occurrence and distribution of some of the commoner ones, such as coal, petroleum, lead, silver, copper, iron, gold and phosphate were touched upon. Mr. Ami showed that the study of Geology was useful, healthful and interesting, and that it was not so difficult as to deter any of his hearers from entering its attractive fields. In investigating the geological features of any locality, a few fundamental principles alone were necessary for the beginner. The leading rocks occurring about Ottawa were then considered, with the different formations exhibited. There were two well defined series of rocks; those of igneous and those of aqueous origin. The Chelsea hills afforded examples of the former, whilst the Parliament Hill belonged to the second, being of sedimentary origin. The various ways in which such stratified rocks were formed were briefly outlined, and the sequence given of the formations found at Ottawa, with the forms of life which characterize them. In conclusion Mr. Ami referred to the extensive fields open for study at Ottawa, and made an earnest appeal to those present to become workers.

A number of specimens were exhibited, amongst which was one of "mountain cork," a mineral of rare occurrence, which had been sent to him by Mr. Warwick, of Buckingham. Several interesting points were discussed by Messrs. Stewart, Fletcher, Whyte and the lecturer.

FOURTH.—On Monday, 30th January, a valuable address was given by Mr. F. R. Latchford on Conchology. Shells, he stated, were portions of certain animals called Molluscs, and were objects in many instances both of utility and beauty, while the softer portions of many species, such as the oyster, mussel, and clam, furnished large supplies of palatable and nutritious food. They might conveniently be divided into two great groups, viz., univalves and bivalves. The latter were represented more largely in America than in any other part of the world. In the basin drained by the Ohio River for instance there were found about three hundred species of Unionidae, whilst all Europe furnished only seven or eight. While freshwater shells of some families were well represented in Canada, the land shells diminished greatly both in species and individuals as these northern latitudes

were obtained, and one family which only affords one species here has hundreds of species in the Southern States. Our land molluscs could, with a few exceptions, be placed in two groups, the Helicidae and the Limacidae, the latter containing the slugs, or species having rudimentary shells. Our species were not climbers, and were to be looked for mostly in damp situations. The larger species could be obtained by turning over logs and stones where the ground was rich and moist, and many of the smaller forms occurred plentifully in the same situations but required to be closely searched for. The small species could also be obtained by collecting moss, grass, leaves, etc., from suitable localities and sifting these materials. Of water shells, such as the Limnæidae, the greatest abundance would be found in warm shallow bays, while the Unionidae were to be searched for when the water in rivers and lakes was at the lowest stage. Other forms would best be found in the rapids of streams at low water. Some admirable directions for cleaning and preserving specimens were given, and mention made of certain books for reference, and of the value of exchanging with collectors elsewhere.

Mr. Latchford exhibited a number of beautiful specimens which were greatly admired by all present, and an interesting discussion followed in which Messrs. White, Harrington, Fletcher, Macoun, Small and Ami took part.

FIFTH.—On Monday, the 9th February, Dr. H. B. Small was unable to be present to deliver his promised talk on Zoology, but Prof. Macoun very kindly filled the gap and gave an admirable elementary discourse on the vertebrates, omitting the birds, of which he had already spoken on a former day. Of the fishes, which stand at the bottom of this division of animal life, we had still surviving in the Ottawa river representatives of some of the earliest, and lower forms, in the gar-pike, or bill-fish, and the sturgeon. Regarding many of the numerous species of fish found in the varied and extensive waters of this region scarcely anything was known, especially of the smaller forms, and it was most desirable that some member of the Club should take up the study. The influence of habitat upon the size of trout and other fish was well illustrated. Of the Reptiles, mention was first made of the three genera of Anura which occur here, and which

include our toads, frogs and tree frogs; then the salamanders were briefly discussed. Of our snakes and turtles much remained to be learned, and special attention should be given to their study and collection. Passing on to the Mammals, the speaker gave a very interesting comparison of the marsupials, or pouched mammals, now chiefly found in Australasia, with the placental forms which are elsewhere found. The different groups, such as the rodents, ungulates and carnivores were outlined, and finally reference was made to man and the evidences of his existence in bygone days.

In the discussion which followed, further interesting points were brought forward by the several speakers and by Prof. Macoun's reply to them, especially in regard to the failure of the Normal and other public schools to teach Zoology, which was brought forward by Mr. J. Stewart. Mr. Harrington exhibited a fine specimen of *Hesperomys leucopus*, the white-footed mouse, which he had trapped the previous night in his shed. Attention was called to the great beauty of this native field mouse and a few remarks were made on its habits. The President, Mr. R. B. Whyte, urged the collection and study of our small mammals, of which there are many species but little known to the members. Mr. Ami made some remarks on the abundance of the lower forms of animal life and the interest attaching to their study.

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### ANNOUNCEMENTS.

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SOIRÉES.—As the Soirée fixed for the 16th February, had to be postponed because the Concert of the Philharmonic Society took place upon that date, two of the evening meetings still remain to be held, and will be as follows:—March 1st, A Paper by Mr. J. Ballantyne upon "Our Squirrels" and Reports of the Botanical and Entomological Branches; March 15th, A Paper by Mr. A. O. Wheeler entitled "Autumn on the Ottawa," and Reports of the Conchological and Ornithological Branches.

MONDAY AFTERNOON LECTURES.—February 29th, Mr. R. B. Whyte on Botany; March 5th, Prof. Macoun on Mosses; March 15th, on Classification of Plants.

ANNUAL MEETING.—March 20th, Third Tuesday in month—the Annual Meeting for Election of Officers will be held at 4.15 in the Museum of the Ottawa Literary and Scientific Society. A full attendance of the members is greatly to be desired in the interests of the Club.

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