1901. VOL. XV. 1902.

THE

OTTAWA NATURALIST,

Being Vol. XVII. of the

TRANSACTIONS

OF THE

OTTAWA FIELD-NATURALISTS' CLUB.

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OTTAWA, CANADA:
OTTAWA PRINTING COMPANY (LIMITED.)
1901.

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THE OTTAWA NATURALIST.

VOL. XV. OTTAWA, APRIL, 1901. No. 1.

THE REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING MARCH 19TH, 1901.

MEMBERSHIP.

Thirty-one members have been added to the Club during the year and nineteen names have been struck off, leaving the present membership two hundred and sixty-five.

Dr. H. M. Ami, the president, represented the Club at the meeting of the Royal Society of Canada, held in this city in May, at which he read a summary report of the work done by the Club during the year 1900.

SPECIAL LECTURES.

Dr. James Fletcher delivered two lectures on "Nature Study, with special reference to Birds," before the Normal School students, and Dr. Ami one on "Soils and their Origin, with special reference to those of the Ottawa Valley."

SOIRÉES.

The programme of Winter Soirées, as printed on page 176 of THE OTTAWA NATURALIST for December, 1900, was carried out with the following exceptions: The meeting for the 22nd of January was postponed for one week on account of the death of Her Majesty Queen Victoria; and the meeting for 6th March was put off till 12th March on account of the death of Dr. G. M. Dawson, a former president and an active member of the Club. In consequence of the latter postponement, the two papers that would have been read last Tuesday have been presented to-night.

Owing to the absence of Mr. W. T. Macoun from the city, his paper was taken as read, and Mr E. D. Ingall was unable to give his.

EXCURSIONS.

The first sub-excursion of the season was held on the 28th April at Rockliffe and Beechwood. About twenty were in attendance. The afternoon was pleasantly spent, but the backwardness of the season made it very difficult to find specimens of interest. Hepaticas, a few Trilliums and Dogtooth Violets, with Aspens, Willows, Red and Silver Maples, together with a few common spring flowers were all that rewarded the botanists. Mr. Gibson secured some specimens of *Grapta Faunus*, an uncommon butterfly in this district.

Three sub-excursions and one general excursion were held in May. The weather at all of these was perfect, and most pleasant and profitable outings were enjoyed.

Saturday, 5th May. Some sixty members and their friends visited McKay's Grove and Beechwood. That portion of the grove adjoining Clarkstown is being rapidly denuded of its wild character, but the botanical students found a variety of early spring flowers. The geologists examined the Keefer Bluff at the forks of the roads leading to the cemetery and found a series of typical fossils belonging to the Black River formation. Several large masses of the Coral *Tetradium fibratum* were obtained in the upper layers of limestone in the old quarry at this spot.

On re-assembling, Mr. Odell described and exhibited the larvæ of some Mosquitoes, and also some Crustaceans he had captured. Mr. Attwood spoke on the plants found during the afternoon, and Dr. Ami described the geological formations.

Saturday, May 13th. Seventy-five members of the Club, Normal School students, teachers and friends visited Beaver Meadow, Hull, P.Q. The botanists found many desirable species of plants and the entomologists captured several good specimens, while the geologists visited "the Heap" on the Aylmer branch of the C. P. R., where they found and listed over thirty species of fossils of the Trenton formation. Dr. James Fletcher, Mr. A. G. Kingston and the President addressed the members before separating.

Saturday, 19th May. Over eighty excursionists spent the afternoon at Hemlock Lake and vicinity. Two small colonies of *Columnaria Halli* were found in the upper strata of the Black River formation at Keefer's Bluff, and both fresh-water and marine shells were found in the Pleistocene deposits round Hemlock Lake. These and other specimens were described by the various leaders before the party returned to the city.

On 9th June a successful meeting was held at Britannia, and many summer flowers and insects were secured.

The first general excursion was held on May 26th to Gilmour's Grove at Chelsea and was, as is always the case, a delightful and instructive excursion. The weather was very fine and the attendance large. Many interesting specimens were collected in all branches of Natural History.

The second general excursion was to Cumberland by the steamer Victoria, in which over one hundred members left Ottawa at one o'clock and returned in the evening by the steamer Empress, after spending several pleasant hours at the beautiful village of Cumberland. This locality is a new field for investigation, and several discoveries were made. The entomologists were much pleased at securing a specimen of the larva of the Large Tortoise-shell Butterfly, *Grapta J-album*, which had been sought for unsuccessfully for many years. The geologists found several valuable species of fossils, and the botanists succeeded in collecting representatives of no less than sixteen species of ferns along the side of the cliff.

The third general excursion was to Kirk's Ferry on the 15th September, when about 150 were present. The day was a perfect type of our Canadian autumn weather, and many interesting specimens were collected and observed. An unusual feature was the large number of plants which were in bloom at this late season, and many of the party were able to regale themselves with ripe raspberries, which were growing in profusion along the railway embankments.

At all these excursions the members assembled and listened to addresses by the various leaders on the collections made during the day and on the natural features of the places visited.

Volume XIV. of THE OTTAWA NATURALIST, containing eleven numbers and 240 pages of text has been completed, under the

editorship of Dr. James Fletcher. The volume has several illustrations and many interesting articles. Among the more important papers published this year are the following:

Some Interesting Moths taken at Ottawa, by Arthur Gibson.

Contributions to the Natural History of the Northwest Territories. The Birds of Southern Saskatchewan, by Eug. Coubeaux.

Soils and the Maintenance of their Fertility through the Growth of Legumes, by Frank T. Shutt.

The Labrador Flying Squirrel, by J. D. Sornberger.

The Two-lined Salamander, by Walter S. Odell.

Notes on Rare Birds occasionally Breeding in Eastern Ontario, by Rev. C. J. Young.

Ornithology (in several numbers), by W. T. Macoun.

Additions to North American and European Bryology (Moss Flora), by N. Conrad Kindberg.

On the occurrence of a Species of Whittleseya in Nova Scotia, by H. M. Ami.

An Ornithological Incursion into Florida, by W. E. Saunders.

A Condensed Summary of the Field-work annually accomplished by the Officers of the Geological Survey of Canada from its commencement to 1865, by D. B. Dowling.

Notes bearing on the Devono-Carboniferous Problem in Nova Scotia and New Brunswick, by Dr. H. M. Ami.

Fauna Ottawaensis, Diptera, by W. Hague Harrington.

The Finding of a Flamingo's Nest, by W. E. Saunders.

Dr. Nansen's Scientific Results, by Prof. E. E. Prince.

Gannets and Cormorants, with special reference to Canadian forms, by Andrew Halkett.

Hemphillia glandulosa, by Geo. W. Taylor.

Catalogue of the Recent Marine Sponges of Canada and Alaska, by Lawrence M. Lambe.

Description of a New Species of Unio from the Cretaceous rocks of the Nanaimo Coal Field, V.I., by Dr. J. F. Whiteaves.

A Preliminary Note on the Amygdaloidal Trap Rock in the Eastern Townships of the Province of Quebec, by John A. Dresser.

The Nesting of the Cærulean Warbler, by W. E. Saunders.

The Annual Address of the President of the Ottawa Field-Naturalists' Club, by Dr. H. M. Ami.

Notes on the Acadian Owl (*Nyctala Acadica*) in captivity, by F. Norman Beattie.

Notes on some Land and Fresh Water Mollusca from Fort Chimo, Ungava Bay, by Dr. J. F. Whiteaves.

Notes taken in the Peace River, Athabasca, and adjacent country, by J. A. Macrae.

Two Warblers new to Canada, by W. L. Kells.

Besides these longer papers there are numerous short notes on scientific subjects, book reviews, etc.

The Treasurer reports that after paying all expenses he has $256.46 on hand.

The Council recommends that the following gentlemen be made corresponding members of the Club in recognition of valuable services they have rendered to the Club and to science, viz: Prof. H. F. Wickham, of Iowa State University, and Mr. Theodor Holm, Assistant Botanist of the Department of Agriculture, Washington, D.C.

A special prize was offered by the Hon. G. W. Ross, Minister of Education, to the student of the Normal School doing the best work in Natural History in connection with the Club's work. The prize was awarded to Miss Elma Cannon, of Athens, Ont., for the best collection of botanical specimens made during the season. A second prize was given by the President, Dr. Ami, and was awarded to Miss May E. Robson, of Grey Co., Ont.

A memorial portrait of the late Elkanah Billings has been presented to the Geological Survey Department by a committee of the Club, as recorded in the OTTAWA NATURALIST for January last.

The hearty thanks of the Club are again due Dr. J. A. MacCabe for giving the use of rooms in the Normal School for our library and for holding Council meetings, and for the use of the Assembly Hall and lantern on two evenings. We have also to acknowledge our indebtedness to the Young Men's Christian Association for the free use of their Assembly Hall for ordinary meetings; to Mr. D. B. Dowling, Mr. Putman and other gentlemen who assisted in operating the lantern at different lectures, and to the daily newspapers for inserting notices of our meetings.

HENRI AMI, President.

W. J. WILSON, Secretary.

TREASURER'S REPORT FOR THE YEAR 1900-01.

To the President and Members of the Ottawa Field-Naturalists' Club.

The Treasurer begs to report that the finances of the Club are in a satisfactory condition. It will be seen by the statement submitted herewith that about 225 members have paid their subscriptions. The advertisements realized a little more than last year, and the Treasurer wishes again to speak emphatically to the members of the Club of the duty we owe to those firms who help us every year by advertising in THE OTTAWA NATURALIST. It will be seen by examining the list of firms who advertise with us, that they are all first-class houses, which will supply goods at least equal in quality to those obtainable anywhere else, and it is only reasonable that these firms should expect to receive an increase of business from the members of the Club, whose interests they serve by advertising in the Club organ. I am quite well aware that many members of the Council do make a point of dealing with these firms, but I believe even more can be done by other members of the Club. For my own part, I always make a point, occasionally even at some little inconvenience, to deal with those who have shown a substantial interest in this Club because it is in an organization in which I am keenly interested. Most matters in this world are arranged on a *quid pro quo* basis, and I leave this matter with the members of the Club, asking them to bear it in mind.

THE OTTAWA NATURALIST has contained many valuable papers, several of which were well illustrated. The printers have done their work satisfactorily, and the cost of the monthly magazine, including illustrations, extras for authors, postage and editing, has amounted to $400.16. Miscellaneous printing has cost $24.55. The conversazione and soirée expenses have this year cost us only $10.82, and there is now a satisfactory balance on hand of $256.46. From this a small amount must be deducted for illustrations which have been ordered but have not yet been received.

Your obedient servant,

JAMES FLETCHER,

Treasurer.

N.B.—All subscriptions are payable in advance, and are due each year on the day of the annual meeting.

—*We patronize our advertisers.*—

THE OTTAWA FIELD-NATURALISTS' CLUB.

The Treasurer's Statement for the year ending March 19, 1901.

RECEIPTS.					
1900.					
March 20—To balance			$146	30	
Subscriptions, 1900-01	$136	50			
,, arrears	89	00			
			225	50	
Advertisements			76	10	
Extras sold			21	30	
OTTAWA NATURALISTS sold			3	70	
Government grant			200	00	
Profit on excursions 1 and 2			11	80	
Electrotypes sold			8	00	
			$692	70	

EXPENDITURE.						
1901.						
March 20.—By printing OTTAWA NATURALIST, Vol. XIV			$256	90		
Illustrations			39	40		
Authors' extras			33	90		
Postage and wrapping			19	96		
Editor			50	00		
			400	16		
Less 5% allowed on printing a/c $297	05	15	15			
					385	01
Miscellaneous printing			18	95		
Programmes			2	00		
Receipt books			3	60		
					24	55
Stationery					2	25
Conversazione expenses					10	82
Typewriting of report					2	00
Telegram						31
Postage					5	80
Loss on excursion 3					5	15
Exchange on drafts						35
Balance in Bank					256	40
					$692	70

Audited and found correct.

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JAMES FLETCHER, *Treasurer.*

THE LATE DR. G. M. DAWSON, C.M.G., F.R.S.

The Ottawa Field-Naturalists' Club here places on record an expression of its deep sense of sorrow and loss at the death of Dr. George M. Dawson, C.M.G., F.R.S., F.G.S., F.R.S.C., &c., Director and Deputy Head of the Geological Survey of Canada, who was President of the Club for the years 1892, 1893 and 1894.

By his death Canadian science loses one of its most brilliant and distinguished leaders; one who by his varied intellectual gifts and ceaseless labours substantially advanced the scientific and material interests of the Dominion during the last quarter of a century.

NATURAL HISTORY IN YUKON TERRITORY.

A letter has been received from Mr. J. B. Tyrrell, now living in Dawson City but formerly of Ottawa, and who has published several very valuable papers in THE OTTAWA NATURALIST, stating that Mr. William Ogilvie and some of the other residents of Dawson are making an effort to start a Yukon Museum in which all the natural products of the country are tobe represented:—rocks, minerals, plants, animals, birds, insects, etc. The local Government is much interested in the undertaking, and a building has been promised for this spring.

Mr. Tyrrell has been chosen as curator for the time being, and there is no one in the Yukon so well fitted to fill this post. Mr. Tyrrell's long experience as a traveller and collector, and in the Museum while on the staff of the Geological Survey, will enable him to do most valuable service in organizing and starting the work at the outset in a systematic and useful manner.

J. F.

BOTANICAL NOTES.

RATTLESNAKE PLANTAINS. *Goodyera repens*, supposed to be a common plant in the vicinity of Ottawa, is not represented among the specimens so named which I have seen. *G. tesselata*, *G. repens* var. *ophioides* and *G. pubescens* have all been collected within the area covered by the Club's work. The true *G. repens* is a northern species and may yet be found in the Gatineau Valley. *G. Menziesii* may also be found here as it has been collected in New Brunswick, Quebec and Western Ontario. A revision of this genus was published in *Rhodora*, Vol. I, No. 1.

ASTER VIMINEUS. We have in the vicinity of Ottawa both *A. vimineus* and the variety *saxatilis*, Fernald. The variety is a slender plant and easily separated from the species by its stiff, ascending branches terminated by a solitary head. It has been collected at Paugan Falls and Casselman.

J. M. M.

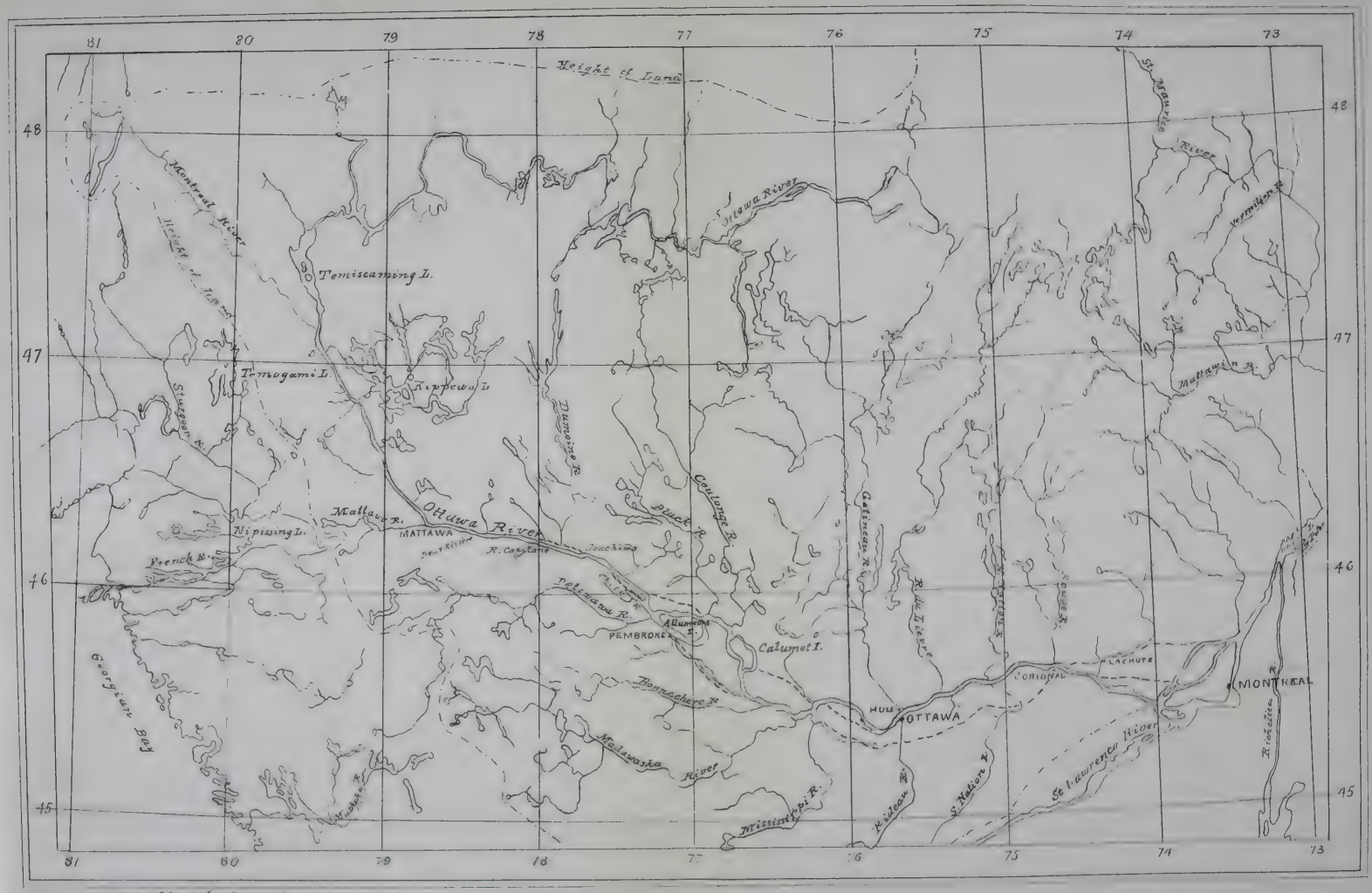
BIRD NOTES FROM POINT PELEE, ONT.

By HARRY GOULD, London.

(Read before the London Ornithological Section of the Entomological Society of Ontario.)

Point Pelee, in Essex County, is a narrow spit of land jutting out into the lake at the west end of Lake Erie. It is interesting in many ways; looking at it from Leamington, about 12 miles distant, one might imagine that a huge Cleopatra's needle had ages ago toppled over and was now lying on its side with the tip stretching out into the lake. Judging from the chips of flint and other indications this point was in times gone by a favourite resort for Indians. Fish and game of all kinds would be plentiful and it is known that many years ago a number of whites were murdered here by the red-skins for the sake of their belongings. It was not, however, to study the archæology of this interesting locality that my friend Mr. W. E. Saunders and I visited it on Sept. 19th and 20th 1900, but on account of it being such a favourable place for the crossing of birds during migration. There is perhaps nothing so interesting in connection with the study of our native birds as their arrival in spring and departure in autumn. We listen with delight in early spring to the first sound of the Bluebird or Robin and with sadness in the fall, to the chirp of the little bird over head at night as he seems to say good bye. Point Pelee is 10 miles from the base to the tip and 4 miles across the base, from which it gradually tapers the whole distance to the tip. A great part of the base has a government ditch or dyke running through it rendering it very good farm land. On the east side towards the tip is a marsh which is rented to a gun club for duck shooting, but on the west side is natural wood-land, which gets more stunted in growth as the tip is approached. Across the lake to the west, about 8 miles distant, is Pelee Island and further south are several smaller islands called the Sister Islands making it a very easy passage for birds crossing the lake into Ohio. With all these advantages it is only natural to suppose a great many of our birds cross at this particular point. Upon the evening of September

19th last Mr. Saunders and I arrived at Leamington about 7.30 p.m. and started on our tramp by going about 5 miles towards the lake on the east side of the point and camping for the night near the road in a little wood where our first bird the Great Horned Owl was noted, as well as a small bird or two journeying overhead. At daylight we were on the move for the lake shore but before reaching it we saw a number of Marsh Harriers and a small flock of ducks, possibly Black Ducks. Feeding in a weedy patch near the road were a number of Dickcissels. The lake was soon reached and having a nice sandy beach we expected to find waders and gulls. The first to be noted were the Herring, the Ring-billed and Bonaparte gulls, Black-billed, Semipalmated, Golden and Kill-deer plovers, Sanderlings and Baird's Sandpiper. Skimming past the Common and Black Terns were seen. By noon the tramp is beginning to tell and we halt to rest and get dinner. The lake water has to be boiled, and the drifting sand plasters the bread and butter but being hungry everything goes and we are soon off again. In passing the open water of the Marsh we were able by the aid of glasses to identify the Horned Grebe. Evening found us at the point and having walked all day in the sliding sand and thinking that enough was as good as a feast, we camped for the night under a scrubby red cedar. Next morning, breakfast over, a start was made back up the west shore, where owing to the woods we expected to find very different birds ; the first specimens noted were a pair of Cooper's Hawks and Sharp-shinned Hawks were to be seen all day while the small birds which they caught napping were many, as was evidenced by the bunches of feathers found here and there through the woods. Warblers were numerous, including Black and White, Black-throated Blue, Black-throated Green, Bay-breasted and Chestnut-sided, also the Black-poll with a few Golden and Ruby-crowned Kinglets. The Gray-cheeked and Olive backed Thrushes seemed to be the favourite food of the Hawks with once in a while a Cuckoo. On nearing Leamington we saw a number of Bald-headed Eagles sailing aloft and on the shore found a number of dead Shad which had been discarded by fishermen. These accounted for the presence of the eagles. A walk of 3 miles back to the train at Leamington finished a very pleasant two days outing.



. . . . Pre-Glacial Channels

MAP OF THE OTTAWA RIVER BASIN

Showing

PRESENT AND PRE-GLACIAL CHANNELS

Scale of Statute Miles

45 0 45 90

ANCIENT CHANNELS OF THE OTTAWA RIVER.

By R. W. ELLS, LL.D., F.R.S.C.

The Ottawa may well be regarded as one of the great historic rivers of Canada. For hundreds of years it formed the favourite means of communication between the Indian tribes of the west and those of the east. It was ascended by Champlain in 1615. At that early date he crossed the height of land at Lake Nipissing, and was presumably the first white man to gaze upon the vast expanse of our inland seas.

Following the advent of this great explorer, this river became the chosen route of the voyageurs on their way inland to the great unexplored country of the western plains. On the coming of the Hudson Bay Company it formed the principal channel for carrying on their immense business, their brigades of boats and canoes passing year by year, carrying eastward the annual harvest of furs and bearing westward into the wilds of our vast interior the various kinds of merchandise suitable to the trade with the savages of the great west. Later, by means of steamboats on the deep stretches and by portages round the falls and heavy rapids, it formed the chief means of communication between the east and the numerous settlers who were scattered along its route.

The river itself is of very ancient date. When the continent was young, its valley was outlined, and for countless centuries the drainage of a large part of eastern and northern America followed approximately the present course. In support of this statement it may be said that along the present channel of the stream, extensive deposits of the oldest Palæozoic formations of this part of Canada are found, ranging from the base of the Potsdam sandstone upward into the Silurian, comprising many hundreds of feet of strata, the greater portion of which, over many thousands of square miles, has long since been removed by the various processes of denudation.

The finding of these formations at many points in the bed of the present channel shews that, before they were deposited, the granite and gneiss hills were formed and the principal river channels

were excavated. The general course of the river must have been defined at an early date in the world's history, and, though since that time many changes have taken place, the causes which led to these may in some cases be readily seen.

The distance from Montreal on the St. Lawrence River to Georgian Bay on Lake Huron may be given as 431 miles. Of this, the part between the junction of the Ottawa and the St. Lawrence at Ste. Anne and the mouth of the Mattawa is 286 miles. This portion of the river has an almost direct course of fifteen degrees south of east. It is, however, deflected from this course at several places. Thus in the lower hundred miles it sweeps southward around the great mass of the crystalline rocks from a point a few miles above the city of Ottawa down to the mouth of the River Rouge, south of which to the St. Lawrence the surface of the country is generally level and occupied for the most part by rocks of the fossiliferous formations or by great areas of drift sand and clay.

The portion of the river above the Mattawa may be divided into two parts. From the source of the stream, which lies near the heads of the Gatineau and the west branch of the St. Maurice, it pursues a course a little south of west, with several large lake expansions and large bends, for about 250 miles, to the head of Lake Temiscaming. Here the direction of the river abruptly changes. Temiscaming Lake is about sixty-one miles in length, with a width diminishing from some six miles at the northern end to only a few hundred yards at the southern extremity. The general course of the lake and the connecting stretch of river to the forks of the Mattawa, which is some thirty-five miles lower down, is thirty degrees east of south.

The drainage basin of the Ottawa is not less than 60,000 square miles. On the south the height of land ranges from 1,400 feet near the sources of the Petawawa and the Muskoka, to 417 feet at the divide near the head of the Rideau Lakes, while further east to the north of Prescott, the height of land is within one mile and a half of the St. Lawrence and the country is comparatively level. Many large streams flow into the main river from either side, the channels of which form deep furrows in the area which they now traverse. The most easterly on the south side is the

South Nation which rises near the St. Lawrence not far from the town of Brockville, and after a somewhat tortuous course of 100 miles reaches the Ottawa about forty miles east of Ottawa city. The descent of the river in this distance is not more than 100 feet, so that, allowing for the High Falls near Casselman and several rapids between that place and the Ottawa, it will be seen that for the greater part of its course the waters of the South Nation must be comparatively sluggish.

The elevation of the height of land to the north which divides the waters of the Ottawa from those flowing into James' Bay is rarely more than 1,000 feet above sea-level. Over a large part of this area to the north, embracing many thousands of square miles in this direction, the surface is covered with heavy deposits of sand which overlie thick beds of clay. These deposits extend from the lower Ottawa and the St. Lawrence nearly, or in places quite, to the height of land. In the absence of fossils in these higher clays positive evidence of their marine origin cannot be obtained, but it may be stated that they are continuous northward with those which do contain such organisms, and therefore the assumption may be made that the sea, at some date prior to or at the time of their deposition, had invaded all the northern country to a depth of some hundreds of feet.

The denudation of the old crystalline rocks, which were the first to appear throughout this area, must have been enormous. How many thousands of feet have thus been removed, cannot be surmised. But along portions of the lower Ottawa, as in the stretch below the Joachims Rapids, known as the Deep River, the present bottom of the channel is now many feet below the sea-level, the surface of the river being about 370 feet above tide, while soundings made several years ago are reported to have reached a depth of over 500 feet.

In Lake Temiscaming also, certain portions have been sounded and show that here the excavation has been very great. At one point a depth of 470 feet was obtained, while the surface of the lake is 591 feet above the sea. There must therefore have been a large amount of denudation throughout this part of the old river basin, though certain parts of this old channel have since been to a certain extent filled in by glacial deposits.

It is interesting to note that, as one ascends the Ottawa, the lower beds of the Palæozoic series fail to appear. Thus, in the lower portion of the river and as far west as the foot of the Chats Falls about thirty-five miles west of Ottawa, the lowest formation of the series, viz., the Potsdam sandstone, rests directly upon the Archæan rocks. This is succeeded upward by the higher members of the series. But even in early times there must have been heavy breaks and uplifts, since, on the crest of the ridge of crystalline rocks which extends eastward from Arnprior to within a few miles of Ottawa on the south side of the river, a deposit of the Potsdam sandstone is seen several hundreds of feet above the beds noted near the river bank at Quyon, while a couple of miles further south, this part of the series has been thrown down again by a heavy break, to about the same distance.

West of Arnprior the lowest beds seen along the river are of Calciferous age, and these are last observed at the west end of Allumette Island, above which no outcrops of this formation have yet been recognized.

Further up the river, above the Roche Capitaine, which is thirty-six miles below the Mattawa, the lowest beds are of the Chazy formation while on several of the islands in Lake Nipissing beds of Black River age are found. On some of the islands in the northern part of Lake Temiscaming fossiliferous limestones of upper Silurian age occur which are about the horizon of the Niagara formation The Black River beds of Lake Nipissing are at nearly one hundred feet greater elevation than the Niagara beds just mentioned, and about 100 feet lower than similar limestones seen in the vicinity of Clear Lake to the south of the Bonnechère.

In all descriptions of the country toward the height of land, north of the Ottawa, the occurrence of great areas of sand has been pointed out. The origin of this sand deposit has never been satisfactorily explained. The material appears to be largely the result of the decomposition, or breaking down to a fine state, of the underlying granite and gneiss which are the predominating rocks of the area. From the generally level character of the country along this height of land isolated peaks rise to considerable elevations, though over long distances these are rarely more than low hill features, scarcely exceeding a hundred feet in height, above the general plain.

It is scarcely to be supposed that the decay of the granitic rocks alone could give rise to the extensive deposits of clay which spread over so wide an area of the Ottawa valley underlying the sand. These clays are seen at elevations up to the summit of the dividing ridge, at several points reaching a height not far from 1,000 feet above the sea. The source of this clay must also be largely conjectural. It may be safely assumed, however, that the amount of denudation throughout the entire area has been something enormous. In the Eastern Townships of Quebec this has been undoubtedly more than 1,000 feet. In the area around Ottawa city it has been fully as much, since at the faulted contact of the Calciferous and the Utica the upraised beds have been entirely removed and the rocks reduced to a uniform level. It is quite possible that there was at one time a regular succession of the Palæozoic formations throughout the Ottawa valley, extending over the whole country both north and south to the present height of land, since even now we find at many widely detached points, patches of these rocks which have in some way escaped the denuding agents. It is therefore quite possible that much of the clay throughout the district has been the result of the decomposition of the more recent formations.

While therefore this grand scheme of denudation has been going forward from the earliest times, this has been supplemented by the agency of ice in the glacial period. How many of these periods of glaciation have been in operation in this area we can not say, but we have distinct evidence of at least three which are presumably the most recent, and the traces of other and earlier ones are probably long since removed. That ice moved over the area in different directions and at different times is shown from the direction of the striæ and groovings now seen on the rock surface. The presence of a third and apparently last set of markings with a western trend seems to indicate that a series of large floating ice-pans moved westward up the Ottawa in a direction almost opposite to that recorded for the earliest known glacier which would seem to have followed down the present channel of the river.

In discussing the history of this valley therefore several periods of upheaval and depression must be considered, and some

of these must have affected the surface or crust by a vertical uplift of many hundreds of feet. The amount of the latest recorded movement can be, to some extent, estimated by the present position of certain terraces which occur along the Ottawa and St. Lawrence rivers. These are found at elevations ranging as high as 900 feet above sea-level on the the slopes of the mountains east of Montreal, while on the upper Ottawa and around Lake Nipissing terraces are recorded at even greater heights. Thus high level beaches in the vicinity of North Bay were recorded by Mr. F. B. Taylor* at elevations of 1100 to 1200 feet and were regarded by him as of marine origin. Along the Ottawa, below Mattawa, Mr. R. Chalmers records beaches and sand terraces at elevations of 1000 feet and more, and further adds "Extensive deposits of sand and silts, implying submergence are spread over this part of the country up to a height even greater than that of the beaches referred to which have been described in earlier reports of the Geological Survey as Algoma sands*.

These sands were formerly supposed to be due to fresh-water agencies, but subsequent investigation has shewn that portions of the deposits thus styled contain marine organism, especially along the lower Ottawa, while their similarity in many respects to those which have been styled Saxicava sands in the lower St. Lawrence basin and which are held to be of marine origin, is very remarkable.

While therefore the Ottawa at some time flowed in a tolerably direct line from the mouth of the Mattawa to the St. Lawrence, certain causes have interposed at different periods to deflect the waters from their original course and to cause them to excavate other and newer channels. In an examination of the valley of the river these interruptions will be found at various points. Thus in that portion of the river between the Mattawa and the head of the Deep River, a distance of fifty-four miles, the channel is fairly straight. Several heavy rapids and falls however occur among which may be mentioned Des Joachims, Roche Capitaine, Deux Rivieres, La Trou, L'Eveille, &c.

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*Bulletin Geol. Soc. Am., Vol. V, 1893.

*Rep. Geol. Sur. Can.. Vol. X. p 18 J.

At most of these the banks are high and the river still apparently follows its original course. At the Roche Capitaine however, and at Des Joachims, secondary channels have been made and the waters diverted. This feature is especially well seen at DesJoachims where the present channel of the river is comparatively new and the course of the old channel lies to the north following the depression occupied by McConnell Lake and coming into the present channel at the head of the Deep River, to the north of the village of Des Joachims in a well defined depression, while the shallow nature of the present channel is indicated by the long line of foaming rapids which come in from the south. The difference in elevation between the foot and the head of these rapids is about forty feet. It is probable that at some time in the history of the river, perhaps at the close of the Glacial period, great accumulations of sand, gravel and boulders blocked the old channel at a point some three miles above the present foot of the rapids or near the mouth of the Dumoine river, and thus diverted the stream. Possibly the same thing occured at the Roche Capitaine, since here the second channel is seen to the north of the large island in the river, this channel being now largely dry at ordinary stages of the water.

Indications of this blocking of the old course of the Ottawa is seen in the great accumulations of boulders near the village of Mattawa, which represent terraces of morainic origin, modified by the agency of the waters of the river. This evidently had some effect upon the river channel at this place, since Dr. A. E. Barlow in his report on the region says that "a well defined old river-channel occurs running through the rear portion of the village between the main street and the railway station which has evidently been followed by the Mattawa or its antecedent stream. It leaves the Mattawa about a mile above its mouth and reaches the Ottawa at the foot of the rapid nearly three-quarters of a mile below"*

About twenty miles west of Pembroke the river makes a sudden bend to the south at what is known as High View. Just above this on the north side is a bold headland known as Oiseau rock, which rises abruptly from the surface of the stream

Rep. Geol. Sur. Can. 1897 Vol. X, p. 178, Part I.

for a height of nearly 500 feet. The southern shore of the river for several miles above High View is a rocky ridge which divides the Deep River channel from a long chain of lakes which starts from the south shore of the Ottawa about ten miles west of High View and cuts across to a point about three miles south of High View point. The surface of the country around this chain of lakes is heavily sand covered and these deposits extend south towards Chalk River. The lakes evidently indicate a former channel of the Ottawa which became choked up by sand subsequent to the glacial period.

The shore of the river opposite High View is indented by bays. The north shore of the main stream east from Oiseau rock continues in a bold range of hills for some miles eastward, and an old channel apparently followed a straight course from the deep bay eastward from High View. This channel evidently became choked up by great deposits of sand and gravel, thus diverting the stream past the east end of what is now known as the township of Buchanan, southward. The old channel thus blocked extended across the southern part of the townships of Sheen and Chichester, and probably reached the Culbute channel of the the Ottawa which flows along the north side of Allumette Island, below the Culbute Fall.

On both sides of the river opposite this place and for some miles to the east and west, the surface is covered with great deposits of sand and gravel, many feet in depth. In that part of the township of Chichester, north of the village of Chapeau, these sand ridges are well defined, continuing for several miles till they reach the foot of a bold ridge of granite and gneiss. This ridge is continuous from the foot of Deep River to the mouth of Rouge River about sixty miles below Ottawa city, and at one time undoubtedly formed the the north shore of the Ottawa River for this portion of its original course.

A great part of Allumette Island is occupied by these reddish granite sands. They form extensive ridges along the centre of the Island from east to west and they were at one time doubtless continuous with the broad areas north of the Culbute channel through which that channel has since been cut. The upper end of this channel for some miles is narrow and rocky, but the portion below the

Culbute fall is much broader and rocks rarely appear along its course except at the crossing of the road north from Chapais. Below this the shores are of clay or sand till the end of the Island is reached where the Pembroke channel joins the Culbute, flowing over broad ledges of Black River limestone, and forming what is known as the Paquette Rapid which is about a fourth of a mile south of the junction of the two channels.

The Pembroke channel which flows past the south side of Allumette Island is not deep. At the upper end rapids extend partly across the river and there are many small granite islets. Along the south shore of the river especially above the mouth of the Petewawa the banks are entirely of sand and in some places are from fifty to eighty feet high.

At the town of Pembroke a depression comes to the river from the south and the Musquash River here joins the Ottawa. This stream flows north-west against the regular course of the Ottawa and discharges the Musquash and Mud Lakes, the former of which is about ten miles in length. The stream is for the most part sluggish, flowing through a clay flat for some miles. On the north side of Musquash Lake a ridge of crystalline rocks rises abruptly, and on the south side Palæozoic rocks, mostly of of Black River age, form outliers, which have steep scarped sides towards the north as if cut down by the agency of running water.

At the upper end of Musquash Lake a stream flows in which discharges a chain of long and narrow lakes, and these continue for some miles in a depression into the township of Horton. Along these lakes, which are surrounded by great masses of sand the action of water is very evident. Some of them are long and very narrow but have a depth of over a hundred feet, though only a few chains in width. They present all the features of an old river channel which has been blocked up by great deposits of sand, gravel and boulders, so that the original channel is now defined simply by the line of the depression and the remnants of the old river left in the narrow series of lakes.

This depression extends out to the river again, reaching it near what is known as the Chenaux rapids, about four miles below the junction of the two channels which surround Calumet Island,

and which join a short distance above the village of Portage du Fort.

Of these two channels the south or Roche Fendu, is very rough and rocky. The north channel from Le Passe around the north end of the island and down to Bryson, flows for the most part of the distance through great beds of sand which show on both sides of the river but are very largely developed on the island, especially on the northwest portion.

Below the Chenaux Rapids the Chats Lake forms the river and extends down to the head of the Chats rapids and Falls about three miles east of the town of Arnprior. The shore on the north side opposite Sand Point and thence to a point opposite the mouth of the Bonnechère River is largely drift covered, and this feature is well seen at Norway Bay where great banks of sand form the shore line for some distance. Inland also these deposits are largely developed to the east of Shawville, where they overlie a great thickness of clay, which extends northward to the main ridge of crystalline rocks.

The Chats Falls are caused by a large dyke of reddish granite which cuts across the crystalline limestone of the Arnprior and White Lake belt, here several miles in width. The falls are among the most beautiful on the river, extending across the whole breadth of the stream which is here about two miles in width. The total rise from the foot of the falls to the waters of Chats Lake is about fifty feet.

Just below the Chats Falls on the south side is the village of Fitzroy Harbour, It is built on a clay bluff about forty feet in height and this rests on the Calciferous dolomite, which in turn reposes on the gneiss and crystalline limestone at the foot of the falls. These newer rocks are seen on both sides of the river.

The Carp river enters the Ottawa a short distance below the village, and has a course of about twenty miles. It also flows westerly against the general course of the Ottawa in a depression through the northern part of the townships of Huntley and Fitzroy and is on the whole a very sluggish stream. About four miles above its mouth there is a rapid formed by a ridge of granite. Elsewhere the bed of the stream is a clay flat, in places very marshy, to its source, which is in the northern part of the township of Goulbourn.

Between the Carp and the present channel of the river, a well defined ridge of crystalline rocks extends eastward from the vicinity of Fitzroy to within nine miles of Ottawa city, where it sinks down nearly to the level of the river and becomes covered over with Potsdam sandstone. The south side of the ridge is marked by a well defined line of fault which brings the Black River limestones against the crystalline rocks. It is supposable therefore that an old channel of the river flowed eastward along the depression in which the Carp River now lies.

To the north of the crystalline rock ridge just mentioned a second line of depression occurs also south of the Ottawa and separated from it by another rock ridge formed of Chazy shale and limestone. In this depression lies Lake Constant, and Constant Creek flows thence westward to the Ottawa into a deep depression known as Sand Bay. The elevation of the Creek and Lake is but a few feet above the present level of the river, the waters being sluggish throughout, and the depression extends eastward through a swampy tract into the Ottawa again at Shirley Bay a few miles west of Britannia. Great areas of reddish sand occupy the shores of the Ottawa about the mouth of Constant Creek and for several miles to the east and west.

The north side of the Ottawa between Hull and a point some miles west of the Chats Falls, practically as far west as the Ottawa opposite the east end of Calumet Island near Campbell's Bay above Bryson, is generally low and largely occupied by great deposits of clay or sand. Occasionally well defined beaches are seen, as in the area to the north-west of Quyon near the village of North Onslow, where they are crossed by the road between these two places. Occasional ridges of rock occur, as in the rear of the town of Aylmer and north of Bristol station, but the main shore of the river was at one time undoubtedly marked out by the great ridge largely composed of reddish grey granite which rises in Kings Mountain, west of Chelsea, and extends westerly for many miles forming the northern limit of the great Ottawa plain.

The lower part of the Ottawa must have been at one time much broader and more delta shaped than at present. On the north side the range of the crystalline rocks must have defined the river much as at present, as far as the mouth of the

Rouge River, but below this place the hill range trends off more to the north-east and a broad plain occupied partly by sand and largely by clay, extends southward to the St. Lawrence. The northern part of this area is treversed by the North River, which between St. Jerome and the town of Lachute has but little current and follows a westerly course till the latter point is reached when it bends abruptly to the south and meets the Ottawa near the village of St. Andrews, near the upper end of the Lake of Two Mountains.

To the south of the North river and east of Lachute a rock ridge formed of the Potsdam and Calciferous rocks comes in and extends eastward for some miles. South of this a broad well terraced valley extends across to the lower portion of the Ottawa, but this area is again traversed by a granite ridge which rises just to the east of St. Andrews and extends eastward for four to five miles. Between these two ridges the depth of clay and gravel is great. At one point several borings have been made, one of which reached a depth of over 120 feet without touching the underlying rock, so that the bottom of this old channel is many feet below the present level of the river.

On the south side of the Ottawa below Ottawa city, the country between the river and the St. Lawrence is generally level or broken by low ridges, sometimes of rock but often of gravel or boulders which have come from the north side of the Ottawa. Over a large part of this area great deposits of clay, overlaid in places by sands and gravels, are seen, and a peculiar feature of these deposits is noted in the fact that while the clays are undoubtedly of marine origin they rarely show marine fossils, while the overlying sands and gravels contain these in immense quantities at very many places. These marine shells however apparently cease west of a line drawn from Smith's Falls to Prescott or have not yet been noticed in the western area, though there is no apparent break in the character of the surface deposits in this direction.

South of the Ottawa also the evidences of an old river channel are very clear. A large number of borings have been made in the last half dozen years both in the vicinity of the river itself and in the area to the south. Some of these are in the course of the east

and west stretch of the Nation river. The holes were sunk only to the rock in most cases, through clay with occasional thin deposits of sand or gravel. The deepest of these was 210 feet, and in the township of Plantagenet on the north bank of the Nation, and in Alfred about two and a half miles east, two holes were sunk to the underlying Utica, to depths of 180 and 186 feet. On a line extending westwardly along what is known as the Brook in the direction of Eastman's Springs a number of similar holes have been bored, the depths of which ranged from 100 to 150 feet, following a fairly direct line. The most easterly of these was put down at Caledonia Springs to a depth in the clay of 132 feet. Beyond this to the north-east the country is flat and clay covered in the direction of L'Orignal at which point presumably this ancient channel reached the river. Recently in the area south-east of Ottawa city, near Ramsay's Corners, a boring has been made which passed through 186 feet of clay and 18 feet of underlying gravel to the Lorraine shales.

This line of excavation may be the continuation of that already described for the Carp valley, since in the eastern portion of the Carp area there are great deposits of clay, gravel and sand which extend beyond the Rideau a few miles south of Ottawa in the direction of the deep borings just referred to. The old channel should cross the Rideau not far from the centre of the township of Gloucester and extend towards the Mer Bleue, since rock escarpments appear a short distance north of that place in the direction of the Ottawa, and rock ledges are seen to the south in the direction of Bear Brook on the line of the Canada Atlantic Ry.

On the lower Ottawa between Grenville and Lachute the surface is generally flat. Deposits of clay, covered in places with a great thickness of sand, occur in the area between the bold escarpment of the crystalline rocks and the river, and near the line of the Grenville canal the accumulation of boulders over the surface is very great. The whole area for some miles is heavily drift covered, and great masses of ice must have discharged immense loads brought from the high lands to the north and north east in this direction. These accumulations of boulders are found at intervals over a large extent of country south of the Ottawa, some of the blocks being of immense size. Near Vankleek Hill

great numbers of these loose rocks can be seen, one of which measures 20 feet by 15 feet and is 4 feet out of the ground.

Among channels of more recent date but which are now closed except at periods of high water on the river, two at least may be mentioned. East from Coulonge village a depression in the surface extends to the Ottawa at the north west angle of Calumet Island. The eastern portion of the depression to the west of the river is known as the Grand Marais or Big marsh; and while at ordinary stages of water in the Ottawa much of this is comparatively dry, in the spring it becomes a regular water-course cutting off the great point which extends south-west from Coulonge village to La Passe.

Further east below Ottawa at the mouth of the Nation river a depression also occurs forming the bay in front of the village of Papineauville, and separating that place from what is known as the Presqu'ile. This latter is a long ridge or tongue of gravel and sand which extends east from the mouth of the North Nation River for about six miles. At high water stages the current passes over the narrow barrier at the west end of the Presqu'ile Bay and flows directly past the village. It is quite possible that close investigation in the Ottawa basin would disclose other channels which are now partly filled.

In this paper it has been the intention to indicate only the most prominent of these old channels. That the submergence of the whole basin has been sufficient to cause the waters of James Bay to unite with those of the Ottawa basin is indicated by the presena of well defined terraces and clay deposits at elevations greater than the present height of land north of Lake Temiscaming. It is probably due to this great spread of inland or ocean waters over this area that the sands and gravels which have been so instrumental in choking up the ancient valley of the river are so widely distributed. That these upper level deposits of clay and sand have not yielded organic remains is only negative evidence against this theory. On similar grounds much of the typical marine clay of the Ottawa and St. Lawrence basins would not be of marine origin since inthe whole stretch north and west of Ottawa city they yield marine fossils only in very rare cases.

Yours truly
George M. Dawson

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NOTE ON A SUPPOSED NEW SPECIES OF LYTOCERAS FROM THE CRETACEOUS ROCKS AT DENMAN ISLAND, IN THE STRAIT OF GEORGIA.

By J. F. WHITEAVES.

In 1871 Mr. James Richardson, then of the Geological Survey of Canada, collected a fragment of the inner whorls of an Ammonite with numerous slender and finely costulate volutions, a wide, open umbilicus, and rounded venter, from the Cretaceous rocks at Norris Rock, south of Hornby Island, in the Strait of Georgia. This specimen was described by the writer, referred with a query to *Ammonites Jukesii*, Sharpe, and figured, in the second part of the first volume of "Mesozoic Fossils," published in 1879. The type and only known specimen of *A. Jukesii*, it may be mentioned, is a mere fragment from the "hard Chalk of the county of Londonderry," Ireland, described and figured by Sharpe in his monograph of the Cephalopoda of the Chalk, published by the Palæontographical Society of London in 1853.

Much larger, more perfect and beautifully preserved specimens of the same shell as the specimen from Norris Rock, were collected at Denman Island, near Hornby Island, four in 1892 and three in 1895, by Mr. Walter Harvey, who also obtained a characteristic fragment at Hornby Island in 1892. Three of these specimens from Denman Island are now in the Museum of the Survey, and two of them were described by the writer, under the name *Lytoceras Jukesii* (Sharpe), and figured, in a paper "On some Fossils from the Nanaimo group of the Vancouver Cretaceous," published in the Transactions of the Royal Society of Canada for 1895.

When this paper was written, the writer had not seen the first part of Dr. Kossmat's memoir on the Chalk formation of Southern India, published at Vienna in 1894, in which the supposed *A. Jukesii* from Norris Rock is placed among the synonyms of *Lytoceras* (*Gaudryceras*) *Kayei* (Forbes.) On receiving a copy of this publication, it seemed to the writer that the large and fine specimens from Denman Island that had been referred to *L. Jukesii* present several points of difference from the *L. Kayei*, as therein figured, and one of the best of the Denman Island specimens was sent to Dr. Kossmat, for comparison with the Indian species. The conclusions arrived at on this point by Dr Kossmat, after this comparison had been made, and as embodied in a letter to the writer, dated March 9th, 1896, are as follows:

"Your *Lytoceras Jukesii* must be distinguished from *L. Kayei*, as you already supposed. "Specimens that are not full grown (as that figured in Mesozoic Fossils, vol. 1, pt. 2, pl. 13) agree remarkably well with all the Valudayur specimens seen by me, and it would be quite difficult to distinguish them. "But, in the adult state, the Denman Island specimens are quite different. "The body chamber of *L. Kayei*, as shown in Plate 3, fig. 2, of my publication, is ornamented with very delicate striæ, even thinner than in the inner whorls, and of almost silky appearance ; whereas, on your *L. Jukesii* the ribs of the last volution become very strong and sharp, and are separated by broad intervals. "There is no doubt that such specimens are very similar to *Lytoceras* (*Gaudryceras*) *Jukesii*, Sharpe, but considering the incompleteness of Sharpe's type specimen, their identification with it will always be disputable. "Judging from the figure and description of Sharpe's specimen, the ribs of the type of *L. Jukesii*, in middle stages of growth, are sharper, somewhat more distant, and not so strongly curved forward on the sides ; the increase of the whorl in thickness is more rapid, and the whorls are perhaps less numerous. "I think that it will be best to give a new name to the fine specimens from Denman Island. "Their septa are typical *Gaudryceras* septa, with descending auxiliary lobes."

The writer, accordingly, begs to propose for these specimens, which have already been described somewhat in detail and figured, the provisional name of *Lytoceras* (*Gaudryceras*) *Denmanense*.

Ottawa, April 16th, 1901.

THE SOURCES AND DISTRIBUTION OF THE GOLD-BEARING ALLUVIONS OF QUEBEC.

By R. CHALMERS, Geological Survey of Canada.

(Read before the Club, March 19th, 1901.)

The few remarks which I have to offer this evening, refer to the gold-bearing river gravels of south-eastern Quebec, in the Eastern Townships and County of Beauce. Alluvial gold has been found here in the valleys of the two principal rivers which drain the region, the Chaudière and the St. Francis. In the bottoms of the valleys along which these rivers and their tributaries flow, it occurs in scattered grains and nuggets in the gravels and sands and frequently in crevices in the underlying rocks. It is, however, most generally found in paying quantities in old river channels now partially or wholly filled with boulder-clay, these often being at a lower level than the present water-courses, and usually on one side or the other, though in the same valley. The general succession of the deposits in these river valleys is much the same throughout the region, and is as follows in descending order, (fig. 1):

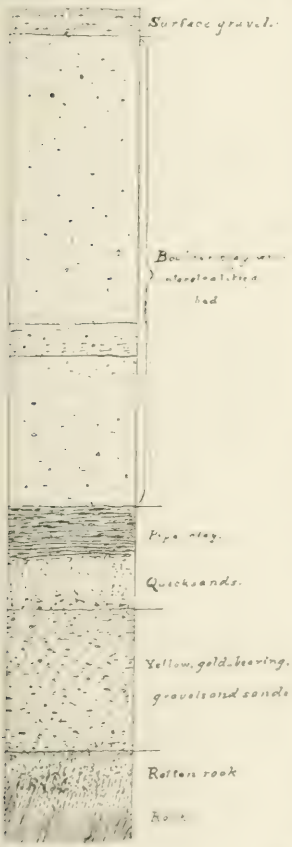

Fig. 1. General Section of the Gold-Bearing Deposits.

1. Surface gravel and sand, carrying fine gold in places.

2. Boulder-clay, including in some valleys, an interglacial deposit.

3. Stratified clay and sand, often in alternate beds; "the pipe clay" and "quick-sands" of the miners.

4. Stratified gravels, usually rusty, or oxidized, the materials belonging to local rocks. Gold-bearing, especially in lower strata. Gold often coarse.

5. Rotten rock, contains particles of gold.

6. Decomposing rock surface, uneven, non-glaciated. Gold in the crevices.

It is in division 4, the lowest member of the stratified beds, that the gold is found in greates quantity, though often met with in the overlying series, as well as in the decomposed rock beneath. Where these stratified, oxidized gravels rest on the bed rock, the gold is most plentiful in the lowest strata, and in the clefts, or between the folia, of the rocks.

The enquiry as to the origin of these gravels and how they came to be gold-bearing takes us back to an early period in the geological history of the region,—soon after it emerged from beneath the sea and became dry land. Subaerial denudation then began and has been in incessant operation ever since. About this time the larger rivers probably had their origin and began to carve out their valleys. Throughout the long ages which have intervened since, these forces of nature, under varying conditions, have been wearing away and reducing the surface of the land. This reduction has been unequal because of the unequal hardness of the rocks, and the difference in their power of resisting erosion. The degradation from these agencies must have been enormous, amounting to several hundreds, perhaps several thousands, of feet, entirely changing the appearance of the country, the existing residual forms of relief being, in no small degree, the result of this wear and waste of the land surface. Regional and orogenic movements have taken place during these ages, the effects of which are evidenced by uplifts and downthrows in several places and in the dislocation of the river valleys; but no cessation in the action of the decomposing and transporting forces seems to have occurred till a much later period, when it was interrupted by the ice age.

Coming down to the Tertiary period we can, perhaps, form some conception of the appearance of this region then, though in an imperfect degree, if we suppose it stripped of all the boulder-clay and overlying deposits. Except on some of the more prominent hills and summits, the surface of the rocks would be mantled by a thick sheet of its own debris. On the slopes and in the river valleys this material would be largely denuded and portions of the decomposed rock would form stratified beds, especially where it

had undergone transportation and modification by the action of rivers and streams. Prolonged shifting of the gravels and their gold content in this manner, assorting and reassorting the materials and the sifting out of the least weighty, allowing the gold and other heavy particles to settle to the bottom—were the processes which brought about the conditions which we now find existing as regards these auriferous deposits.

In the glacial period which followed, these river beds were buried beneath sheets of boulder-clay. The thickness of the boulder-clay in the Chaudiere valley is 100 feet or more. The ancient valley of the Gilbert was likewise filled with it to a depth of 25 to 50 feet.

On the withdrawal of the ice of the glacial period the rivers began to clear out their ancient channels cutting down into the boulder-clay and other beds, and in many places eroding the gold-bearing gravels beneath, and once more exposing them to view. But in some valleys, as for example in that of the Gilbert, the river was diverted from its original channel and caused to form a new one, and the auriferous gravels in the pre-glacial channel have thus been preserved from erosion. In these valleys the ancient channel is generally at a lower level. The pre glacial channel of the Gilbert is from 30 to 85 feet below the bed of the present river in that part wrought for gold, and from 100 to 400 feet or more to the south of it. All the river valleys have, however, undergone dislocations during and since the glacial period, so that while some parts of a pre-glacial river channel may be considerably lower than the present one, in other places it is not.

From all the facts which have been obtained it would seem that the alluvial gold is entirely of local origin, that is, the gravels and the gold they contain belong to the rocks of the particular valley in which we now find them. But just from what rocks the gold came, whether from the pre-Cambrian or Cambrian or both is by no means evident. There is no question but that it is derived from some of the quartz veins in the vicinity of where it now occurs; but as little or no quartz mining has been carried on, no new facts were obtained by us which would elucidate the problem. Logan and Hunt regarded the gold as belonging to the oldest rocks of the region, that is to the crystalline schists of the Notre

Dame range. But the gold of southeastern Quebec is not confined to the oldest rocks. Though occurring in these, it is also found in quartz veins which traverse Cambrian slates. Indeed, the largest quantities of alluvial gold have been obtained in districts occupied by these slates, where they are cut by diorite dykes, a fact brought out by Ells. On the supposition that the original source of the precious metal is in the pre-Cambrian schists, however, these, in their disintegration and waste, may have yielded gold to the sediments which, doubtless, entered into the composition of the Palæozoic rocks. This gold would be in a fine state of division, but would be concentrated in the quartz veins at a later date.

The total gold production of southeastern Quebec, as been valued at two millions to two and a quarter million dollars. Of this amount probably from one million and a quarter to a million and a half dollars worth have been taken from the Gilbert river beds alone. Ditton is said to have yielded from seventy-five to one hundred thousand dollars. The remainder has been obtained from the gravels of Du Loup, Famine, Des Plantes and Mill rivers, tributaries of the Chaudière, and from Dudswell, Magog, etc., on the St. Francis.

A NEW HORSE GENTIAN.—In the March number of *Torreya*, Dr. Bicknell describes a new species of *Triosteum* which he names *T. aurantiacum*. An examination of the specimens in the herbarium of the Geological Survey shows that while those from Western Ontario are *T. perfoliatum* those collected at Casselman, near Ottawa, are *T. aurantiacum*. Though there are many striking differences between the two species, the most obvious one is to be seen in the main leaves "which broadly perfoliate in true *perfoliatum* are in the new species conspicuously narrowed into a merely sessile base." As the two species have much the same range *T. perfoliatum* should be looked for in this vicinity.

J. M. M.

ALLIES OF *STELLARIA MEDIA* (L.) Cyrillo.

By THEO. HOLM.

(With two plates.)

Plants as common as the "common Chickweed" are seldom collected by botanists, very seldom studied, and as a rule, but poorly represented in herbaria. Authors of manuals, especially in North-America, have usually paid very little attention to the plant, and no variety or subspecies has, so far, been recorded from Canada or the United States. Being considered as a weed infesting gardens, and being so very abundant everywhere in damp soil, it has escaped attention in this country, although other plants of similar frequent occurrence, and with much the same behaviour as weeds have been granted a good deal of attention, and have been treated quite elaborately by systematic botanists. But *Stellaria media* appears always to be the same, a single species with no characteristic forms or varieties appended, yet it is recognized as being equally common in the boreal and temperate regions of both the old and new world, and to produce its flowers from earliest spring to late autumn or sometimes even throughout the winter.

Judging from a geographical range such as this, one would naturally suspect that the species would hardly be equally uniform and constant in appearance, as it is noted to be common nearly everywhere. We all know that it may be met with in our wanderings through woods and thickets, along borders of creeks, in old river bottoms, very often remote from inhabited places, yet it is always looked upon as an introduced plant of no interest whatever. Whether it was introduced to this country from Europe or Siberia, no one knows, but the probability is, that it has existed on the Pacific Coast a sufficient time to develop into several varieties, or perhaps even subspecies with power to spread towards more distant regions in eastern direction. It would be interesting to know something about its geographical distribution in the boreal parts of America, where it, no doubt, extends beyond the Arctic circle as it does in Siberia and Europe, Russia for instance; that it extends from the Pacific

to the Atlantic in the British provinces, has been recorded in Professor Macoun's Catalogue of Canadian plants, and it shows a similar wide range in the United States, even as far south as from California to the coasts of Florida. But it does seem strange that we actually know so little about this plant in America, and that no one has, so far, attempted to illustrate the species as it occurs in the north and south, east and west, in cultivated grounds, in woods, thickets, etc., instead of being contented with the idea that it is always the same introduced "common Chickweed."

In Europe the plant is known much better. Already Linnæus distinguished between "pentstemon" and, "decastemon" as two forms of the species, both of which were then figured in Flora Danica by M. Vahl and O. F. Mueller (1769-70); the locality for "pentstemon" is given as everywhere in cultivated grounds, while the other is said to be frequent in springy places. A corresponding variation in the number of stamens from 3 to 10 is, furthermore, recorded by Lightfoot[1] and Rafn.[2] Meanwhile Father Bernardinus of Ucria[3] described an apetalous *Stellaria*, which he consequently named *S. apetala*, and which in many respects looks like a depauperate or abnormal form of our Chickweed. This is the plant which Dumortier[4] described as *Alsine pallida* and Jordan[5] as *Stellaria boreana*, and which Piré[6] finally figured under the name *S. pallida*. "Pentstemon," "Decastemon" and "apetala" thus signify two distinct plants of which the two first were at that time supposed to represent *Stellaria media*, while "apetala" was a species distinct from this. However, some years later we find the Linnæan form "decastemon" elevated to specific rank as *Stellaria neglecta* Whe.,[7] a suggestion

[1] Lightfoot, John. Flora Scotica. 1777, p. 172.

[2] Rafn, C. G. Danmarks og Holsteens Flora, 1800, p. 381.

[3] Father Bernardinus of Ucria. Plantæ ad Linnæanum opus addendæ et secundum Linnæi systema noviter descriptæ. "Rœmer's Archiv für die Botanik," Vol. I, 1796, p. 68.

[4] Dumortier B. Prodromus floræ Belgicæ, 1827, p. 109.

[5] Jordan, A., Pugillus plantarum novarum, 1852, p. 33.

[6] Piré, Louis. Notice sur l'*Alsine pallida* Dmtr. "Bull. de la soc. Roy. de Botanique de Belgique," Vol. 2, 1863, p. 43.

[7] Weihe in "Bluff et Fingerhuth: Compendium floræ Germaniæ," 1825, Vol. 1, p. 560.

that was followed by several botanists, among them Elias Fries,[8] who recorded it from Sweden and Denmark, and Babington,[9] who reported both this and *S. pallida* from the British Isles. There are not a few authors, however, who have felt more inclined to consider these plants as representing a single species, "*S. media*" with the others as merely varieties. Thus Fenzl[10] enumerates three varieties, *decandra*, *oligandra* and *apetala*, besides four others, which are less characteristic; a similar classification is given by Lange,[11] who distinguishes between var. *vulgaris* with 3-5 stamens, var. *neglecta* with 10 stamens and var. *apetala* without petals, or as suggested by Dœll[12] var. *decandra* and var. *apetala*.

Stellaria media is, thus, with European botanists the plant with 3-7 stamens, *S. neglecta* the one with 10 stamens and *S. apetala* with 2-5 stamens, but with no petals. Of these the typical form has been described as being very frequent in North-America, while none of the others have been cited. It would, however, be desirable to know a little more about this plant as it is represented in this country, and we thought therefore, that some more information might be obtained by presenting this brief notice about the European plant with its allies, whether these be considered as varieties or species. And there is good reason for supposing that the species, *S. media*, in this country is actually an aggregate of several well defined forms or even species, which may naturally be looked for in the cold temperate regions or farther south. So far the writer has succeeded in detecting Weihe's *S. neglecta* in the vicinity of Washington, D.C., where it grew in shady places in deciduous forests, moreover, some specimens in Dr. E. L. Greene's herbarium, collected in California proved to be this species, besides that the herbarium of the Geological Survey Department of Canada, contains several

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[8] Fries, Elias. Corpus florarum provinciarum Sueciæ I. Flora Scanica. 1835, p. 88.

[9] Babington, C. C. Manual of British Botany, 1874, p. 57.

[10] Fenzl in "Ledebour's Flora Rossica." 1841, Vol. I, p. 377.

[11] Lange, Joh. Haandbog iden Danske Flora, 1864, p. 342.

[12] Dœll, I. Ch. Flora des Grossherzogthums Baden, Vol. 3, 1862, p. 1224.

specimens of the same from British Columbia, Manitoba and Sable Island.* As regards *S. apetala* we have seen no specimens from North America, but it would be very strange if this should not be found here also.

In order to facilitate the identification of *S. apetala* and *S. neglecta*, we have thought it worth while to illustrate these besides giving a few notes upon their principal characteristics.

Stellaria apetala Bernard. (Plate 1, fig. 1.)

This has the general aspect of ordinary forms of *S. media* in regard to the leaf-shape and inflorescence, but it is pale green and the flower has no petals ; however, rudimentary petals may occasionaly be found in the earliest developed flowers ; the number of stamens varies from two to five, and the styles (fig. A.) are diverging horizontally from near the base, while in *S. media* (fig. B.) the styles are erect and only recurved at the apex. The seeds are of a pale yellowish-brown colour, minutely tubercled like those of *S. media*. The figure (1.) is drawn from a Swedish specimen, natural size.

S. neglecta Whe. (Plate 2, fig. 2.)

Generally taller, but more slender than *S. media*, deep green. The lower leaves have long petioles (fig. C) and the blade is very distinctly pointed in contrast to the leaf of *S. media* ; the inflorescence is more lax and the flowers are borne on long, very slender peduncles, which bend downwards after the flowering, but become erect soon after the seeds have fallen. The petals are as long as the calyx or even a little longer, while they are shorter than the calyx in *S. media*. The stamens are ten in number, but the styles are erect with recurved apex, as in *S. media*. The seeds (fig. D.) are larger than those of *S. media* (fig. E) and the tubercles are much more prominent and often cone-shaped. The figure (2) is drawn from a specimen collected near Washington, D.C. *S. neglecta* is, according to Murbeck,[13] a well marked type in North and Middle Europe, but specimens from the Mediterranean,

* These specimens are labeled : Cedar Hill near Victoria B.C.; Burrard Inlet B.C.; Killarney Man.; Sable Island, N. S.

[13] Murbeck Sv. Die nordeuropæischen Formen der Gattung *Stellaria*. Botaniska Notiser. Lund. 1899, p. 193.

for instance North Africa, are less distinct, passing gradually over into *S. media*. Dr. Murbeck feels, therefore, more inclined to consider *S. neglecta* as a subspecies of *S. media*, rather than an independent species. While the plants from Washington and Canada show the characteristic habit of Swedish and German specimens, we must state, however, that the seeds of our specimens did not show the tubercles quite as prominent as we observed in the European plant, of which the seed (fig. D) has been illustrated.

These characters seem sufficient for distinguishing these plants, but it would be interesting to know whether *S. apetala* occurs in this country, and whether the characters are constant. It may be that *S. neglecta* is more typically developed in the northern countries than in the south. In regard to the flowering time, *S. media* is known to bloom and produce seeds nearly throughout the year thus several generations may appear in the same year under favourable conditions. *S. apetala* and *S. neglecta* are, on the other hand, known only to bloom in the spring, and their seeds do not germinate until the following autumn, as has been observed in Europe. Our specimens from Washington of the latter were, however, collected in the last week of September with ripe seeds and a very few flowers, which might indicate a second generation.

EXPLANATION OF PLATES.

Plate 1, fig. 1.—Flowering specimen of *Stellaria apetala*, Bernard. Natural size.

Fig. A.—Pistil of same.

Fig. B.—Pistil of *S. media*.

Plate 2, fig. 2.—Inflorescence of *Stellaria neglecta*, Whe. Natural size.

Fig. C.—Stem-leaves of same, natural size.

Fig. D.—Seed of same, magnified.

Fig. E.—Seed of *S. media*, magnified.

NEW PLANTS FROM ALBERTA.

By EDW. L. GREENE.

BERBERIS BREVIPES. Allied to *B. nana* but every way smaller, the foliage of a deeper green and merely glaucescent rather than glaucous; leaves with very short petiole, not longer than the internodes of the rachis; leaflets usually seven, rather broadly elliptic-oblong, 1 to 1¾ inches long, sharply and closely spinulose-serrate, very acute, conspicuously though minutely reticulate, in texture comparatively thin; racemes short and few-flowered, but in fruit surpassing the petioles; berries small, subglobose, blue and very glaucous.

Collected at Crow's Nest Pass, Rocky Mts., August, 1897, by Prof. John Macoun; No. 18,080 of the Canadian Geological Survey Collection. It is next of kin to the more southerly *B. nana*, Greene, which so long passed, by mistake, under the name of *B. repens*; but it is wholly distinct by several characters, among the best of which is the short-stalked foliage. In *B. nana* the petioles are so long as to surpass even the long fruiting racemes.

STELLARIA SUBVESTITA. Numerous suberect stems densely tufted, slender though firm, 5 to 10 inches high, very leafy below the middle, the dichotomous cyme notably narrow and strict; leaves linear-acuminate, ¾ inch long, 1-nerved, erect, subtomentose beneath, otherwise more or less pilose-pubescent, the stem also pilose, the peduncle and pedicels less so; bracts of the cyme ovate or ovate-lanceolate, acute, scarious, often villous-ciliate; sepals oval, obtuse or acutish, scarious-margined, 1-nerved and the nerve often pilose; petals little exceeding the calyx; capsule not seen.

Obtained at Devil's Head Lake and Banff, National Park, July, 1891, by Prof. John Macoun; the specimens distributed for *S. longipes* var.; but the species is of different habit, and is well marked by the strong pubescence, the strict and narrow cyme, etc.

THE LATE GEORGE MERCER DAWSON.

The world of science and especially of geology received a severe shock on the evening of Saturday, the 2nd day of March 1901, when the news of the death of Dr. G. M. Dawson was announced. This sad event was altogether unexpected and leaves the ranks of the Canadian Geological Survey minus one of its most distinguished men, one who had always taken a foremost part in carrying on the good work of his predecessors in the position of Director.

Not only as a geologist, but also as an ethnologist and naturalist Dr. Dawson was well known, and his too early loss will be felt by the whole scientific world.

The immediate cause of the death, was a severe attack of capillary bronchitis which set in subsequent to a somewhat protracted but apparently only slight cold. Dr. Dawson had been attending to his official duties all day Thursday Feb. 28th and had thus been only a whole day absent from the Department when he breathed his last at five minutes after six in the evening, at his rooms in the Victoria Chambers, Ottawa.

His loss to Canada cannot be overestimated. His place can never properly be filled. He will be missed most by the various members of the Geological Survey of Canada with whom he was in constant communication regarding the advancement and welfare of every part of the Dominion of Canada.

The early training he received with his father, Sir William Dawson, at McGill University, subsequently in London, England, at the Royal School of Mines, eminently fitted him for the distinguished positions which he held during his lifetime and at the time of his death, as Director of the Canadian Geological Survey.

By his demise there is removed from this sphere of activity one of the greatest lights and intellects of the last progressive half of the century just ended. His numerous and important writings are a monument which will ever be a crown of glory and renown to his life-work, for his industry, talent and painstaking accuracy.

He was a Nestor in Canadian geology and the grasp which

his strong intellect had of all problems relating to the economic and natural resources of our vast Dominion, made him master of his Department and a centre of distribution of the most valuable information. With a diminished staff at his disposal, he guided the Department under his care with unsparing as well as inspiring efforts, and was thus producing more results and giving out more information than ever before in any period of the history of the Survey in all its different branches.

With the ever increasing demands for exact information concerning the mineral and other economic resources of Canada, with the increase of labour and attention to official matters, he was kept more than usually busy for the past six years. Through his personal efforts and that of his staff, he did much to disseminate such information regarding Canada's mineral resources, that the mining interests of the Dominion may now be said to be fairly well established upon a firm and non-speculative basis.

Dr. George Mercer Dawson was the eldest son of the late Sir William Dawson who was the honoured Principal of McGill University for upwards of forty-four years, and who preceded the subject of this sketch by a few months only, having died in Montreal, his home, on the 19th day of November, 1899, at the advanced age of 79.

"Doctor George," as he was wont to be called, was born in the town of Pictou, Nova Scotia, Aug. 1st, 1849. His early training was at the Montreal High School, then subsequently, at home under tutors, and in McGill University, where however, he did not graduate, but went to Edinburgh and London. There he carried on studies and researches in Mining and Geology, especially at the Royal School of Mines, London, from 1869 to 1872, carrying off the highest honours of his class and the Duke of Cornwall's prize in his year, also the Edward Forbes gold medal for palæontology, ranking first, and subsequently became an "Associate of the Royal School of Mines," a much coveted title.

On his return to Canada he spent some time investigating the copper and iron deposits of Nova Scotia, his native province, and later lectured in Morrin College. In 1873, he was appointed geologist and botanist to Her Majesty's British North American boundary commission, of which Major D. R. Cameron, R.A., was

Chief Commissioner for Britain. His excellent report upon the Geology and Mineral Resources of the 49th parallel from the Lake of the Woods to the Pacific Ocean marked him out as a scholar and an eminent observer. He was only twenty five years of age when this report was prepared. This volume was so eagerly sought, that it is now out of print, the edition being soon exhausted and a copy is conceded to be actually worth its weight in gold.

Then it was that were laid down the lines upon his subsequent career and researches lay, for in July 1875, when he received from the Dominion Government an appointment on the Geological Survey staff, as Chief Geologist, his explorations and researches led him into the vast and then practically unknown Northwest Territories, and in British Columbia. In the mass of his voluminous and much-sought-for reports upon the resources of the districts which he examined and explored will be found the most authentic and useful information on those now rapidly developing and flourishing districts. In his Yukon explorations of 1887 and 1888, he examined and reported upon that most valuable and important district to which the world has been and is still looking for most years for a goodly share of its source of supply of gold. He was the real discoverer and describer of that now famous gold-bearing belt in which there is happily left as a monument to his indefatigable researches in the eighties the capital town or city of the Yukon Territory, which now bears his name.

Not only were his mental strength and intellectual vigour remarkable but even his powers of physical endurance were great. As an instance of the latter, may be mentioned a boat journey of 1,300 miles and a portage of fifty from the Valley of the Liard to that of the Yukon, as one of the feats which his zeal and energy as an explorer accomplished. It would be superfluous here to give even a synopsis of his numerous reports, suffice it to say that they are all most readable and full of useful information on the regions traversed.

Besides being an eminent geologist, he was also a foremost naturalist. Amongst his contributions to the Empire may be mentioned his work as one of the Commissioners appointed by Her Late Majesty Queen Victoria, as one of the arbiters in the

Behring Sea seal fisheries. The conditions and real facts concerning seal life were studied by him and have been Britain's most powerful argument in the case. In 1883 he was appointed assistant director to the Geological Survey Department. In 1892, after his work on this commission was ended, Her Majesty Queen Victoria was pleased to create him a C.M.G., and in 1890 and 1891 respectively, Queen's and McGill Universities conferred upon him the degree of doctor of laws *honoris causâ*.

In 1891 he was made a Fellow of the Royal Society of England, the highest scientific body in Britain, for his eminent work in geological science. In 1893 he was elected President of the Royal Society of Canada ; in 1894, corresponding member of the Zoological Society of London ; in 1895, Fellow of the American Association for the Advancement of Science ; in 1896, chosen President of Section "C" in Geology of the British Association for the Advancement of Science, and in 1897 delivered a masterly inaugural address upon the Archæan geology of Canada. In the same year, the Royal Geographical Society of London presented him with their highest award, a gold medal ; and in 1891 had been awarded the Bigsby medal for eminent researches in geology by the Geological Society of London. The recipient of this medal must not be older than 45 years at his last birthday.

As an ethnologist and archæologist, Dr. Dawson stood foremost in Canada and was an eminent authority. Many of his spare hours were devoted to this most important subject. His report upon the manners and customs of the Haidas in the Queen Charlotte Islands and the numerous and interesting specimens he brought with him have laid the foundations of the ethnological department of the National Museum at Ottawa. The Geological Survey of Canada was fortunate in having so able a scientist and geologist as Dr. Dawson for its director. He has done much in disseminating exact knowledge regarding the vast regions of the west chiefly, whilst his attention and care has led him to take a most prominent part in the economic prosperity and development of the eastern or older provinces. His courteous and practical replies to the constant stream of correspondence which, in his position as chief of the Geological Survey department, he received, have done much to place Canada's mining interests on a solid

basis. He had successfully carried out the work of his predecessors, Sir William Logan and Dr. Selwyn, in investigating the resources of Canada, both far and near. His death is an irreparable loss to Canada, to science, but especially to the Geological Survey Department.

Dr. Dawson was by nature of a retiring disposition, though exceedingly sociable and amusing as well as always interesting in company, yet more so in the case of geologists, and above all in the field. He was unmarried, and a foremost member of the Rideau Club, where he was most popular and highly appreciated. He proved to possess a perfectly inexhaustible fund of ready knowledge upon questions of Canadian or of world-wide interest.

His writings are to be found in the Annual Reports of the Geological Survey department, in the Quarterly Journal of the Geological Society of London, in the American Journal of Science and Arts, in the Canadian Naturalist, the Ottawa Naturalist, &c. In 1894 he was unanimously elected President of the Royal Society of Canada, the theme of his address being "The Future of Science in Canada." He was Associate Editor of the Journal of Geology of Chicago, and for three years he was President of the Ottawa Field-Naturalists' Club, during which term he did all in his power to advance and promote the interests of the Club. His was a life constantly devoted to the best interests of his official work. He combined indomitable energy with will power which did much to keep up his vital strength as against what might be termed a weakly physique. Close attention—possibly too close attention—during late years, to office work, and a lack of outdoor physical exercise, which he was wont to enjoy in his arduous mountain climbings and in his explorations of many unknown regions of this great Dominion, possibly combined to weaken his constitution.

He was called away most suddenly and will be missed by all who knew him personally or through his writings; but he has left behind him a noble monument of his industry as an explorer and of his skill as a practical geologist both in his official work and in the personal influence which he exerted in the advancement of science and scientific thought for twenty-six years.

As a geologist Dr. Dawson's reputation was world-wide. He was one of those investigators into the realm of geological science

who sought not only to point out the at once practical and economic side in the resources of the earth's crust of Canada, his native land, but one who diligently and intelligently hammered away at the numerous problems of pure geological science. They are numerous the problems in the geology of North America which are as yet unsolved ; and, wherever an element of doubt came in, as to the truth or validity of the results propounded by this or that investigator, or whenever intricate bits of geology presented themselves to his mind and eye for investigation, he made it his sacred duty to closely examine and carefully study their various relations in the field as well as in the office, thus seeking to ascertain all the facts of the case to enable him to arrive at a satisfactory conclusion of the difficult points involved. He never rested until the problem which he had before his mind was solved. In other words he was *thorough*. His reports, maps and papers are models of excellence and description. He had a facile pen, an intelleect ready and lucid, which could grasp the situation at a glance. His love for thoroughness and the best possible work came forth time and again in his endeavors, as the head of the Geological Survey of Canada, to present to the Hon. the Minister of the Interior, and to Parliament, the reports under his care, as well as the innumerable correspondence of the department making enquiries on the resources of every quarter of our great Dominion as models of care and attention. The reports issued during his régime as Deputy Head and Director can truly be said to be the pride of the Department. As regards quality as well as quantity of work brought forth and exact information published and disseminated by him during the six years and two months of his administration, it can not be denied that they were both unparalleled in any previous period in the history of this now old and established institution.

A cursory sketch of the various regions examined by Dr. Dawson during his connection with the Geological Survey of Canada will serve to shew the amount of territory which he covered and the nature of his extensive researches.

After completing his explorations and surveys in connection with the British American Boundary Commission, and writing his priceless memoir on the same, he contributed several reports which

are noted in the Reports of Progress of the Geological Survey of Canada for 1873-74, for 1874-75. These include reports on the hematite deposits of Pictou County, Nova Scotia; on the limonites of the same county and on the spathic ore deposits of the Sutherland's River, N.S.; also on the clay-iron stones of the Tertiary, along the 49th parallel, and the limestones of the Cretaceous of the Swan River and Thunder Hill in Manitoba; together with the results of his botanical researches along the 49th parallel.

In the Report of Progress for 1875-76 comes his report on Chilco and Nazco rivers and trail to Fort George, B.C., and in the next year's report his results in the basins of the Blackwater, Salmon and Necchacco rivers and of François Lake, B.C., along with a reconnaissance report of Leech River and vicinity on Vancouver Island. This report includes a statement of the condition of mines and mining in British Columbia at this early period. Coals and lignites and many minerals of economic importance were obtained by him along the route and analyses made by the department which have helped to lay down the foundation of the mineral wealth of that once remote province, but one whose resources, thanks to Dr. Dawson's work, is to-day well known and appreciated.

In 1877 and 1878 Dr. Dawson's field of explorations was in the Queen Charlotte Islands. It would suffice to obtain an estimate of the subject of this sketch to peruse the most interesting report on the resources and possibilities of these hitherto unknown islands from his pen. It was a practically virgin district for him and the excellent maps which he prepared that were published by the Department reflect greatly to his credit however young he was at that time. Not only as a geologist did he excel in this report, but he distinguished himself also as an ethnologist of repute. He shewed the world of science what an abundant field for research and enquiry there was open on that west coast. Even with the languages and vocabularies of the different tribes of the aborigines which he visited and examined, he made himself familiar, and has contributed much of value to the Philology of the western tribes of British Columbia.

Dr. Dawson's reports are usually accompanied by an extensive series of Appendices. He was a most prolific collector of

facts and specimens. Accordingly, his reports sometimes contain as many as a dozen appendices on all kinds of subjects of importance and interest to our country. The floras and faunas met with, the insects and crustacea, the shells of the land and of the sea, weather reports and other interesting meteorological observations; as well as the fossil organic remains of the district which he visited, he ever looked after most carefully, for he truly knew their great value as horizon-markers. He not only submitted these various collections to specialists and authorities throughout the country and abroad from whom he received further information from time to time but examined and described them himself.

Later, in the Report of Progress for 1878-79, he gives notes on the geology of areas drained by the Red and Assiniboine Rivers in Manitoba, and also describes the Coal deposits of the Lignite Tertiary of the Souris River, from the Great Valley and Porcupine Creek. The report of his explorations on the Skeena and down the Peace in 1879 are embodied in the Report of Progress for the year 1879-80, which is entitled "A report on exploration from Port Simpson to Edmonton, by the Peace River." Much important astronomical data has been furnished the government by Dr. Dawson during his numerous voyages and explorations which serve to fix the latitude and longitude of distant places on our Map of the Dominion.

In 1882 Dr. Dawson visited Europe where he carried on studies having for their object the utilization of the lignites of the West as fuels, and the results of his researches were embodied in a subsequent report.

For a knowledge of the forests of British Columbia the country is under a great debt to Dr. Dawson. He sought not only to bring forward the immense value which they prove to possess but also to point out the best means to preserve such a grand heritage. In the Districts of Alberta and Assiniboia he did much to reveal their hidden geological structure and economic resources, especially as far as coal is concerned. Up to 10,000,000 tons of coal to the square mile for hundreds of square miles of territory he has described and reported, and time will only serve to emphasize the accuracy of his carefully sought out facts from the bosom of Nature which was ever ready to yield her secrets to him

who knew her heart and appreciated her bountiful stores. His report on the geology of Bow and Belly Rivers in the Report of Progress for 1880-82 affords a condensed summary of his explorations in the districts just east of the Foothill country.

In 1883, Dr. Dawson was engaged along the western slope of the Rocky Mountains proper and had with him as assistant that year Mr J. B. Tyrrell who examined the geology and structure of the Crow's Nest Pass with its great possibilities for Coal. In 1884 he carried on explorations farther north in the Rocky Mountain and Selkirks region and prepared a reconnaissance map and a report giving the results, together with notes on the geology of the Red Deer River country.

In 1885, Dr. Selwyn was appointed as Canadian Commissioner to the Colonial and Indian Exhibition and Dr. Dawson superintended the work of the survey as Acting Director, and his time was fully occupied in attending to the duties of the office, to the shipment of the minerals and ores of the Dominion and cataloguing the same as well as of editing the first Annual Report of the Survey's new series. However, he found time to write and publish his own report on the Rocky Mt. region, and Dr. Selwyn makes the following kindly allusion to his work :—

"I wish here to record my high appreciation of the very able "and efficient manner in which Dr. Dawson has performed all the "work."

Dr. Dawson was officially appointed to the staff of the Geological Survey of Canada in 1876, as we read on page 7 of the Report of Progress for 1875-76, where Dr. Selwyn, then Director, informs us as follows :— "Mr. G. M. Dawson, late Geologist and Naturalist on the International Boundary Survey of the 49th parallel was appointed and has since been actively engaged in exploration in British Columbia." It was during this first year of Dr. Dawson's connection with the Canadian Survey that the Centennial Exhibition was held in Philadelphia and on page 2 of the report just quoted one can see that even at that early date he had the material welfare and prosperity of British Columbia at heart. He contributed, we read, not a little towards the proper representation and display of the then little known mineral resources of the Pacific province, and not only were the minerals attended to, but also the vegetable as well as the animal products of British Columbia.

His recent reports on the Kamloops District of British Columbia, those on the Southern Interior of the same province, on the Northwest Territories, on the Yukon Territory (containing in 1888, as this last mentioned report did, nearly 400 pages of description of that now famous region including its gold-bearing gravels,) also his Queen Charlotte and Vancouver Island reports, are all replete with the greatest interest and afford the best works of reference upon these important regions.

A list of Dr. Dawson's writings has been prepared from various bibliographic sources and references to original papers from his pen, in geology, natural history, &c. These comprise hundreds of reports, memoirs and papers on economic as well as scientific subjects. It is reserved for a subsequent issue of THE OTTAWA NATURALIST.

Dr. Dawson was President of the Ottawa Field-Naturalists' Club for three years, from 1891 to 1894; and as much as lay in his power he worked in the interest of our Club, not only by contributing important papers to the pages of its Transactions but also by encouraging others to do the same. His love for science and scientific work was unbounded, and of him it may be truly said that he spent himself for his country and his country's good. Especially in the West he will be greatly missed.

I cannot more fitly close this sketch than by quoting part of that admirable

ODE TO "DR. GEORGE" BY CAPT. CLIVE PHILLIPPS-WOOLLEY.*

"Hope she has fooled us often, but we follow her Spring call yet,
And we'd risk our lives on his say so and steer the course he set,
Down the Dease and the lonely Liard, from Yukon to Stikine;
There's always a point to swear by, where the little doctor's been,
Who made no show of his learning. But, Lord! what he didn't know
Hadn't the worth of country rock, the substance of summer snow.
I guess had he chosen, may be, he'd have quit the noise and fuss
Of cities and high palavers to throw in his lot with us.
He'd crept so close to Nature, he could hear what the Big Things say,
Our Arctic Nights, and our Northern Lights, our winds and pines at play.
HE loved his work and his workmates, and all as he took for wage
Was the name his brave feet traced him on Northland's newest page—
That, and the hearts of the hardfists, though I reckon for work well done,
He who set the stars for guide lights, will keep him the place he won,
Will lead him safe through the Passes and over the Last Divide,
To the Camp of Honest Workers, of men who never lied.
And tell him the boys he worked for, say, judging as best they can,
That in lands which try manhood hardest, he was tested and proved A Man."

Ottawa, 19th April, 1901. H. M. AMI.

*Ex. British Columbia Mining Record for April, 1901.

ORNITHOLOGY.

BIRD NOTES.

By W. T. MACOUN.

Although the winter was unusually long and the ground covered with snow until the second week of April the Robins, Song Sparrows and Bluebirds, three of the first migrants, were here several days earlier than either in 1899 or 1900. Although not birds, the frogs, which are among the first spring songsters, were heard near the Experimental Farm on April 10th. Mr. White reports seeing them on the 14th. By co-operation the records of the arrivals of birds become more reliable, and we have begun well this year, several members of the Club having sent in their notes. As space will not permit of publishing all the notes only the earliest dates are recorded. Observers in other parts of Canada have also contributed notes, but as these are not yet complete their publication in tabular form has been postponed until next month. Notes intended for the Ornithological Editor should be sent to him not later than the 20th of the month.

1901.

Jan. 12—SAW-WHET OWL, *Nyctala acadica*. Mr. C. H. Young.

Feb. 20—RUFFED GROUSE, *Bonasa umbellus*. Mr. A. G. Kingston.

20—BLUE JAY, *Cyanocitta cristata*. Mr. Kingston.

20—AMERICAN CROW, *Corvus americanus*. Mr. Kingston. Spring migration, March 13th. Mr. White.

20—CHICKADEE, *Parus atricapillus*. Mr. Kingston.

March 1—PRAIRIE HORNED LARK, *Otocoris alpestris praticola*. Mr. Young. Not seen at the Experimental Farm until March 19.

12—EVENING GROSBEAK, *Coccothraustes vespertina*. Three specimens seen near Normal School by the caretaker and reported by Mr. Alexander.

22—ROBIN, *Merula migratoria*. Heard by Mr. A. Gibson at Experimental Farm March 24th; seen by Mr. W. Harrington. Nest almost built at C. E. F. April 24th. First records of previous years: 1898, March 15th; 1899, April 6th; 1900, April 1st.

23—SONG SPARROW, *Melospiza fasciata*. Mr. W. A. D. Lees, at Russell, Ont.; March 24th, Mr. Young; March 24th, Mr. White. First records of previous years: 1898, March 11th; 1899, April 6th; 1900, March 31st.

24—AMERICAN ROUGH-LEGGED HAWK, *Archibuteo lagopus Sancti-Johannis*. Mr. Young.

26—BLUEBIRD, *Sialia sialis*. Mr. Lees. March 27th, Mr. Young.

1901.
March 27—PIGEON HAWK, *Falco columbarius*. Mr. Young.
28—SLATE-COLOURED JUNCO, *Junco hyemalis*. Mr. Young.
29—SHARP-SHINNED HAWK, *Accipiter velox*. Mr. White.
30—BRONZED GRACKLE, *Quiscalus quiscula æneus*. Mr. Kingston.
April 2—RUSTY BLACKBIRD, *Scolecophagus carolinus*. Mr. Young.
2—RED-WINGED BLACKBIRD, *Agelaius phœniceus*. Mr. Young.
2—AMERICAN GOSHAWK, *Accipiter atricapillus*. Mr. Kingston.
5—MEADOWLARK, *Sturnella magna*. Mr. Kingston.
9—PHŒBE, *Sayornis phœbe*. Mr. White. April 11th, Dr. Fletcher.
10—TREE SWALLOW, *Tachycineta bicolor*. Mr. Kingston.
13—AMERICAN GOLDEN-EYE, *Glaucionetta clangula americana*. Mr. White.
13—VESPER SPARROW, *Poocætes gramineus*. Mr. W. T. Macoun. April 14th, Mr. Kingston.
13—AMERICAN HERRING GULL, *Larus argentatus smithsonianus*. Mr. White.
13—BELTED KINGFISHER, *Ceryle alcyon*. Mr. Kingston.
15—PURPLE FINCH, *Carpodacus purpureus*. Mr. Macoun.
15—WHITE-THROATED SPARROW, *Zonotrichia albicollis*. Mr. Macoun.
16—RED-TAILED HAWK, *Buteo borealis*. Mr. White.
18—COW-BIRD, *Molothrus ater*. Mr. Macoun.
18—YELLOW-BELLIED SAPSUCKER, *Sphyrapicus varius*. Mr. White.
18—GOLDEN-CROWNED KINGLET, *Regulus satrapa*. Mr. Kingston.
18—AMERICAN OSPREY, *Pandion halliaëtus carolinensis*. Mr. Young.
19—NORTHERN SHRIKE, *Lanius borealis*. Mating at Experimental Farm. Seen at intervals during the latter part of the winter.
21—FLICKER, *Colaptes auratus*. Mr. Young.
22—CANADA GOOSE, *Branta canadensis*. Three birds. Mr. Macoun.
22—BUFFLE-HEADED DUCK, *Charitonetta albeola*. Mr. White.
23—PURPLE MARTIN, *Progne subis*. Mr. White.
23—BARN SWALLOW, *Chelidon erythrogaster*. Mr. White.
23—TREE SPARROW, *Spizella monticola*. Mr. White.

MEADOW-SWEET.—It is doubtful whether the true *Spiræa salicifolia* occurs in Canada. At least two varieties have been collected near Ottawa and others will probably be found. The most common form is var. *latifolia*, Ait., with obovate or elliptical dentate-serrate leaves; the inflorescence is broadly pyramidal. Another variety is *lanceolata*, Ait., with finely serrate oblanceolate leaves.

J. M. M.

ROSS'S GULL (*Rhodostethia rosia*, Macgill.)

By Protessor E. E. PRINCE, Ottawa.

My brief account of the scientific results of Dr. Nansen's Polar Expedition, which appeared in THE OTTAWA NATURALIST last November, has brought me many kind and interesting communications none more so than a letter from Dr. Otto J. Klotz who generously loaned to me a volume of the Report of the International Polar Expedition sent out by the United States Government in 1881. In this volume Dr. Klotz pointed out to me, occur two fine coloured plates of Ross's Gull, or the Roseate Gull (*Rhodostethia rosea*, Macgill.) and my statement on p. 143, vol. 14 of this publication demands correction. I ventured to say that in the conjoint report of Dr. Nansen and Dr. Collett, on birds observed in the polar regions, there is given for the first time a fully detailed description of Ross's Gull with exquisitely tinted illustrative plates and I am indebted to Dr. Klotz for calling my attention to the real facts, and for enabling me to correct my statement. In matters of this kind rigid accuracy is above all things necessary and it is only just to the United States observer, Mr. John Murdoch to state that on pp. 123-4-5 of his report on the birds noticed during the International Polar Expedition, 1881-2-3 he gives a description of this rare species, and accompanies it by two tinted plates. Mr. Murdoch states that a large series of specimens was secured, and they appeared not sporadically and in scattered numbers, but in abundance on certain dates. Thus from September 28th to October 22nd, 1881, small flocks were seen moving northeast, their total numbers being so considerable that the observer speaks of them as exceedingly abundant. Next year about the end of September these gulls again appeared plentifully; but, curiously enough, they were all young birds as far as could be ascertained. Mr. Murdoch pertinently remarks that it is difficult to say what becomes of the thousands coming west, and proceeding along the Alaskan coast taking a northeasterly course. Of course the point of observation (Point Barrow) was nearly nine degrees of latitude south of Nansen's, which as I pointed out was in the Hirtenland waters, and its nesting grounds as Nansen sur

mised are no doubt in these more remote and inhospitable regions. I may add that Mr. Murdoch's beautiful plates occur in a volume mainly consisting of meteorological and other physical records, and less likely on that account to meet the eyes of the naturalist. My indebtedness to Dr. Klotz is on that account greatly increased. I have already sent a note of correction to the New York Sun, which newspaper, as our President, Dr. Ami informed me reproduced almost complete the article published in these pages last November.

Ottawa, February, 1901.

THE GOLDEN EAGLE. AN ADDITION TO THE FAUNA OF MIDDLESEX COUNTY.

By J. E. KEAYS, London, Ont.

(Read before the Ornithological Section of the Entomological Society of Ontario.)

On Saturday, December 1st, 1900, a large bird was noticed in the vicinity of Lambeth and towards evening was seen pursuing and finally capturing a turkey from the flock of Mr. Jas. Cassidy. Carrying the bird to some distance it lit on the low branch of a tree and commenced its repast at which it remained so engrossed, that two boys, sons of Mr. Cassidy were able to approach close enough to strike it on the head with a rifle, slightly injuring its skull and stunning it so that it was easily carried to the house where it was placed in the cellar apparently dead; but after two hours it was found to be a very lively bird, and on Monday or Tuesday was brought to the city for sale, and is at present in the possession of Mr. Davey. It proves to be a Golden Eagle, in fine young plumage, and as far as we can learn a new record for Middlesex Co.

This eagle breeds sparingly through eastern Canada and is seldom seen far from the courses of large rivers or the shores of lakes, where it follows and preys upon the flocks of water-fowl. Mr. McIllwraith mentiones two taken at Hamilton and several at Toronto but a capture this far inland I think is somewhat unusual in Ontario. In the west it is much more numerous and there

breeds in the mountainous parts from New Mexico and Arizona to far north in British Columbia and Alaska.

Its food consists of mammals and large birds, such as rabbits, racoons, gophers, squirrels, grouse, waterfowl, etc., and unlike the Bald Eagle sparingly, if ever, partakes of fish, but will frequently feed upon carrion.

From time to time we see newspaper reports of children being carried away by Eagles, fortunately, however, the majority of such are sensational, but in sections of the south these birds are condemed by the sheep farmers, from the havoc they play among their flocks by feeding on the very young lambs, one firm alone reporting in 1889 the loss of from 400 to 500 lambs.

A comparison of the Golden Eagle with its near relative, the Bald gives the latter a slight advantage in size as the following table will show.

	Length.	Expanse.	Wing.
Male Golden,	30 to 35 in.	78 to 84 in.	23 to 24½ in.
Male Bald,	30 to 35 in.	84 in.	20 to 25.9 in.
Female Golden,	35 to 40 in.	84 to 90 in.	25 to 27 in.
Female Bald,	34 to 43 in.	84 to 96 in.	25½ to 28 in.

The Golden Eagle in *Adult* plumage is nearly uniform dark brown, the feathers of head and hind neck and tarsus tawny, tail darker than body and banded with grayish ; *Young* similar to the adult but with basal half of tail pure white, and feathers of tarsi paler sometimes nearly white or with portions white, head and neck same as in adult. In any plumage it may easily be distinguished from the Bald Eagle by its tawny head and by having the tarsus thickly feathered down to base of toes.

NOTE.—The specimen referred to above has since come into my possession and I have made a skin of it. The bird was exceedingly fat, weighing about 10 lbs. with an alar expanse 6 ft. 11 in. from tip to tip. Beneath the skin was found one pellet of shot about No. 6, which was very much out of shape as though it had hit a bone. This pellet was embedded in the fat. The ulna, (the large bone in the wing) had been broken about an inch from the wrist, but was entirely healed over, making a very strong join.

W. E. SAUNDERS.

REVIEWS.

THE PHYSICAL FEATURES AND GEOLOGY OF THE PALÆOZOIC BASIN BETWEEN THE LOWER OTTAWA AND ST. LAWRENCE RIVERS. By R. W. Ells, LL.D. (Trans. R. S. C., Sec. IV, 1900, pp. 99-120.)

This paper may be looked upon as a continuation of one read before the Royal Society in 1894, in which many additional facts relating to the structural features of the Palæozoic formations exposed in what may be called the Ottawa Basin. This information is believed to be especially important and opportune at the present time, in view of the boring operation which have lately been undertaken for the purpose of securing a supply of natural gas and oil which would be economically valuable. The formations exposed range in age from the Potsdam sandstone which rests upon the uneven surface of the Archæan to the Medina shales which here represent the lowest member of the Silurian proper. These constitute in general a broad synclinal basin whose boundaries are defined and note is made of their extension across the St. Lawrence into the state of New York. The various railways traversing and giving access to this area are mentioned as well as certain details in regard to the elevation above sea level at certain points. These have been secured through the kindness of Mr. Jas. White, Geographer to the Department of the Interior from advance proofs of "Altitudes in the Dominion of Canada," which it is expected, will be published shortly. These levels have evidently been quoted only approximately and many of them will be corrected in Mr. White's forthcoming volume. The determination of the various lines of demarcation between the several formations is very difficult owing to the thick and widespread covering of drift. A few general remarks are made in regard to ice movement, the striæ representative of these showing no less than three such periods. The thickness of the several formations vary considerably at different points and the presence of numerous extensive faults prevents any very definite statement.

The following estimates are furnished and will doubtless be found valuable in any future boring operations which may be undertaken. The figures represent what is believed to be the greatest thickness.

Potsdam, 300-700 feet.
Calciferous, 300 feet about.
Chazy, 175 feet about.
Black River, 38-100 feet.
Trenton, 600 feet.
Utica, 100 feet.
Lorraine, ?.
Medina, 75 feet.

Descriptions of the trend of some ancient channels of the Ottawa are given as revealed by borings and the general topography of the area.

Details in regard to the position and extent of the main lines of dislocation are given and the fact noted that both vertical displacements and horizontal throws are represented.

It is believed by the author that the question of the occurrence of natural gas or oil in the Ottawa basin has never yet been actually tested. The borings already made have been placed in locations quite unfavourable for this purpose or in the case of those to the south of the Ottawa river have penetrated the rock at but few points. Gas has been found in considerable quantity in several of the deep borings which have been made in the clay along the ancient channel of the Ottawa. The location of favourable anticlinal folds is rendered very difficult owing to the thick overlying mantle of drift.

A. E. B.

SYNOPSIS OF THE GEOLOGY OF CANADA, BEING A SUMMARY OF THE PRINCIPAL TERMS EMPLOYED IN CANADIAN GEOLOGICAL NOMENCLATURE. By Henry M. Ami, M.A., D. Sc., F.G.S. (Trans. R. S. C., Sec. IV, 1900 pp. 187-225.)

This extract from the transactions of the Royal Society, with its hundred names newly coined to mystify the reader and to replace others well known and more appropriate, justifies an observation made by a Committee of the House of Commons that such purely scientific researches seem devoted rather to upsetting theories of antecedent scientists, than to the discovery of new principles or the addition of new information. The author divides the 3,616,980 square miles of British North America into

five regions, the Acadian, Laurentian Highlands, Lawrencian Lowlands, Interior Continental Plain, and Cordilleran; gives a list of the geological systems; then, "compelled" thereto "by dire necessity," proceeds "to affix provisional formational names."

Of this great area nearly two-thirds belong to the Laurentian and Huronian systems—names now generally adopted throughout the world—in which no definite organisms have been found. In regard to the occurrence of these rocks at Hudson Bay there is a vague description (p. 190) of an "undifferentiated mass of granites, ...consisting of granites and *gneisses* and other crystalline rocks similar in structure and chemical composition to.....crystalline *limestones*"!

The great gold-bearing series of Nova Scotia, provisionally called Lower Cambrian, is also barren of fossils; while the over lying Etcheminian and Upper Cambrian rocks of Newfoundland, Cape Breton and New Brunswick hold fossils in abundance. Dr. Ami, misunderstanding Mr. E. R. Faribault's description of the mode of occurrence of the gold in Nova Scotia, speaks of "many *anticlines* superimposed one upon the other at different depths and intervals;" and of strata, altered in a narrow zone by contact with granite masses, as a "metamorphic series"! Three Cambrian fossiliferous zones have been recognized in British Columbia among a great series of volcanic rocks.

Ordovician or Cambro-Silurian rocks have been determined by the author from their fossils in every one of the five regions, "the Skiddaw and Arenig, the Hartfell and Llandeilo formations being easily recognized in Canada." The Silurian system also "presents a compact fauna which in facies closely resembles rocks in the Kendal and Ludlow regions of England;" yet local designations "based upon the faunistic relations" are given by the writer. It is noteworthy that he now agrees with Dr. Honeyman to include in the Silurian the disputed beds of the Nictaux iron mines, called by him elsewhere Eo-Devonian. His new names for the Arisaig Silurian tend only to obscure the correlation of a regular succession of strata shown, forty years ago, to range from Lower Helderberg to Medina.

In all the five regions, Devonian and Carboniferous strata have been met with. Many will object to the author's grouping

of those of the Acadian provinces, since it rests neither upon the ascertained stratigraphical sequence nor on any inference from the organic remains. And in justice to Dr. Matthew, Sir J. W. Dawson, Messrs David White and R. Kidston, authorities quoted by him, he should state the evidence by which he is "constrained to place" (p. 207) in the Eo-Carboniferous ten or fifteen thousand feet of strata constituting the Mispec and Little River groups of New Brunswick, included in the Devonian by the two first named, by the last in the Upper Carboniferous. On pages 211 to 213 there is some obscurity of thought or expression concerning the age of his so-called Windsor formation, two widely divergent views being hinted at, each of which has been held in turn by Dr. Ami. The first, commonly accepted, refers that formation to the Carboniferous Limestone of England; the second maintains that its fossils indicate the summit, not the base of the Carboniferous system. The confusion of ideas is thus expressed: The Windsor formation is followed upward by the Millstone Grit; unconformably above the latter is the New Glasgow Conglomerate, the basal portion of a continuous series northward into equivalent and newer strata on Prince Edward Island called Permo-Carboniferous, Permian and Triassic and probably representing the Windsor and Millstone Grit formations of Nova Scotia! This circular classification is not stratigraphical. And if the Upper Carboniferous can not be distinguished from the Little River formation or Middle Devonian by its fossils, why should it surprise us that "no characteristic fossil evidence has as yet been obtained to enable us to clearly separate these rocks (called Permian) from the Upper or Neo-Carboniferous"? In the Geological Survey reports Upper Carboniferous and Permian have the same meaning.

It was not the author who examined the Crow's Nest and Kootenay passes (p. 210.) Instead of the North Saskatchewan, in the next sentence, he probably means the Bow River. The Albert shales of New Brunswick (p. 212) are not overlaid by the Millstone Grit as stated by him, but unconformably by Lower Carboniferous limestone, shales and conglomerate. It is also a notable fact that the Cretaceous beds of the Kamloops district in British Columbia (p. 217) described by him as "consisting of argillites, limestones and sandstones," contain no limestones. The author (p. 218) quotes the "Paskapoo series" or Paskapoo formation, or upper

division of the Laramie," when in fact the adopted names is Paskapoo *beds*. Certain crystalline limestones in the Yale district (p. 202) are said to occur west of Lansdowne, at Adams Lake, whereas that lake is fifty miles *north* of Lansdowne.

Triassic rocks occur, also according to the author, in British Columbia, Vancouver and the Queen Charlotte Islands; and Jurassic, in the Arctic archipelago. The Cretaceous, largely developed in Manitoba, the Northwest and British Columbia, includes important coal fields.

The Quaternary deposits he divides into three periods; the Glacial or boulder clays; the Champlain or marine clays deposited during a period of submergence; and the Recent or terrace period of elevation.

He introduces three different names for the boulder clays:—the Labrador formation for the boulder clay of the Laurentide glacier or glaciers; the Rupert formation for that of the Keewatin glacier; and the Cordilleran formation for the product of the Cordilleran ice sheet. These names are of no practical use, and, moreover, are misleading and tend to confusion. For example, how is it to be known from the term Rupert formation that it is a boulder clay, without referring to Dr. Ami's paper? No geologist has used any other term than the descriptive one of boulder clay or till for the product of Pleistocene ice. As well might the Triassic be given different local names in different parts of Canada.

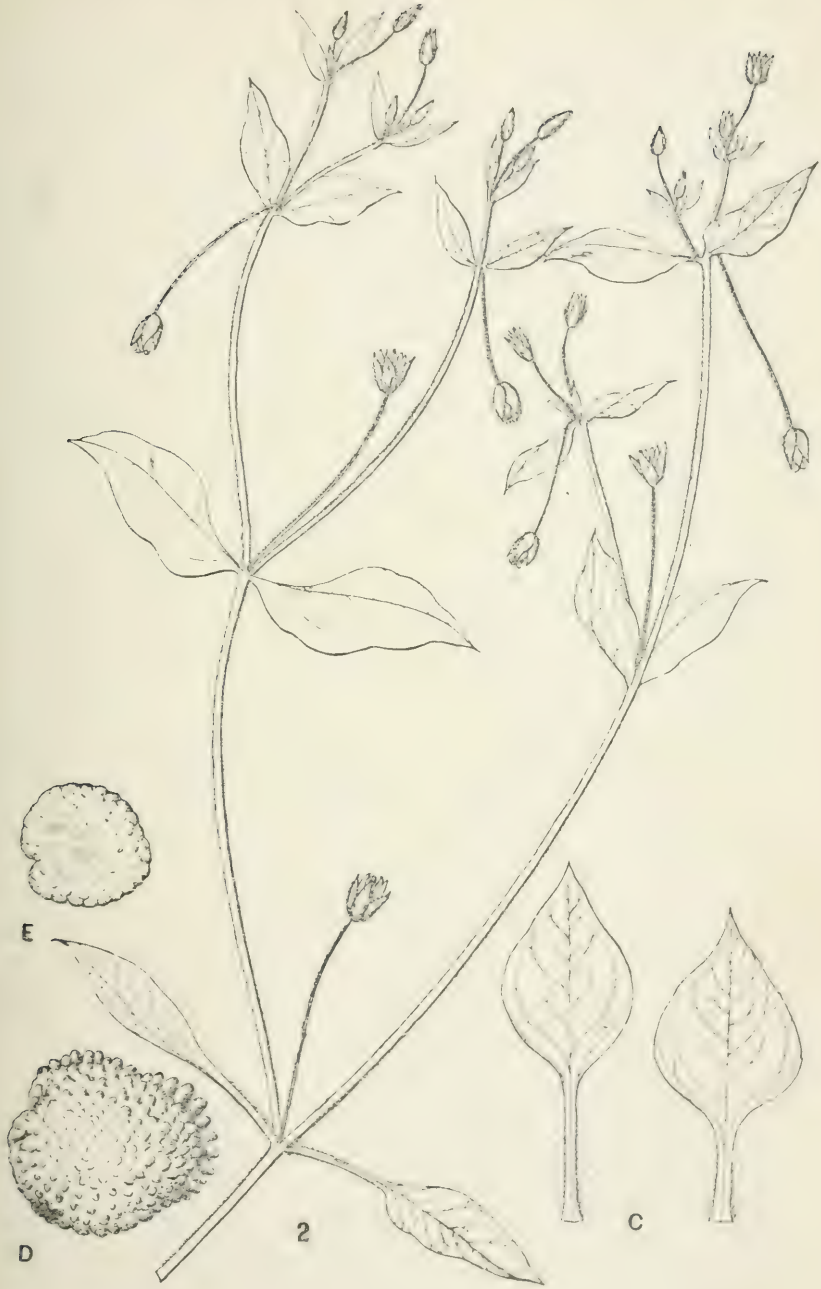
Dr. Ami also adopts the term Champlain, presumably supposing it to be the equivalent of the Leda clay and Saxicava sands. This is a name not in common use north of the International boundary, simply because neither the upper nor the lower limits of the deposits classed under that term as defined by Hitchcock and Dana correspond with those of the marine beds of the St. Lawrence valley and Maritime provinces. The two geologists referred to have made the Champlain a glacial formation, but in Eastern Canada no deposits attributable to ice action have been met with in the Leda clay and Saxicava sands. Further, the fossils they contain are really identical with forms now living in the northern part of the Gulf of St. Lawrence and on the east coast of the Labrador peninsula, where no glaciers exist at the present day.

Only in the most recent of our superficial deposits have traces of the aborigines been found, together with their stone or copper implements and remains of beaver, deer, bear and other animals of the chase identical with those of to-day. H. F.

Auctor ad nat. del.

STELLARIA APETALA

(A) Pistil of S apetala. (B) Pistil of S. media.



Auctor ad nat. del.

STELLARIA NEGLECTA

(C) Leaves of S. neglecta. (D) Seeds of S. neglecta.

(E) Seeds of S. media.

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NOTES ON A TURTLE FROM THE CRETACEOUS ROCKS OF ALBERTA.*

By LAWRENCE M. LAMBE, F.G.S., of the Geological Survey of Canada.

(With four plates.)

In the collection of reptilian remains, made by the writer during the summers of 1897 and 1898, from the Cretaceous of the Red Deer River, Alberta, are parts of two plastrons of a Chelonian, of large size, that evidently belong to Cope's species *Compsemys variolosus*. The specimens are in an excellent state of preservation and throw new light on the generic affinities of the species. Referable also to this species are parts of the carapace, plastron and endoskeleton, belonging presumably to one individual, that were collected in 1881 by Dr. G. M. Dawson on the Old Man River below Fort McLeod, and two marginal bones with some smaller fragments of the shell obtained by Mr. R. G. McConnell on the Red Deer River in 1882. These latter specimens, taken in conjunction with those first mentioned, form a most interesting series that help to elucidate some important structural points.

The rocks exposed on the Red Deer River, from which the specimens of Mr. McConnell and the writer were obtained, belong to the Belly River series which underlies the marine Pierre-Fox Hills (or Montana) formation in this region. The specimens collected by Dr. Dawson on the Old Man River are from a higher horizon, viz., the Willow Creek subdivision of the Laramie.

The original description of *C. variolosus*, Cope, based on material from the Fort Union (Laramie) beds of Montana, ap-

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

peared in 1876 in the Proceedings of the Academy of Natural Sciences of Philadelphia, vol. xxviii, p. 257, as follows: "One of the most abundant, and the largest species of the Fort Union beds. The carapace is convex and the plastron flat; the marginal bones are heavy and strongly convex on the inferior side. The margin of the plastron is thickened and heavy, characters which also belong to all parts of the carapace. The sutures of the dermal scuta are deeply impressed, and the surface of the bone is strongly sculptured above and below, and even on the superior face of the thickened margins of the free lobes of the plastron. The sculpture consists of round fossæ, which are deeply impressed and are arranged quincuncially, so that their borders never form straight lines. The latter are also more or less angulate on the edge, so that the surface has a more than usually rugose character. The typical specimen equals those of the large land tortoises of the Eocene in dimensions." The specimens that Professor Cope had may not have permitted a more detailed definition of the species, but the style of sculpture and other points of resemblance seem to remove beyond doubt the question of the specific identity of the Montana specimens with those from the Old Man and Red Deer rivers.

The proportions of the component elements of the plastron can be seen by referring to plate III, where a restored outline is given, based on two specimens from the Red Deer River, which are represented in the figure by the dotted portions. The sutures between the bones are shown by the sinuous lines and the boundaries of the shields by the heavy ones. The dotted lines represent the supposed shape of the end of the posterior lobe, the direction of the sulcus defining the front limit of the femoral shields, and the position of a sulcus that probably crossed the xiphiplastrals, whilst the extent of the hypoplastrals is conjectural.

The plastron is flat except at the sides where it bends evenly upward, the lobes are short and broad, and the sternal bridge long. The entoplastral is roughly pentagonal and rather broad. The epiplastrals are of not unusual size and shape, whilst the hyoplastrals are relatively large. A divided intergular shield separates two small gulars, behind which are well-developed humeral shields. The pectorals narrow rapidly toward the sides

where they and the abdominals meet a series of inframarginals that overlap the peripheral bones. All the sulci are deep and very conspicuous except those marking the position of the inframarginals, the inner anterior boundaries of the gulars, and the division of the intergular. These latter, however, are sharply and clearly defined. The sutural line between the hypoplastrals and the xiphiplastrals is shown in the smaller of the two specimens. As regards the sculpture, the original description is accurate and succinct.

Turning to the dorsal or upper side of the plastron (fig. 2, plate III) it is seen that the rugose sculpture extends inward for some distance from the free edges of the lobes, more particularly at the extreme anterior end, where also the bone is very much thickened. A decided thickening also occurs in the axillary region. The oval outlines on the xiphiplastrals (P, plate III) show the position of smooth, slightly raised, flat surfaces that are apparently facets for the articulation of the pubic bones.

In the two marginal bones collected by Mr. McConnell the rib prolongations from the adjacent costal bones are preserved. These marginals, with parts of costal bones collected by Dr. Dawson, show that the carapace had a sculpture similar to that of the plastron, and was covered by well-developed shields. The rib-heads of the costals were apparently also well-developed.

The foregoing characters indicate a Chelonian that cannot be retained in the genus *Compsemys*, which is nearly allied to *Pleurosternon* and possesses a mesoplastral element. The presence of two small gular shields separated by a divided* or double intergular shield (in reality two intergulars), and of a series of inframarginals, the absence of a mesoplastral and of a sutural union of the pelvis with the plastron, together with an abbreviation of the lobes and a decided lengthening of the sternal bridge are characters that suggest such close affinities to the genus *Adocus* of Cope that this species is here referred to that genus.

Measurements :

	M.
Estimated length of plastron (28½ inches)	.720

*G. Baur. Proc. Acad. Nat. Sci. Philadelphia, vol. xliii, 1891, p. 428. The genus *Adocus*.

Length along median line from anterior end to posterior border of pectoral shield	.295
Breadth from median line to lateral suture (= half of breadth of plastron)	.280
Length of entoplastral	.085
Maximum breadth of entoplastral	.123
Thickness midway between gulars	.035
Thickness at centre of gular shields	.033
Thickness on median line at posterior border of pectoral shield	.013
Thickness at posterior edge of hyoplastral near left boundary of abdominal shield	.007
Thickness in axillary region near lateral suture	.032
Thickness midway between entoplastral and the axillary notch	.025

In 1882 Dr. J. F. Whiteaves had labelled the two marginal bones from the Red Deer River with the name *Compsemys variolosus*, and to him belongs the credit of having first noticed the occurrence of this species in Canada.

The writer is indebted to Dr. O. P. Hay, of the American Museum of Natural History, New York, who since the above was written, has compared some of the Red Deer River material, sent to him, with the type of *Compsemys variolosus*, Cope, and confirms the correctness of the writer's specific identification. Dr. Hay informs the writer that in the type there is little, if any, of the carapace represented and that the anterior lobe of the plastron is missing. Also that the specimen shows the central portions of the plastron, and the posterior lobe, which latter is broadly rounded.

EXPLANATION OF PLATES.

Plate III.

FIGURE 1—The plastron of *Adocus variolosus* (Cope); from the Cretaceous of Alberta. One-sixth natural size. I G, Intergular shield; G, Gular do.; HUM, Humeral do.; PEC, Pectoral do.; AB, Abdominal do.; FEM, Femoral do.; AN, Anal do.; EP, Epiplastral bone; ENTP, Entoplastral do.; HYP, Hyoplastral do.; HPP, Hypoplastral do.; XP, Xiphiplastral do.

FIGURE 2—The upper or inner side of the plastron of *Adocus variolosus* (Cope). One-sixth natural size. P, surface for the articulation of the pubis.

Plate IV.

Lower or outer surface of specimens represented in plate III; one-third natural size.

Plate V.

Upper or inner surface of specimens represented in plate III; one-third natura size.

Plate VI.

The lower surface of the anterior end of the plastron figured in the preceding plates; natural size; to show the sulci of the intergular and gular shields, details of sculpture, etc.

CORY'S LEAST BITTERN (*Botaurus neoxenus*, Cory).

By W. L. KELLS, Listowel, Ont.

Many years ago, in the time of the early settlement of the township of Peel, the writer remembers to have seen a specimen of a bird which he has never since seen alive. It was at the time of the spring migration, and the bird, probably wearied with a long flight, was able to fly but a short distance at a time, so that being pursued it was finally captured in a pool of water into which it fluttered in its efforts to escape. When dissected it proved to be a female. It evidently belonged to the family of the Waders, or Shore birds, as it had a long neck and bill and long legs, with a slender body, but some of the colouring of its plumage was very beautiful.

Many years afterwards, when visiting the museum in the University of Toronto, a specimen of the Least Bittern *Botaurus exilis* was identified as similar in size and form, but lacking in some of the handsome hues of the Peel specimen. When again in Toronto, in the spring of 1891, the writer noticed at the store of Thurson & Spanner a mounted specimen of a Least Bittern, which had been collected the season before in the Toronto marsh. In the published "Transactions of the Canadian Institute" for 1890-91, is the following reference to this bird, which was then regarded as the first specimen of the Florida Dwarf Bittern or, as it had been previously called, Cory's Least Bittern, unknown to science, that had been taken in Ontario. Mr.

W. Cross, the writer of the article, says: "On May the 18th, 1890, a very interesting capture was made on Toronto Island, and I afterwards received the bird. It was a small bittern with all the colouring very dark and blended with rich chestnut-brown on the back. It was so unlike any other Least Bittern that I had previously seen that I put it down as a new bird, and soon identified it as Cory's Least Bittern. It is a resident of Florida and Mexico, and is supposed to have wandered here with our *Botaurus exilis* during the spring migration." This bird was a female, and Mr. Cross presented it to the Canadian Institute, where, after being mounted, it now remains. A second specimen of this interesting species was taken on May 20th, 1893, and a report of this capture by Mr. H. Brown was published in the *Auk*. The specimen was sent for examination to Mr. Wm. Brewster, a distinguished American ornithologist, who wrote regarding it: "It agrees very closely with a skin taken at Lake Flirt in 1892. The Toronto bird is a trifle darker on the back, and the chestnut of its under parts is slightly richer, but in other respects the two specimens are exactly alike. It, also, is a female." On May 26th, 1894, a third specimen was shot at Ashbridge Bay, Toronto, by a Mr. Jacobs, who flushed it with a *B. exilis* from a clump of reeds. Both birds were secured and found to be males. On comparing the three specimens it was found that the one shot in the summer of 1893 was identical with the one obtained in 1894, with the exception of the wing coverts, which are a little darker. The female shot in 1893 is black on the crown only, the back of the neck is a dark rufous-chestnut, the back is black with a decided brownish shade, not green as the other two; the remainder of the colours correspond with the exception of one or two white feathers on the legs. It is interesting to know that up to that date this Toronto specimen was the ninth known in collections. Mr. Charles Pickering captured another specimen of this species on the 15th of July, 1894, and has written the following interesting account regarding that event: "While going through Toronto marsh I had the good fortune to find a Cory's Bittern. It was a little east of the south end, and was just in the act of lighting a little behind me when I caught sight of it; I thought at first that it was a Virginian Rail, but on the second sight its long legs showed

clearly that it was not. I therefore pushed my boat as close to the rushes as I dared, and watched it for a quarter of an hour, and then turned to leave it as I had no gun. After going some fifty yards I turned as I thought to have another look at my rare friend when my lady companion suggested to me to hit it with my oar. I took the hint, but as I was about to strike, the bird arose and flew to the other side of the marsh. I followed, and as it allowed me to approach within a couple of yards, I succeeded in knocking it over and secured it. While watching its actions I noted that these were altogether different from those of any other Least Bittern that I had previously seen, for instead of standing erect when being watched, as is the habit of the other members of the family, it would crouch down until it seemed to be only the size of a Virginian Rail, its long neck being altogether out of sight. It had a very slow, sneaky walk, grasping a single rush with one foot and striding as far as possible so as to grasp another. It seemed to be feeding on insects on the lily leaves at the foot of the rushes, as it would every few seconds dart out its neck with great rapidity and take something off the leaves."

In the appendix to Coues' "Key to North American Birds, 1884," the following description of the Florida Dwarf Bittern is given: "Crown, back and tail black, glossed with green; sides of head and throat chestnut, the feathers on the back of the neck tipped with greenish-black, breast and under parts rufous-chestnut, nearly uniform, shading into blackish on the sides, under tail coverts dull black, upper tail coverts rufous-chestnut, the under ones paler chestnut, all the remiges slaty plumbeous. Length 10.80 inches, wing 4.30, tarsus 1.40, bill 1.80; habitat southwestern Florida." It will also be noted by the more advanced students of Ornithology that while these specimens are thus described by Dr. Coues in "The Key" of 1884, *Ardetta neoxena*, yet, in "The Union Check List" of more recent date, the name *Botaurus neoxenus* is used, and by ornithologists it is known by both these names, as well as by the different English names previously mentioned. In the October, 1894, issue of the "Biological Review for Ontario," Mr. H. Brown writes that up to that date nine specimens of Cory's Bittern had been captured at Toronto, and he gives a résumé of its history, from which a few extracts are here given. "A most peculiar circum-

stance in the history of this bird is that it has only been recorded from two isolated and widely separated localities, viz., Southern Florida, and Toronto, Ont., and it is interesting to note that not until 1890 was it observed at Toronto, some four years after it was discovered in Florida. In 1893, another was captured here, and this year (1895) five have been secured. Quite a number have been observed, but only five taken in Florida since the type was obtained.

This fact would lead to the supposition that the species is increasing in numbers; or is it because greater interest has been taken in searching for them? The marshy location at Toronto to which the birds resort and where all the specimens recorded were taken, is only about half a mile square protected from the waters of Lake Ontario by a narrow sand bar a few yards in width, and is situated immediately adjacent to the city of Toronto, so that the bird, though evidently of retired habits, could scarcely have chosen a more frequented piece of marsh. In Florida the habitation of Cory's Bittern extends over a swampy area about 40 by 50 miles in extent. Of the specimens taken at Toronto, the majority were males, and it was found by dissection of three of this number that they feed on small bass and perch, and in one stomach there was found the larva of a dragon-fly. That they breed at Toronto seems evident from the dates at which the specimens were taken, and the manner in which several allowed themselves to be captured, indicates either their stupidity or tameness. Its nesting modes and eggs are similar to those of the other species of Least Bittern.

NOTE.—Since the above was written information has been received of several more specimens of this species being taken at Toronto, and one in the State of Michigan.

W. L. K.

CONTRIBUTIONS TO CANADIAN BOTANY.[1]

By JAMES M. MACOUN, Assistant Naturalist, Geological Survey of Canada.

XIV.

THALICTRUM CONFINE, Fernald, Rhodora, vol. II, p. 232.

Rootstock 2 to 4 cm. long, bearing 10 to 12 strong roots: stem slender, 3 to 6 dm. high, puberulent, pale-green, often finely mottled with purple, leafy to the summit: the four or five leaves glandular-pruinose, glaucous beneath, the lower, including the short petiole 3 to 4 cm. long; leaflets suborbicular broadly obovate or flabellate, coarsely toothed, 0.75 to 1 cm. long, the terminal on slender petiolules, the lateral short-petiolulate or subsessile: flowers diœcious, greenish or purplish, the panicles 1 to 2 dm. high, with ascending branches: sepals greenish, oblong-lanceolate, caducous: carpels 6 to 10, glandular-pruinose; stigmatose style lance-subulate, 3 to 5 mm. long; achenes ovate-lanceolate, excluding the persistent style, 4 to 5 mm. long, 2 to 3 mm. thick, plump, subterete, scarcely compressed or ancipital with 8 simple or slightly branched strong ribs, the alternate ones strongest; seed linear-lanceolate, hardly filling the cell.

Thickets, Hemlock Lake, near Ottawa, Ont., in flower, Aug. 8th, 1894. Herb No. 2,956.[2] (*John Macoun.*) Also collected in Maine.

THALICTRUM OCCIDENTALE, Gray.

T. dioicum purpurascens, Can. Rec. Sci., 1894, p. 77.

Rootstock slender, elongated: stem glabrous, 1 m. or less high, leafy to the summit, the three to six leaves glaucous beneath, smooth or minutely glandular, the lower including the long petiole 0.5 to 3 dm. long, those of the inflorescence often simple; leaflets thin, reniform or obovate, with coarse rounded lobes, the terminal on slender petiolules, the others

[1] Published by permission of the Director of the Geological Survey of Canada.

[2] These numbers are those under which specimens have been distributed from the Herbarium of the Geological Survey of Canada.

short-petiolulate or sub-sessile: flowers diœcious or polygamo-diœcious, greenish or purplish, the panicles 1.5 to 3 dm. high, with ascending branches: sepals oblong: carpels glabrous or minutely glandular-pruinose; achene excluding the persistent style 6 or 7 mm. long, 2 or 3 mm. wide, compressed, strongly ancipital, with three strong or somewhat branching ribs on each side: filaments yellowish, greenish, or purplish, elongated, slightly clavellate; anthers linear, mucronate.

Represented in the herbarium of the Geological Survey of Canada by many sheets from the west and by specimens collected at Eel River, N.B., by Robert Chalmers, and on the St. John River above Woodstock, N.B., by John Macoun. Mr. Fernald has examined specimens collected by Mr. G. U. Hay at South Tobique Lakes and St. John, N.B., and by Bourgeau near Lake Winnipeg.

RANUNCULUS PALLASII, Schlecht.

Mosquito Bay, Lat. 60° 42′, east coast of Hudson Bay. Aug. 18th, 1898. Herb. No. 23,003. (*A. P. Low.*) Not recorded from Eastern America.

BERBERIS BREVIPES, Greene, Ott. Nat., vol. xv, p. 42.

Crow's Nest Pass, Rocky Mts., 1897. Herb. No. 18,080. (*John Macoun.*)

SARRACENIA PURPUREA, L. var. HETEROPHYLLA, Torr.

In bogs, Madawaska River, Algonquin Park, Ont. 1900. (*John Macoun.*) Only Canadian specimens in herbarium of Geological Survey.

DENTARIA GEMINATA, Wats.

Koksita, Vancouver Island. (*R. H. Jameson.*) New to Vancouver Island.

VIOLA MISTASSINICA, Greene, Pittonia, vol. IV, p. 6.

Lake Mistassini, Que. 1885. (*J. M. Macoun.*) Richmond Gulf, Hudson Bay. (*Wm. Spreadborough.*) West branch of Hamilton River, Labrador. (*A. P. Low.*) Banff, Rocky Mountains. (*V. B. Sanson.*) Cassiar Trail, west of Dease

Lake, B.C. Lat. 58° 30′. (*Dr. G. M. Dawson.*) The western specimens differ slightly from those from the east, but seem referable here. This plant is readily distinguished from *V. blanda*, *V. renifolia*, and *V. amœna* by its "stout scaly-looking and elongated root-stock and by its notably toothed foliage, the leaves in all the others being crenate, the proper teeth never salient but on the contrary almost obselete." The lowest petal is not only purple-veined but the purple colour is diffused over the whole petal.

VIOLA WATSONI, Greene, Pittonia, vol. IV, p. 5.

Boggy meadow near Charlottetown, P.E.I. 1898. (*Lawrence W. Watson.*)

VIOLA CYCLOPHYLLA, Greene, Pittonia, vol. IV, p. 7.

Yellow Head Pass, Rocky Mountains, July 13th, 1898. Herb. No. 19,298. The type. (*W. Spreadborough.*)

STELLARIA SUBVESTITA, Greene, Ott. Nat., vol. XV, p. 42.

Common in the Rocky Mountains on both sides of the Bow River Pass.

STELLARIA MEDIA, Cyrillo.

Attention is again drawn here to Mr. Theo. Holm's paper on "Allies of *Stellaria media*" in the last number of THE OTTAWA NATURALIST. These plants should be carefully studied everywhere in Canada. Among our herbarium specimens labelled *S. media*, *S. neglecta* was found from Victoria, Vancouver Island; Burrard Inlet, B.C., Killarney, Man.; Sable Island, N.S.

RADIOLA LINOIDES, Gmel.

Along a ditch near the old fortifications at Louisburg, Cape Breton Island, N.S. 1898. Herb. No. 20,232. (*John Macoun.*) New to Canada. Probably introduced by the French.

SPIRÆA SALICIFOLIA, L.

The reading of Mr. Wiegand's note on *S. salicifolia* in *Rhodora* for May, 1900, suggested an examination of the

sheets in the herbarium of the Geological Survey of Canada. This examination has forced me to the conclusion that we have no true *S. salicifolia* in Canada. There are, however, three or four well defined varieties or species of which the most abundant in the east is *S. salicifolia*, var. *latifolia*, Ait., common from Nova Scotia to Lake Superior but not found in the Northwest Territories. The form most nearly approaching *S. salicifolia* is var. *lanceolata*, Ait., represented in our herbarium by specimens from Newfoundland west to Prince Albert on the North Saskatchewan. Though the herbarium material is ample no attempt will be made at present to characterize the other forms as like some other genera of the *Rosaceæ*, *Spiræa* must be studied in the field. The part of the plant which can most easily be made into a herbarium specimen is not always that most necessary for the proper determination of the species.

AGRIMONIA HIRSUTA, Bicknell.

A. Eupatoria, Macoun, Cat. Can. Plants, vol. 1, p. 142 in part.

Truemanville, N.S. (*H. Trueman.*) Billings' Bridge, Ottawa, Ont.; Pt. Edward, St. Clair River, Ont. (*J. M. Macoun.*) Belleville, Ont.; Wooler, Northumberland Co., Ont. (*John Macoun.*) Edmonton, Ont. (*Jas. White.*)

AGRIMONIA BRITTONIANA, Bicknell.

Boylston, N.S. (*Dr. C. A. Hamilton.*) Big Intervale, Cape Breton Island, N.S.; Flat Rock Portage, Nipigon River, Ont.; Killarney, Man. (*John Macoun.*) The western specimens in the herbarium of the Geological Survey include several species.

MYRIOPHYLLUM ALTERNIFLORUM, D.C.

Golden Lake, Renfrew Co., Ont. (*John Macoun.*) The western limit of this seldom collected species.[1]

TRIOSTEUM AURANTIACUM, Bicknell, Torreya, vol. 1, p. 26.

Rich soil on the rocky bank of the Nation River at

[1] The geographical limits given in these papers refer to Canada only.

Casselman, Ont. (*J. M. Macoun.*) *T. perfoliatum* is represented in the herbarium of the Geological Survey by specimens from Belleville and Churchville, Ont.

EUPATORIUM BOREALE, Greene, Rhodora, vol. III, p. 83.

Stout, erect, 2 feet high or more, glabrous except as to the inflorescence: leaves ample, very thin, dark-green, feather-veined, the veins not light-coloured, 3 or 4 inches long, often 3 inches broad towards the base, broadly subcordate-ovate, abruptly acuminate, coarsely and evenly serrate, the serratures 20 to 25 on each side, some of the larger with a secondary tooth; petioles ¾ to 1½ inches long, somewhat ascending: cymes terminal, but with one pair from the axils of the uppermost leaves: peduncles and pedicels rather densely pubescent, but involucres glabrous, their bracts thin, only obscurely striate; tips of the corolla-teeth somewhat hairy: achenes dark-brown, sharply thin-angled, the angles of those of the outer series remarkably setose-hispidulous, the surface glabrous.

Represented in our herbarium by specimens from Bass River, Kent Co., N.B., collected by Prof. J. Fowler. Most of what has been taken to be *E. ageratoides* in Eastern Canada is probably this species.

SOLIDAGO PRUINOSA, Greene, Pittonia, vol. IV, p. 70.

Erect, 3 feet high or more, very leafy up to the dense short, pyramidal panicle of short, spreading or slightly recurved abruptly ending and obtuse racemes of rather large heads: leaves ascending, 2 inches long, elliptic-lanceolate, acute or acuminate, slightly but evenly serrate from near the base to near the apex, distinctly 3-nerved and canescent or almost hoary on both faces with a dense, rather soft puberulence or pubescence: pedicels and branches of the inflorescence almost tomentulose: bracts of the more than middle-sized involucre in about 3 series, the short outer ones subulate-linear, the inner long ones also visibly narrowed from base to apex but obtusish; flowers apparently light yellow.

Moose Jaw, Assa., Aug. 13th, 1895. Herb. Nos 10,892, 10,893 and 10,894. (*John Macoun.*)

EUCEPHALUS MACOUNII, Greene, Pittonia, vol. IV, p. 70.

Along fences, Sea's Farm, near Victoria, Vancouver Island. Herb. No. 447. (*John Macoun.*) Distributed as *Aster radulinus.*

CENTAUREA SCABIOSA, L.

Along the Canadian Pacific Railway at Snellgrove, Ont. (*Jas. White.*) New to Canada and known from only one other locality in America. Determined by Dr. Robinson.

SENECIO OVINUS, Greene, Pittonia, vol. IV, p. 110.

S. resedifolius, Macoun, Cat. Can. Plants, vol. I, p. 267 in part.

Mountain slopes, western summit of North Kootanie Pass, Rocky Mts., 1883. (*Dr. G. M. Dawson.*) High slopes of Sheep Mountain, Waterton Lake, Rocky Mts. Herb. No. 11,619. (*John Macoun.*) Described from the Sheep Mountain specimens.

VACCINIUM NIGRUM, Britt.

V. corymbosum, var. *pallidum,* Macoun, Cat. Can. Plants, vol. I, p. 291.

Point Pleasant, N.S.; Englishtown, Cape Breton Island, N.S.; common in the vicinity of Ottawa, Ont., and at Niagara, Ont. (*John Macoun.*)

LYSIMACHIA VULGARIS, L.

Well established on Toronto Island, Ont. (*W. Scott.*) Only Canadian record.

STEIRONEMA LANCEOLATUM, Gray; Macoun Cat. Can. Plants, vol. I, p. 313.

Recorded from Ontario, but such specimens as we have seen so named are *S. quadriflorum,* Hitchc.

ACERATES LONGIFOLIA, Ell.

Dry sandy soil, southwest of Sandwich, Ont., 1893. (*Alex. Wherry.*) Our only Canadian specimens. The specimens referred here, Macoun, Cat. Can. Plants, vol. I, p. 563, are *A. viridiflora* var. *lanceolata,* Gr.

ASCLEPIAS PULCHRA, Ehrh.

In Mahone River bed at New Germany, N.S., and at entrance of West River into New Germany Lake, N.S., July 1891. Herb. No. 23,581. (*Dr. C. A. Hamilton.*) New to Canada.

ERYTHRÆA CENTAURIUM, Pers.

Very abundant on the old land near the main lighthouse station, Sable Island, N.S. 1899. (*John Macoun.*) Our only Canadian specimens.

LITHOSPERMUM LATIFOLIUM, Mx.

Lorette Falls, near Quebec, Que. 1895. (*Mrs. Brodie.*) Not before recorded except from Ontario.

HELIOTROPIUM CURASSAVICUM, L.

Saline soil, McLeod, Alta. Herb. No. 23,971. (*John Macoun.*) Western limit.

CONVOLVULUS ARVENSIS, L.

Open prairies, Morris, Man. (*John Macoun.*) Not recorded from Manitoba.

PHYSALIS IXOCARPA, Brot.

Roadsides near the hotel, Golden Lake, Renfrew Co., Ont. (*John Macoun.*) New to Canada.

HYOSCYAMUS NIGER, L.

Old railway ground, Banff, Alberta. 1900. (*N. B. Sanson.*) Not before recorded from the west.

BUCHNERA AMERICANA, L.

Port Frank, Ont., Sept. 8th, 1891. (*J. Dearness.*) Only Canadian record.

GERARDIA PAUPERCULA, Britt.

In marshy places near the main station, Sable Island, N.S. 1899. Herb. No. 22,578. (*John Macoun.*) Not recorded east of Quebec.

LIPPIA LANCEOLATA, Mx.

Wet places, Leamington, Ont. 1892. Herb. No. 24,-270. (*John Macoun.*) New to Canada.

AMARANTUS BLITOIDES, Wats.

East of Brandon, Man.; Cardston, Alta. (*John Macoun.*) Not recorded west of Ontario.

MONOLEPIS CHENOPODIOIDES, Moq.

Cypress Hills, Assa.; Kananaskis and Banff, Rocky Mts. (*John Macoun.*) Western limit.

CHENOPODIUM BOTRYS, L.

Waste places, Spence's Bridge, B.C. (*John Macoun.*) Not recorded west of Ontario.

CHENOPODIUM LEPTOPHYLLUM, Nutt.

Sandy soil, Spence's Bridge, B.C.; Deer Park, Lower Arrow Lake, B.C. (*John Macoun.*) Not recorded west of Rocky Mountains.

CHENOPODIUM LEPTOPHYLLUM, Nutt., var. SUBGLABRUM, Wats.

Sandy woodlands, Pt. Pelee, Essex Co., Ont. 1886. (*Dr. Burgess.*) Neither the type nor variety recorded from Ontario.

CHENOPODIUM URBICUM, L.

Nanaimo and Victoria, Vancouver Island, B.C. 1893. (*John Macoun.*) Not recorded west of Ontario.

CHENOPODIUM RUBRUM, L.

On brackish flats near the main lighthouse station, Sable Island, N.S. Very rare. 1898. (*John Macoun.*)

SALICORNIA HERBACEA, L.

Borders of saline ponds near Kamloops, B.C. 1890. (*J. M. Macoun.*) Not recorded from British Columbia.

SALICORNIA AMBIGUA, Mx.

Long Arm, Skidegate Inlet, Queen Charlotte Islands, B.C. (*Dr. C. F. Newcombe.*) Northern limit.

RUMEX PATIENTIA, L.

Not uncommon about houses and in fields, Boylston, N.S. (*Dr. C. A. Hamilton.*) Not recorded east of Ontario.

SCLERANTHUS ANNUUS, L.; Macoun, Cat. Can. Plants, vol. 1, pp. 80 and 499.

West of London, Ont., 1890; Komoka, Ont., July, 1892. (*J. Dearness.*) Our only herbarium specimens.

PODOSTEMON CERATOPHYLLUM, Mx.

On stones near the mouth of Eel River, 12 miles below Woodstock, N.B. Herb. No. 22,593, 1899; Petawawa River, Algonquin Park, Ont., 1900. (*John Macoun.*) Our only other specimens are from Hull, Que.

CYPRIPEDIUM GUTTATUM, Swartz.

Shore of Great Slave Lake, 1899. (*Dr. R. Bell.*) The single specimen brought home by Dr. Bell is the third from the Mackenzie Basin, the others having been collected by Richardson.

CYPRIPEDIUM PASSERINUM, Rich.

West shore of Great Bear Lake, Lat. 65° 30′ to 66° 30′. 1900. (*J. M. Bell.*) Northern limit.

ZYGADENUS ELEGANS, Pursh.

West side of Great Bear Lake, Lat. 65° 30′ to 66° 30′. 1900. (*J. M. Bell.*) Northern limit.

JUNCUS BULBOSUS, L.

In boggy places, east end of Sable Island, N.S. 1899. Herb. No. 22,623. (*John Macoun.*) Only Canadian specimens in herbarium of Geological Survey. Reported from Labrador.

STENOPHYLLUS CAPILLARIS, (L.) Britt.

Wet sandy fields, Sandwich, Ont. Herb. No. 25,334. (*John Macoun.*) New to Canada.

FIMBRISTYLIS AUTUMNALIS, R. & S.

Wet sandy fields, Sandwich, Ont. Herb. No. 25,333. (*John Macoun.*) New to Canada. Growing with *Stenophyllus capillaris.*

CAREX LEIOCARPA, C. A. Meyer; Macoun, Cat. Can. Plants, vol. II, p. 110.

Dawson Harbour, Skidegate Inlet, Queen Charlotte Islands, B.C. (*Dr. C. F. Newcombe.*) The second Canadian station.

CAREX CAPITATA, L.

Additional stations for this species are Northern Labrador. (*A. P. Low.*) Boggy places, Bragg's Creek, Elbow River, Rocky Mountains. Herb. No. 25,447. (*John Macoun.*)

THE ALGONQUIN NATIONAL PARK OF ONTARIO—ITS RESOURCES AND ADVANTAGES.

By ARCHIBALD M. CAMPBELL, Ottawa.

The Parry Sound division of the Canada Atlantic Railway renders readily accessible for the first time one of the most remarkable regions of lake and stream, primeval forest and rugged rock that can be found anywhere. It lies between the Ottawa River and Georgian Bay, and is a compact territory over forty miles square, with an area of nearly 2,000 square miles, comprising eighteen townships and six half townships in the District of Nipissing, and representing in the aggregate a million acres of land and water. The Ontario Government has set apart and reserved for all time to come, "for the benefit, advantage and enjoyment of the people of the Province," this Algonquin National Park. In it, the citizens of Canada have a possession, the value of which they have not yet even remotely realized. It is in reality a huge game preserve, a fisherman's and sportsman's paradise, a source of water supply, a field for reforestry operations, and a natural sanitarium which bids fair to outdo the Adirondack region and other noted health resorts of America.

RIVERS AND LAKES.

In the valleys, between the rocky ridges of the Laurentian formation, are the fountain-heads of the Muskoka, Magnetawan, Madawaska, Petawawa, Amable du Fond, and South rivers—all important streams, emptying into Georgian Bay, the Ottawa and Mattawa rivers, and Lake Nipissing. Within the limits of the Park is a large part of the watershed which divides the streams flowing into the Ottawa river from those which empty into Georgian Bay, and there is probably not to be found elsewhere within the Province a tract of country which in the same limited space gives rise to so many important streams. Therefore, one of the principal objects that the Government had in view when establishing the reservation was the protection and maintenance of their water supply. The interests of the lumberman, who annually floats large quantities of timber to market down their waters, of the manufacturer for whose mill-wheels they supply the motive

power, and of the farmer to whom a continuous supply of water in spring, well and stream is an absolute necessity—all required that provision should be made to keep the hills and highlands of this inland plateau covered with a heavy forest growth. The park contains within its boundaries an immense volume of water in lake and river, brook, pond and marsh. The spring and autumn rains and the heavy snows of winter keep the fountain heads of the important streams rising there continually replenished, the density of the forest retarding evaporation, and the spongy layer of leaves and decaying vegetation which covers the ground, tending to maintain an equable flow throughout the year. The reservation is a veritable lake-land, it being estimated that there are about 1,000 lakes and ponds within its borders. Most of the large lakes find a place on the map of the Park that has been issued by the Ontario government, but many of the smaller ones have not as yet been accurately located. Many of the lakes are of great natural beauty—not too large to be picturesque, nor too small to possess many a mirrored islet. Great Opeongo lake in the south east corner of the Park is the largest body of water, being twelve miles in length. It is a truly noble sheet of many square miles in extent, is very irregular in shape, possesses numerous islands, and presents many picturesque features. At a certain spot on the lonely shore of this lake there are still the remains of an ancient burial ground of the Algonquin Indians, reminding us of that once powerful race, which, in days gone by, held all this northland as its untitled domain. The name of the Park is the only reminder that we have of this primitive ownership, for the white man has displaced the red, the stalwart brave has vanished to his happy hunting-ground, and the pale-face reigns in his stead. The superintendent of the Queen Victoria Niagara Falls Park writes as follows of the lake scenery of the region : "Each expanse of water has some charm peculiarly its own. On every side the forest primeval clothes the hills and mountains with verdure of varying hue down to the very shore ; deep shades are thrown across the Park waters of the lake, whose placid surface mirrors to perfection every outline of cloud or hill, tree or rock ; while the baby ripples from the bow of the canoe, or the congeries of air bubbles

from each stroke of the paddles, glisten in the sunlight like diamonds, or as the stars on a December night. To the tourist the continual change from lake to river, from river to portage, and from portage to river and lake again, make a delightful panorama which captivates the eye and the senses, and provides abundant opportunity for the cultivation of the tastes in the study of all the varying phases of the landscape, and impels a seeking after more perfect knowledge of the many varieties of animal and vegetable life, which have their habitat in the territory.

TIMBER.

This region forms part of the great forest which formerly covered the whole Province, and which here consists of white and red pine, hemlock, tamarac, balsam, spruce, cedar, birch, maple, beech, ironwood, ash and basswood. All the lands embraced in the Park limits are now covered by licenses to cut timber, and on certain of them, pine has been cut for nearly half a century. Bush fires and lumbering operations have made serious inroads upon the supply of pine, but it will still be many years before the Park can, under existing contracts, be freed from these operations. There are no other vested interests in the reservation, so that eventually the Crown will have sole ownership and control of all its products and resources.

A FINE CANOEING AND CAMPING GROUND.

For canoeing and camping, the Park offers unexcelled facilities and attractions. The rangers have already made over a hundred miles of trails and portages, and have cleared obstructions from, and otherwise improved the navigation of, many of the streams. This work will be continued until the comparatively free navigation of the more important routes through the reservation has been secured. As a rule, the portages are short and easily made, and are generally welcomed by the canoeist, giving him a chance to stretch his legs. Forty or more log huts or cabins have been erected at different points throughout the Park, and this number is to be yearly increased. They are intended to furnish shelter to the rangers and others in their canoe trips through the reserve, and vary in distance from seven to ten miles of each other—the limit being a day's journey on snowshoes in the winter.

A NATURAL GAME PRESERVE.

Mr C. K. Grigg, then a member of the Park staff, in the autumn of 1897, contributed two short articles to the "Ottawa Evening Journal," which contained some very interesting information about the inhabitants of this great game and fish preserve. He also proved conclusively the necessity for such an asylum for our game, and showed how successful the experiment had been. He said that prior to the inception of the Park, scarcely a beaver could be found outside its present limits anywhere in this province south of Lake Nipissing, and that in what is now the Park, only a few straggling and decimated colonies existed. It is estimated that there are now hundreds of colonies of these interesting animals within its boundaries. In many cases, they have not only erected new dams, but have also built upon the ruins of old ones. The beaver houses which dot the edges of the streams and marshes are, like the dams, marvels of engineering and architectural skill. The menu of this industrious little denizen of the forest consists principally of the tender bark of the saplings, and he afterwards utilizes the denuded trunks for his dams. The following extracts from the "Report of the Royal Commission on Forest Reservation and National Park," may be of interest :

"Of the fur-bearing animals, the beaver is by far the most valuable. On the shore of every lake in this district are to be found old beaver houses, and there is scarcely a brook in the whole territory on which at short intervals their abandoned dams may not be seen. Now one may travel for days there without seeing a single fresh beaver sign.

"There are two reasons why this industrious and harmless animal should be preserved from destruction. First, because its skin furnishes us with one of our richest and most valuable furs ; and, second, because from its habits it is perhaps the greatest natural conservator of water. It is probably within the mark to say that were this region again stocked with beaver as it once was, there would be in every township at least a hundred dams and beaver ponds, each with its family or families of beaver, exclusive of the large numbers in the lakes and rivers where no dam building is necessary. In this way the water area would be increased by perhaps a fifth, a very important circumstance from the lumberman's point of view.

"The beaver is a most prolific creature, and, if left undisturbed, the progeny of a single couple would, in a few years, stock a large extent of country. The young beavers remain in the same house as the parents until they are a year old, when they strike off in couples for themselves, and either build a new house on the same pond or select a site on some other creek, and there erect a dam and house. In a few weeks the dry swamp or marsh is transformed into a lake, and the stock of provisions, consisting of a pile of saplings and brush, for winter use, is laid up beside the house, only a few of the limbs showing above the surface of the water. In the interior of the house a dry, warm nest is made, where they remain all winter. Going out at the call of hunger to the pile of provisions, they drag a piece up out of the water and eat the bark, which, together with the roots of aquatic plants, is their only food, thrusting the pole back again into the water. Here they remain until the long, warm days of spring soften the ice, when, cutting a hole in it, they go out for a taste of fresh food. In the beginning of May they bring forth their young, which almost invariably consist the first year of two, after which the average number is from four to six."

Otter are also now very plentiful, and the marten, mink, fisher and their fur-coated kin are not behind in fecundity. In fact, the net-work of waters that course through the dark tree-avenues of the reservation are becoming thickly populated with these animals, and this region affords grand opportunities for the observation and study of the naturalist. The true sportsman will certainly rejoice that there is now such a sanctuary for our nobler game, and that already the lordly moose, which has been almost totally exterminated in Nova Scotia, New Brunswick and elsewhere, and which bids fair to suffer a similar fate in this Province, is again multiplying. It seems almost incredible with what ferocity and wastefulness such animals as the moose have been hunted and killed in the past. According to an official report, in the spring of 1887, to give an example, the carcasses of not less than sixty moose were found in this district, the animals having been killed for their skins alone. During the preceding winter, between Lake Traverse on the Petawawa and Bissett's station on the C. P. R., a distance of a little over twenty miles, seventy moose were

slaughtered after Christmas. If one half of these were females, and if they even averaged only one calf each, here was game enough destroyed in one season to stock the Park. Besides affording noble sport to the hunter, the moose is a very valuable animal to the settler and the frontiersman, and it would be a pity to allow him to be exterminated like the buffalo of the western plains without at least affording him every opportunity of survival. A full-grown moose weighs upwards of 1,000 pounds, and will dress 600 pounds of beef, while his skin will make twenty pairs of moccasins, which readily sell at two dollars a pair.

The nimble-footed deer are, notwithstanding the onslaughts of the pot-hunter in the past, and of their natural enemy the wolf, always, growing in numbers. For here, too, the wolf, the fiercest and most cunning enemy of all animal life, thrives, and claims many a victim, especially among the young deer and smaller quadrupeds. The interlocked antlers of moose and deer, which the rangers occasionally find in the Park, tell of forest tragedies where conflicts have been waged to the death and the strife has been ignominiously terminated by the arrival of the wolves on the scene. At the time of his first visit to the Park, the writer was shown (and got an excellent photograph of) two pairs of these locked antlers, which had been taken from the carcasses of two bucks found the previous winter in the woods, and whose inextricable grip of each other caused their mutual destruction. It would, in fact, be impossible to separate them without destroying them.

BIRD LIFE.

Bird life is also being attracted to the Park. Owing to the wanton and useless destruction of our feathered friends, by means of guns in the hands of boys and young man, insectivorous birds are every year becoming scarcer in the settled portions of the Province, and had we not a refuge such as the Algonquin Park some species would probably eventually become practically extinct. Partridge are numerous, but are preyed upon by the foxes — which, however, along with the wolves, bears and other destructive and objectionable animals and birds, are being gradually killed off by the rangers. Wild duck are reported plentiful on some of the lakes, and wild rice has been sown with the intention of at-

tracting these birds to other waters. It is said to be the government's intention to introduced black game and capercailzie from Europe, and prairie fowl from our own western plains.

FISH, AND FISHING.

The disciples of good old Izaac Walton will find in the streams and lakes of the Algonquin Park an abundance of trout, pike, pickeral, and, in certain localities, white-fish and herring. Eels of large size are plentiful in the Opeongo branch of the Madawaska. Strange to say, both black and rock bass are missing. With the view of introducing these excellent and gamy fish, General Manager Chamberlin, of the Canada Atlantic Railway, offered special facilities for their transportation from other lakes in the Parry Sound District to those of the Park. As a rule, brook trout, considered by many as the "King of fishes," are looked for in rushing mountain torrent or the shining silver brook, but while the waters of most of the brooks in the reservation are dark, it seems to suit the taste and requirements of this loveliest and gamiest of fishes. Mr. George B. Hayes, Prison Commissioner of the State of New York, claims to have fished nearly all the streams of North America, but says that for game qualities as well as beauty of color and form, the brook trout of the Algonquin Park excel all others. Perhaps the biggest of these speckled beauties are caught in the Petawawa river, where they range on an average from half a pound to four and a half pounds in weight, almost, if not quite, equal in size to those of the famous Nepigon. Most of the brook trout are of a superior quality of flesh, being firm, and ranging in color from a rich cream to the brightest salmon tint, while the skin exhibits its glorious rainbow hues. In most of the lakes the salmon trout, commonly called grey or lake trout, abounds. To catch them, spoon or bait is used, as they seldom rise to the fly. To fish within the Park limits, it is necessary to get a permit from the Superintendent, and, even then, the use of rod and line and trowling line only are permitted. Moreover, the angler is only allowed to take such fish as he requires for his own use, within the Park, and is forbidden to carry away or wantonly destroy any piscatorial spoils. It is not likely that the waters within the reservation will ever be choked with the sawdust which has proved so fatal else-

where, so that, with the afore-mentioned restrictions in force, the finny tribes should there have great opportunities for increase.

GEOLOGICAL FORMATION AND MINERALS.

The land comprised in the Algonquin Park is in general of little use for agricultural purposes, being, as might be expected from its situation on a watershed, for the greater part rough, broken and stony. There are few high hills, the surface being mostly composed of rocky ridges, alternating with valleys, swamps and marshes. The rough ribs of the Laurentian formation everywhere protrude, and in granite or gneiss dip at all angles to the southeast, the strike of the strata being northeast by southwest. No limestome, so far as the writer knows, occurs; and the indications of mineral hitherto found are few, consisting principally of traces of iron. Mining exploration or prospecting for minerals within the Park is prohibited except under certain conditions and provisions. The working of mines and the developing of mining interests would be regulated in the same way.

A FIELD FOR EXPERIMENTS IN FORESTRY.

Much might be said about the possibilities for useful experiment in forestry which such a region affords. The re-planting of burnt areas, the re-filling of gaps in the original forest, the obtaining of accurate information anent the soils, localities and exposures suitable for certain trees, the discovery of the best method of obtaining from a forest the maximum amount of product which it is capable of yielding without at the same time trenching upon its capacity, and the solution of the problem of destroying the branches and tree tops left on the ground by the lumberman during the culling of a pine forest, are all experiments of a great probable value which might advantageously be made.

CLIMATE.

The retention of such an extensive block of forest is bound to have a beneficial influence on the climate of the surrounding country. Forests tend to promote humidity, and exert a tempering effect upon injurious winds, preventing the fierce hurricanes and "blizzards" common in unforested lands. They also help to equalize the atmosphere, cooling the summer air and mitigating

its severity in the winter. Consequently, the destruction of a large portion of the forest growth of a country is generally attended by a deterioration in its climate. History proves that many countries which once possessed forests became sterile after having been deprived of them.

A NATURAL SANITARIUM.

Owing to the altitude of this region, and its bracing atmosphere—redolent with the resinous odours of the pine and balsam, it is a great natural sanitarium, where consumptives may recover lost health and vigor. The idea has been shown to be well founded that pine forests are of specific value in the cure of lung disease. The old Romans sent sufferers of this class to Libra, where, by breathing the bal samic emanations of the pines which there abounded, they are said to have received much benefit. In the Adirondack Forest of New York State a sanitarium has been in operation for many years, with the special object of relieving patients in the early stages of consumption. It offers to such the benefit of climatic treatment, a systematic out-door life, hygienic habits and suitable medical treatment, and its reports show that twenty-five per cent of the patients are apparently cured; while twenty-five or thirty per cent more are sufficiently restored in health to resume their work or support themselves by their own efforts while living in a suitable climate. The Gravenhurst sanitarium on Lake Muskoka is a newer institution, which has also attained a considerable measure of success in this sort of treatment, but perhaps the results obtained by the famous Dr. Otto Walther, at the sanitarium at Nordrach, in the Baden Black Forest, Germany, are better than those obtained at any similar hospital in the world. However, there can be little doubt but that a sojourn in the pine forests of this Nipissing upland, with its pure air, good water and aromatic breezes, would be beneficial to many afflicted with weak lungs.

THE PARK HEADQUARTERS.

The Park headquarters were at first situated on Canoe Lake, but, for various reasons, Cache Lake was considered a more suitable spot for them, and they were removed thither. Suitable buildings for the accommodation of the superintendent and his

staff of six or seven rangers, were erected during the summer of 1897 on the lake shore just south of the railway track. The rangers are supposed to be travelling about most of the time, in order to keep a sharp lookout for trespassers and poachers, and against fires, and to watch especially the waterways and usual entrances to the Park. They incidentally erect shelter-lodges, make other improvements, and wage war on wolves and other noxious animals.

On a rocky point, about fifteen feet above the water, and so embowered in birches and spruces that one might paddle by unconscious of its presence, stands "Fort Necessity"—one of the shelter-lodges. It is a small, rustic, one-roomed cabin, containing a sheet-iron stove, rude stools and table, and a platform bed the width of the building. The latter will accommodate, if necessary, six men, three at one end and three at the other, lying feet to feet.

The inlet of the lake is near by, and a paddle of half a mile up it brings you to White's Lake, in the vicinity of which—and within the sound of the locomotive whistle—a fine beaver-dam and other works of that exemplary animal can be seen.

Enough has, doubtless, been said about the Algonquin National Park to give some idea of its character and resources, and of the great inducements which it offers to the canoeman, the camper, the sportsman, the seeker after rest and health, and the lover of Nature.

ORNITHOLOGICAL NOTES.

By W. T. MACOUN.

As announced in the May Naturalist, several observers in different parts of Canada and Michigan have agreed to send in their notes for comparison of records in the Ottawa Naturalist. This arrangement was brought about by Mr. Wm. Saunders, London, Ont., and Dr. James Fletcher; the notes, however, are being sent to the ornithological editor for tabulation. The gentlemen who contributed the notes are Mr. Alex. Gow, Windsor Ont.; Mr. Wm. Saunders, London, Ont.; Mr. J. Hughes Samuel, Toronto, Ont.; Mr. W. P. Melville, Sault Ste. Marie, Mich.; and Mr. L. McI. Terrill, Robinson Bury, Que.

The records of the common birds should prove of most value as often the rarer species are not seen until some days after their arrival and hence the comparison of records is misleading. Another table of records will appear in a later number of the Naturalist.

COMPARATIVE RECORDS OF ARRIVAL OF BIRDS.

	Windsor, Ont.	London, Ont.	Sault Ste. Marie, Mich.	Toronto, Ont.	Ottawa, Ont.	Robinson, Bury, Que.
Meadowlark, *Sturnella magna*	Jan. 20	March 17		March 26	April 5	
Prairie Horned Lark, *Otocoris alpestris praticola*	Feb. 11	Feb. 22	March 18		March 1	March 8
Song Sparrow, *Melospiza fasciata*	,, 22	March 17	April 8	March 25	,, 23	April 4
American Rough-legged Hawk, *Archibuteo lagopus sancti-johannis*					March 24	
Canada Goose, *Branta canadensis*	Feb. 24	April 4			April 22	
Robin, *Merula migratoria*		March 9	April 1	March 11	March 22	April 7
Bluebird, *Sialia sialis*	March 31	,, 12		,, 16	,, 26	,, 13
Black Duck, *Anas obscura*		April 1		,, 16		
Kildeer, *Ægialitis vocifera*	April 13	March 17	April 26	,, 18		
Bronzed Grackle, *Quiscalus quiscula æneus*	,, 29	,, 19		,, 26	March 30	April 16
Red-winged Blackbird, *Agelaius phœniceus*	March 24	,, 19		,, 22	April 2	,, 28
Pigeon Hawk, *Falco columbarius*					March 27	
Flicker, *Colaptes auratus*	April 7	March 19	April 26	April 17	April 21	April 28
Rusty Blackbird, *Scolecophagus carolinus*	,, 13	,, 24			,, 2	
Glaucus Gull, *Larus glaucus*				March 26		
Cow-bird, *Molothrus ater*	April 14	March 26	April 22	,, 29	April 18	
American Woodcock, *Philohela minor*		April 1		,, 26		
Marsh Hawk, *Circus hudsonius*		,, 27		April 5		
Red-tailed Hawk, *Buteo borealis*		March 12		March 28	April 16	
Red-shouldered Hawk, *Buteo lineatus*		,, 17		,, 28		
Pintail, *Dafila acuta*				,, 29		
Phœbe, *Sayornis phœbe*	April 14	March 26		,, 29	April 9	
Vesper Sparrow, *Pooecætes gramineus*	March 31	,, 26		April 17	,, 13	
American Golden-eye, *Glancionetta clangula americana*		April 1			,, 13	
Towhee, *Pipilo erythrophthalmus*		,, 1		April 18		
American Goshawk, *Accipiter atricapillus*					April 2	

Savanna Sparrow, *Ammodramus sandwichensis savanna*	.....	April 16	.....	April 13	May 8	.....
Great Blue Heron, *Ardea herodias*	April 14	,, 4	.....	,, 10	.....	.....
Holbœll's Grebe, *Colymbus Holbœllii*	.....	.....	.....	,, 6	.....	.....
Buffle-headed Duck, *Charitonetta albeola*	.....	April 19	.....	,, 6	April 22	.....
Wilson's Snipe, *Gallinago delicata*	.....	,, 8	.....	,, 13	.....	.....
Mourning Dove, *Zenaidura macroura*	April 28	,, 7	.....	.....	.....	.....
Field Sparrow, *Spizella pusilla*	,, 14	,, 8	.....	.....	.....	.....
Yellow-billed Sapsucker, *Sphyrapicus varius*	,, 14	,, 12	.....	April 12	April 18	.....
Spotted Sandpiper, *Actitis macularia*	,, 13	,, 22	.....	,, 24	May 8	May 8
Fox Sparrow, *Passerella iliaca*	.....	,, 20	.....	,, 13	.....	.....
Tree Swallow, *Tachycineta bicolor*	April 17	,, 13	April 16	April 13	April 10	May 8
American Herring Gull, *Larus argentatus smithsonianus*	.....	.....	.....	.....	,, 13	.....
Cooper's Hawk, *Accipiter Cooperi*	.....	April 13	.....	.....	.....	.....
Belted Kingfisher, *Ceryle alcyon*	.....	,, 19	.....	.....	April 13	May 6
White-rumped Shrike, *Lanius ludovicianus excubitorides*	April 14	March 26	.....	April 26	.....	April 19
American Sparrow Hawk, *Falco sparverius*	,, 14	.....	.....	.....	.....	.....
White-throated Sparrow, *Zonotrichia albicaulis*	.....	April 29	.....	April 21	April 15	.....
Cedar Waxwing, *Ampelis cedrorum*	.....	.....	.....	,, 15	.....	April 19
Chipping Sparrow, *Spizella socialis*	.....	April 17	April 23	,, 21	April 23	.....
American Bittern, *Botaurus lentiginosus*	.....	.....	.....	,, 18	.....	.....
Swamp Sparrow, *Melospiza georgiana*	.....	April 19	.....	.....	April 26	May 8
American Osprey, *Pandion haliaëtus carolinensis*	.....	,, 22	.....	.....	,, 18	.....
Hermit Thrush, *Turdus aonalaschkæ Pallasii*	.....	,, 20	.....	.....	.....	April 19
Purple Martin, *Progne subis*	May 16	,, 28	.....	April 24	April 23	.....
Barn Swallow, *Chelidon erythrogaster*	,, 5	,, 17	.....	,, 22	,, 23	May 8

OTTAWA BIRD NOTES.

1901.

April 10—RED-SHOULDERED HAWK, *Buteo lineatus.* Mr. C. Guillet.

19—HAIRY WOODPECKER, *Dryobates villosus.* Mr. Guillet.

19—DOWNY WOODPECKER, *Dryobates pubescens.* Mr. A. G. Kingston.

23—WILSON'S THRUSH, *Turdus fuscescens.* Miss E. Guillet; April 25, Mr. Geo. R. White.

23—BROWN CREEPER, *Certhia familiaris americana.* Mr. Guillet.

23—CHIPPING SPARROW, *Spizella socialis.* Mr. Guillet.

25—HOUSE WREN, *Troglodytes ædon.* Mr. Kingston.

25—WOOD THRUSH, *Turdus mustelinus.* Mr. White.

26—WILSON'S SNIPE, *Gallinago delicata.* Mr. White.

26—AMERICAN GOLDFINCH, *Spinus tristis.* (Full breeding plumage.) Mr. White.

26—RUBY-CROWNED KINGLET, *Regulus calendula.* Mr. White.

26—RED-BREASTED NUTHATCH, *Sitta canadensis.* Mr. Guillet; April 28, Mr. Kingston.

26—SWAMP SPARROW, *Melospiza georgiana.* Mr. Kingston.

28—ROSE-BREASTED GROSBEAK, *Habia ludoviciana.* Mr. Kingston.

28—WHITE-BREASTED NUTHATCH, *Sitta carolinensis.* Mr. Kingston.

28—RED-SHOULDERED HAWK, *Buteo lineatus.* (Nest and three eggs.) Mr. Kingston.

28—BROAD-WINGED HAWK, *Buteo latissimus.* Mr. White.

28—HERMIT THRUSH, *Turdus aonalaschkæ pallasii.* Mr. White; April 30, Mr. Guillet.

May 2—CHIMNEY SWIFT, *Chætura pelagica.* Mr. White.

2—AMERICAN BITTERN, *Botaurus lentiginosus.* Mr. White.

4—CHESTNUT-SIDED WARBLER, *Dendroica pennsylvanica.* Mr. Guillet.

4—BROWN THRASHER, *Harporhynchus rufus.* Mr. W. T. Macoun.

4—SPOTTED SANDPIPER, *Actitis macularia.* Mr. White.

4—MARSH HAWK, *Circus hudsonius.* Mr. White.

5—PINE WARBLER, *Dendroica vigorsii.* Mr. Kingston.

7—LEAST FLYCATCHER, *Empidonax minimus.* Mr. Guillet.

8—SAVANNA SPARROW, *Ammodramus sandwichensis savanna.* Mr. Kingston.

8—WHIP-POOR-WILL, *Antrostomus vociferus.* Miss Harmer.

9—FOX SPARROW, *Passerella iliaca.* Miss E. Guillet.

9—BLACK-THROATED BLUE WARBLER, *Dendroica cærulescens.* Miss E. Guillet.

9—WARBLING VIREO, *Vireo gilvus.* Mr. Guillet.

9—YELLOW WARBLER, *Dendroica æstiva.* Miss E. Guillet, Miss Harmer.

10—BLACK AND WHITE WARBLER, *Minotilta varia.* Mr. Guillet; May 11, Mr. White.

10—BANK SWALLOW, *Clivicola riparia.* Mr. White.

10—CLIFF SWALLOW, *Petrochelidon lunifrons.* Mr. White.

10—MYRTLE WARBLER, *Dendroica coronata.* Mr. White.

11—WHITE-CROWNED SPARROW, *Zonotrichia leucophrys.* Mr. Macoun; May 12, Mr. Guillet, Mr. White.

11—BALTIMORE ORIOLE. *Icterus galbula.* Mr. Kingston, Mr. White.

11—KINGBIRD, *Tyrannus tyrannus.* Mr. White.

11—COOPER'S HAWK, *Accipiter Cooperi.* Mr. White.

12—CAPE MAY WARBLER, *Dendroica tigrina.* Mr. White.

12—TENNESSEE WARBLER, *Helminthophila peregrina.* Mr. White.

12—BLACKBURNIAN WARBLER, *Dendroica blackburniæ.* Mr. White.

12—NASHVILLE WARBLER, *Heminthophila ruficapilla.* Mr. White.

15—KILDEER, *Ægialitis vocifera.* Mr. Kingston.

15—WOOD PEWEE, *Contopus virens.* Mr. Guillet.

16—CATBIRD, *Galeoscoptes carolinensis.* Miss E. Guillet, Mr. White.

16—AMERICAN REDSTART, *Setophaga rutilla.* Miss E. Guillet; May 18, Mr. White.

16—OLIVE-BACKED THRUSH, *Turdus ustulatus swainsonii.* Mr. White.

16—BOBOLINK, *Dolichonyx oryzivorus.* Mr. White.

18—BAY-BREASTED WARBLER, *Dendroica castanea.* Mr. White; May 19, Miss Harmer.

18—OVEN-BIRD, *Seirus aurocapillus.* Mr. White; May 21, Mr. Kingston.

18—MAGNOLIA WARBLER, *Dendroica maculosa.* Mr. White.

19—BLACK-THROATED GREEN WARBLER, *Dendroica virens.* Mr. White; May 21, Mr. Guillet.

19—SCARLET TANAGER, *Piranga erythromelas.* Mr. White.

19—MARYLAND YELLOW-THROAT, *Geothlypis trichas.* Mr. White; May 21, Miss E. Guillet.

19—GREAT-CRESTED FLYCATCHER, *Myiarchus crinitus.* Mr. White.

21—RUBY-THROATED HUMMING BIRD, *Trochilus colubris.* Mr. White.

21—NIGHT HAWK, *Chordeiles virginianus.* Mr. Guillet, Mr. Macoun.

NOTE.—The editor finds that when notes are not sent in until the 20th of the month they delay the publication of THE NATURALIST. Observers will therefore oblige by sending them on the 15th instead of the 20th. Interesting records of the nesting of birds or their habits should be included, and all sent to the Ornithological Editor, Mr. W. T. Macoun, Experimental Farm, Ottawa.

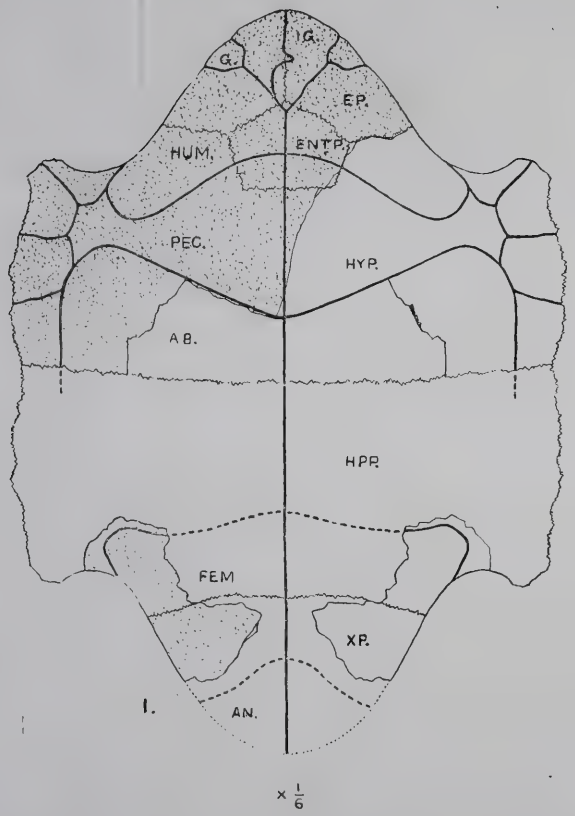
EXCURSIONS.

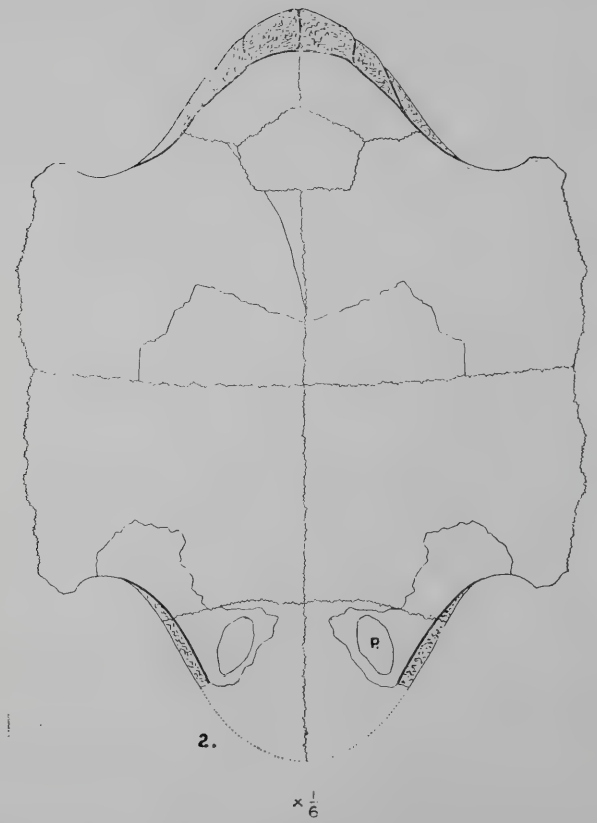
APRIL 27TH.—The first excursion of the season under the auspices of the Club was held at Beechwood. About eighty members were present. Under the leadership of Dr. Bell, the president of the Club, and Dr. Ami, those interested in Geology examined the excavations for the main sewer, where 15 species of fossils were collected. Col. White and Dr. Fletcher took charge of those who wished to study birds, plants and insects. Twenty-three species of plants were found in bloom.

MAY 4TH.—The excursion to Britannia was more largely attended than that held at Beechwood a week before, a large number of Normal School students being present. The majority of those who took part in the excursion were interested in Botany, and under the leadership of Dr. Fletcher, Dr. Guillet and Mr. Putnam the woods and fields about Britannia were thoroughly examined. *Petasites palmata*, a rare plant in this vicinity, was collected by Miss Matthews. The geologists, under the leadership of Dr. Ami, studied the rocks of the vicinity securing many interesting specimens. A full report of the geological work done at these excursions will be published later.

SWEET COLTSFOOT.—A few years ago *Petasites palmata* grew at the old race-course south of Patterson's Creek on Bank street, but the draining of the Glebe lots and the partial clearing of "Stewart's Bush" have caused its extinction. It has always been rare in this vicinity, but has been noted in two widely separated localities this spring. By Miss Matthews near Britannia, as recorded in the report of the sub-excursion published in this number of THE NATURALIST, and by the Hon. F. R. Latchford beside a road leading through a swamp from near Mountain View in Hull to what is known as "The Hollow Road." Mr. Latchford's specimens and his diagram showing the exact locality at which the plants were found are in the Herbarium of the Geological Survey. He reports the plant as occurring in considerable numbers were found.

J. M. M.





ADOCUS VARIOLOSUS, (Cope).

Figure 1. Lower surface of plastron.

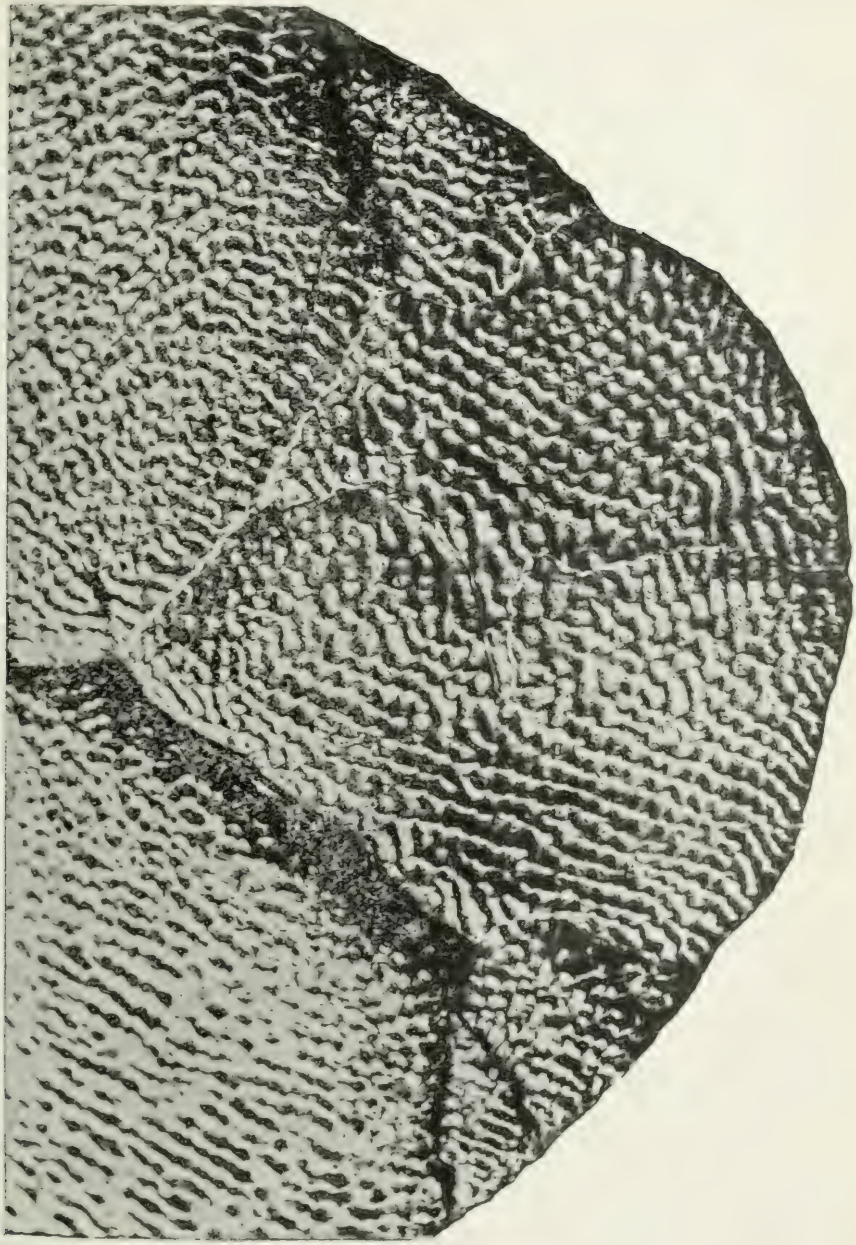
Figure 2. Upper surface of plastron.

ADOCUS VARIOLOSUS, (Cope).

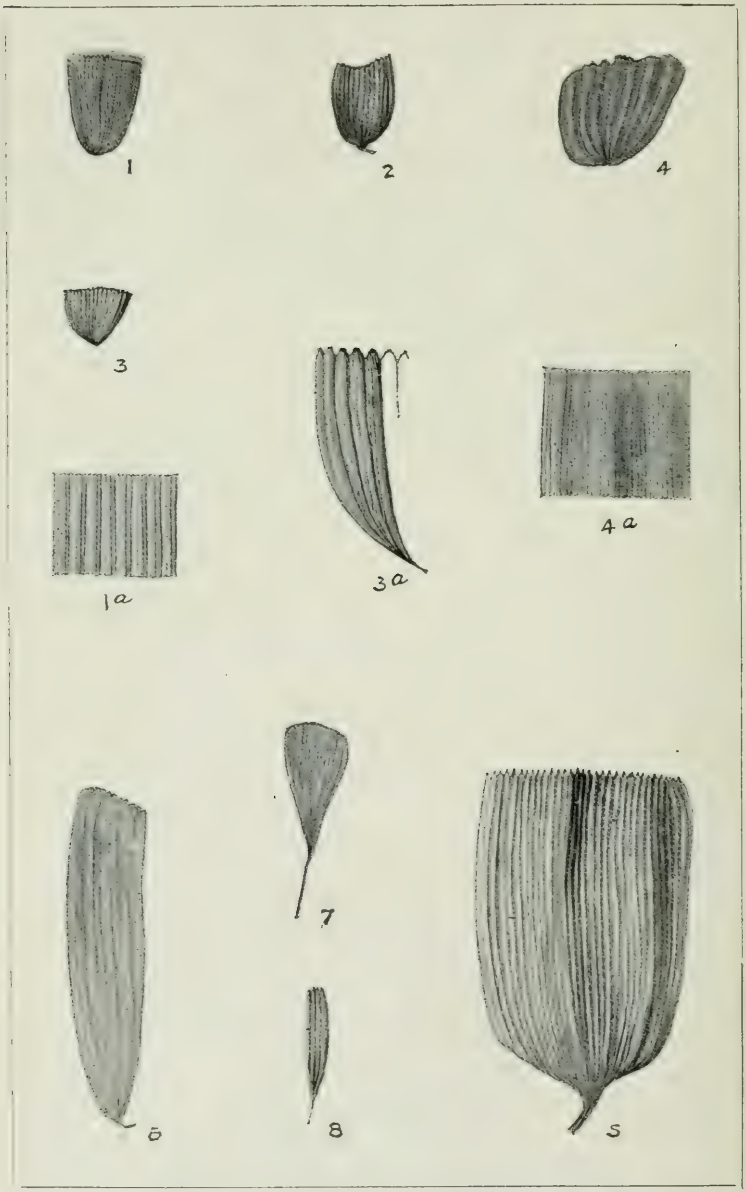
Lower surface of plastron; one-third natural size.

ADOCUS VARIOLOSUS, (Cope).

Upper surface of plastron; one-third natural size.



ADOCUS VARIOLOSUS. (Cope).
Anterior end of plastron; lower surface; natural size.



TO ILLUSTRATED PAPER BY DAVID WHITE ON SPECIES OF WHITTLESEYA.

THE OTTAWA NATURALIST.

VOL. XV. OTTAWA, JULY, 1901. No. 5.

THE EXTINCTION OF THE ELK IN ONTARIO.

By L. H. SMITH, Strathroy, Ont.

(Read before the London Ornithological Section of the Entomological Society of Ontario.)

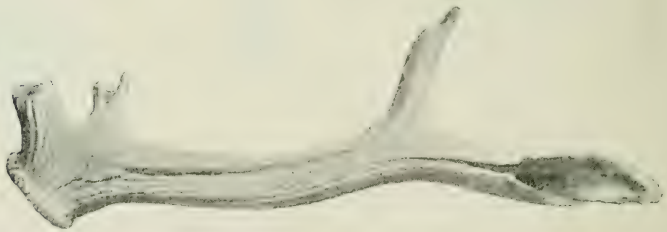
That the Wapiti (*Cervus canadensis*), commonly called "Elk," once roamed in numbers in the southern part of Ontario which lies between Lakes Huron and Erie, I have positive evidence, but as to what time they lived here or when or by what means their extinction was brought about, I have been able to glean very little information.

The extinction of some animals of our fauna is easily accounted for; the wolf, the bear, the common red deer and the wild turkey were all indigenous to our forest; their death-warrant was signed when the first settler, with his axe, felled the first tree making the little clearance to erect his primitive log shanty. Naturalists do not agree on the cause of the disappearance of the passenger pigeon, which used to be with us in countless millions. I am of the opinion that clearing the forest, and thus destroying its great natural food supply, was the cause. The animals I have named were all here when the first settlers came to the country, but the great elk was not.

The first settlers came into the township of Adelaide in 1832. There were no elk here then, and I have never been able to glean any information from them about this great deer, although I have spoken to many. The most interesting information I have been able to get of this animal is from an Indian on the Kettle Point Reserve, in the county of Lambton. He was an intelligent man and acted as interpreter. He was an elderly man when I spoke to him, perhaps between 60 and 70 years of age. He knows nothing

of the elk himself, but his father used to tell him stories of shooting them in that part of the country when he was young. Figured out at the time, I thought it was quite 100 years ago when this great deer roamed in these parts.

I have an interesting collection of elk antlers ; one, a perfect specimen, measures forty inches in length and has seven points, one only of which is broken off. Another, a broken one, a cut of which accompanies this sketch, must have belonged to a large animal. This piece is thirty inches long and measures thirteen inches in circumference where it joined the skull. I have several small pieces, all of which were found in this neighborhood and in the adjoining county, Lambton. From the state of decay all are in, I can quite believe it is more than a century since they fell from the heads of the animals to which they belonged.



The most perfect specimen I know of, belongs to Mr. George Wilson, of Strathroy. This set of antlers is in a perfect state of preservation and must have been carried by a noble animal. Each antler measures fifty-five inches in length ; one has seven points and the other six. The longest point is eighteen inches. The greatest spread is thirty-four inches, and the weight when found was 35 pounds. Mr. Wilson obtained this grand set on his farm, lot 15 in the 12th concession in the township of Lobo, about seventeen years ago, and now has it mounted, in good shape, in his hall, where it makes a fine ornament.

This set of antlers was found in a boggy spring where Mr. Wilson had bored for water, of which he obtained a bountiful supply. Some time subsequently his sons, while digging a little ditch to carry off the surplus water, came on the horns. They also found bones which were part of the skeleton, and, as the

antlers were still fast to a part of the skull, it was evident that the animal to which they belonged died there.

How this Elk skeleton came there would be a question for thinking naturalists to solve. Mr. Wilson is of the opinion that it might have been driven by wolves and have mired there. Perhaps the most reasonable theory is that it either died a natural death or was killed on that spot by a pack of these blood-thirsty brutes.

How these great deer became extinct here will, perhaps, ever remain, to naturalists, a hidden secret. The Indian did not annihilate it because they never killed to extermination. If disease overtook them, as it sometimes does the great white hare of the far north, it is only reasonable to think that others would have come to replace the dead, or the few, if any, left would have increased again. We are quite in the dark concerning them. What we do know, is that this grandest of North American deer once roamed here, but it was before the white man came.

ENTOMOLOGICAL NOTE.

THE PAINTED LADY BUTTERFLY.—An interesting occurrence of a butterfly suddenly appearing in numbers sufficient to attract general attention has taken place this spring throughout Manitoba and the Northwest Territories, where this insect, *Parameis Cardui*, has been extremely abundant. Caterpillars produced from eggs laid by the females have appeared in thousands, and natur2lly have caused much anxiety among those growing crops of any kind. The food plant of this butterfly in Canada is chiefly the Canada Thistle, but it also feeds on other plants. Owing to the scarcity of their natural food, the larvæ had to take to a new plant, viz., the Blue Bur (*Echinospermum Lapyula*). A. G.

THE CANADIAN SPECIES OF THE GENUS WHITTLESEYA AND THEIR SYSTEMATIC RELATIONS.

By DAVID WHITE.

SOURCES AND SUPPOSED AGE OF THE MATERIALS.

The discovery of the genus *Whittleseya* in the Upper Palæozoic of Nova Scotia was announced by Dr. H. M. Ami, of the Geological Survey of Canada, in the August number of this journal for 1900. This well marked Palæozoic plant type has been found only within a very limited vertical range, and it has hitherto been regarded as characteristic of a stage in the Meso-carboniferous of North America. The occurrence, therefore, of the genus in the shales of the Riversdale formation, concerning the age of which there is at present great difference of opinion, is a matter of palæontological importance and interest. Through the courtesy of Dr. Ami and of Dr. G. M. Dawson, the late Director of the Survey, a series of the specimens forming the basis of the former's notes has been placed in the writer's hands for study and comparison with the types from the Allegheny region.

The material from Nova Scotia includes a number of specimens collected by Dr. Ami in 1898, from the banks of the Harrington river near the boundary between Cumberland and Colchester counties, and at West Bay shore, Parrsboro', Cumberland county. The fossils are said to have been gathered from the Riversdale formation, a sequence reported to be several thousands of feet in thickness of sandstones and shales which, on account of their stratigraphic position and relation to the metamorphism in the region, are regarded by the stratigraphical geologists[1] who have investigated the structure and extent of the Palæozoic formations of this region as of undoubtedly Middle Devonian age.

On the other hand, palæontologists, though differing somewhat as to the stage of the fossils, are entirely agreed that the rocks are Carboniferous. According to the evidence of the Batrachia, Crustacea and Lamellibranchiata examined by Sir William Dawson, Professors T. R. Jones and Henry Woodward,

[1] Hugh Fletcher, Ann. Rept. Geol. Surv. Canada, 1886, vol. II, p. 64P; also Trans. Nova Scotia Inst. Sci., vol. X, 1900, p. 242; also R. W. Ells, Ann. Rept. Geol. Surv. Canada, vol I, 1885, p. 51E.

and by Dr. Ami, the conclusion is reached that the formation is safely within the Carboniferous. Dr. Ami, who has not only critically reviewed all the faunal evidence but who has also studied the structure and position of the beds in the field, refers the Riversdale formation to the Eo-Carboniferous, and places it at the base of the Lower Carboniferous.[1]

Palæobotanists have been disposed to refer this formation to a still higher stage. Specimens from Harrington River examined by Sir William Dawson, were referred by him to the Millstone Grit. Later, in December of 1897, a small collection from these beds was inspected by the writer and recognized by him as indicating a position in the Carboniferous not far from the dividing line between the Upper and Lower Carboniferous, *i.e.*, in the region of the Millstone Grit or the Pottsville of the Appalachian trough. A little later a collection was submitted to Mr. Robert Kidston, of Sterling, Scotland, who arrived, absolutely independently, at nearly the same conclusion, suggesting that the plants might be even so late as the Lower Coal Measures. Both Mr. Kidston and the writer recognized the approximate contemporaneity of the Riversdale plant beds with the "fern ledges" of the Lancaster formation at St. John. Both regions furnish species of *Asterophyllites*, *Calamites*, *Sphenopteris*, *Aneimites*, *Neuropteris*, *Alethopteris*, *Cordaites* and *Cardiocarpon*, which, after continued study of the Carboniferous floras of the Appalachian trough, I find to be characteristic of that stage. I therefore do not hesitate, on the evidence of the fossil plants, to regard the Harrington River plant beds as representing a level at or not far below the Pottsville.

In addition to the specimens from the Riversdale formation of Nova Scotia the *Whittleseya* material in hand for description includes a single specimen from the "fern ledges," Lancaster formation, at St. John, New Brunswick. On examining one of the specimens of *Neuropteris Selwyni*, labelled by Sir William Dawson and now in the collection of McGill University, a small outcropping plant fragment was observed whose nerves suggested those of *Whittleseya*. The removal of the rock from the remaining portion of the specimen brought to light a new and very interest-

[1] Trans. Nova Scotia Inst. Sci., vol. X, 1900, pp. 167-178.

ing species, *Whittleseya Dawsoniana*, whose description, through the courtesy of Professor Penhallow of the University, I am enabled to include in this paper. The "fern ledges" have been, and are still, regarded by most Canadian geologists as Middle Devonian.[1] The composition of this flora is essentially that of the Pottsville of the Allegheny region, to which most of the Lancaster ferns are common. In fact, the fossil flora of the "fern ledges" appears to be representative of the Pottsville (Millstone Grit in part) of the United States. The more exact distribution of the species seems clearly to indicate, as I have elsewhere remarked,[2] the reference of a portion at least of the "fern ledges" to the Upper or Sewanee division of the Pottsville.

The discovery of *Whittleseya* at once in the Riversdale of Nova Scotia and in the Lancaster formation of New Brunswick not only tends to confirm the conclusion as to the approximate contemporaneity of these formations, a relation that has long been accepted by most geologists, with the exception of the late Sir William Dawson, but it is also corroborative of the correlation of both of these formations with the Pottsville.[3]

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[1] Sir William Dawson, Fossil Plants of the Devonian and Upper Silurian formations of Canada; Geol. Surv. Canada, 1871. L. W. Bailey, Observations on the Geology of Southern New Brunswick, 1865, pp. 54-76. Hugh Fletcher, Geological Nomenclature in Nova Scotia, Trans. Nova Scotia Inst. Sci., vol. X, 1900, p. 235.

[2] 20th Ann. Rept. U. S. Geol. Survey, Pt. 2, 1900, p. 917.

[3] The Pottsville ("Pottsville conglomerate") in the type section in the Southern Anthracite field of Eastern Pennsylvania covers the interval, including a basal transition, between the marine Lower Carboniferous and the Lower Productive Coal Measures. Its lower portion contains a flora apparently corresponding to the Ostrau-Waldenberg zone of Europe, included by many palæontologists within the top of the Lower Carboniferous. The upper portion includes the plants of the Millstone Grit and of the Lower Coal Measures of the Old World. Mr. Kidston's reference of the St. John Flora to the Lower Coal Measures corresponds perhaps exactly to my correlation of the plant beds with the upper portion of the Pottsville, since, as he has pointed out (Proc. Roy. Phys. Soc. Edinburgh, vol. XII, 1894, p. 225), the Millstone Grit flora of Europe is essentially the same as that of the Lower Coal Measures, from which in many cases the Millstone Grit seems not to have been entirely stratigraphically distinguished.

DESCRIPTION OF THE SPECIES.

Whittleseya, Newberry, 1853.

The genus *Whittleseya*, established by Newberry[1] in 1853, embraces a type of narrowly petiolate leaves, more or less flabelliform in plan, whose nervation is composed of broad and thick, closely or even densely arranged, fascicles or bands of nerves originating chiefly from a marginal strand on either side of the base and sometimes forking, not far above the point of origin, before passing upward, longitudinally parallel, to the generally truncate apex, where the nerves of each band or fascicle abruptly converge in a more or less distinct crenulation or tooth.

The leaves may be oblong, squarrose, triangular, cuneate or linear. They are always narrowed, sometimes so abruptly as to give an almost round-truncate profile, at the base. The petiole is usually long, and often filamentose. The lateral borders are in most instances nearly parallel, and the distal border is frequently acutely dentate. In the more cuneate forms the basal marginal nerves are less developed, the nerve fascicles radiating more directly from the summit of the petiole. In some species, and circumstantially in others, the vascular bands coalesce and are so densely arranged in the thick leaf substance as to be hardly separable. In most species the thickened central portions of the bands produce low costæ, though the bands are not wholly distinct from one another below the teeth; or, in many examples in which the teeth or corrugations are obscure, they may not be distinguished, unless topographically, for a portion of their length. The bands sometimes divide once near the base. Above the base they continue nearly parallel to the lateral margins of the leaves. Frequently the lateral margins are very slightly infolded near the apex.

The branchlets or possibly the stems of this type, as shown in specimens of *Whittleseya microphylla*, are slender, rarely dividing at a rather wide angle, apparently naked at some distance below the apices, and probably woody as indicated by the rather densely carbonaceous residue. The leaves, still attached to the

[1] Annals of Science, vol. 1, No. 10, Cleveland, 1853, p. 116.

terminal portions of the branches, were sustained by apparently lax, often extremely slender petioles, sometimes several times as long as the blade of the leaf. No precise correlation has yet been made between the *Whittleseyæ* and any of the types of Palæozoic fruits, one or more genera of which are usually found associated in the same beds.

The species already attributed to this genus are : *Whittleseya elegans*,[1] *W. crassifolia*,[2] *W. undulata*,[3] *W. microphylla*,[4] *W. Campbelli*,[5] and *W. Lescuriana*.[6] To these are now added three species from Nova Scotia and New Brunswick, as follows :

Whittleseya desiderata, n. sp.

Pl. VII, Figs. 1, 2, 1*a*.

Leaves of moderate thickness, oblong, slightly cuneate, 9 mm.-14 mm. in length above the petiole, 6 mm.-10 mm. broad near the truncate apex, slightly rounded at the distal angles, rapidly contracted in the lower one fourth to form a round-obtuse or obtuse base; apex crenulo-denticulate, often obtusely denticulate, with short, rounded teeth ; vascular bands or costæ 18-24 in number, often low-rounded, usually distinct, confluent and generally once-forked at a narrow angle at the base, the outer two or three on either side blending in a marginal band; petiole relatively broad at the top, the length and mode of attachment being unknown.

The species here described is one of the smaller of the genus, of which, however, it shows well the distinctive characters. As is usual in this group, especially in the type, *Whittleseya elegans*, the

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[1] Newberry, Ann. Sci., vol. 1, Cleveland, 1853, p. 116, figs. 1, 2. Lesquereux, Coal Flora, vol. II, p. 523, pl. IV, f. 1., 1a.

[2] Lesquereux, Coal Flora, Atlas, 1879, p. 2, pl. IV, f. 2 (*W. integrifolia*, op. cit., vol. II, p. 524,)

[3] Lesquereux, op. cit., vol. II, p. 525, pl. IV, f. 3.

[4] Lesquereux, op. cit., vol. III, p. 843. Lesley, Dict. Foss. Pa., vol. III, p. 1256, text-figs.

[5] D. White, 20th Ann. Rept. U. S. Geol. Survey, Pt. II, 1900, p. 867.

[6] Loc. cit., p. 867.

vascular bands become more distinct and separate as they approach the teeth. In the middle of the leaf they are often more diffuse, though they are generally recognizable down to near their points of origin.

The normal aspect of *Whittleseya desiderata* is shown in Pl. VII, Fig. 1, an enlargement of whose vascular bands is presented in Fig. 1*a*. In this example the origin of the bands is easily traceable. The original of Fig. 2 is slightly warped or deformed in the matrix, which gives the apex an unduly contracted form. It is notable, however, that in this specimen, as is often the case in *W. undulata* and *W. Campbelli*, the bands on the extreme borders are slightly infolded near the apex, so that one or two of the teeth at each corner are sometimes overlapped and slightly inward inclined. In this specimen is also indicated a trace of a petiole, which would appear to be filamentose, as in *W. microphylla* Lx. *Whittleseya desiderata* is distinguished from *W. Dawsoniana* by its proportionately smaller and more elongated form, and especially by the narrow and more numerous vascular bands. The latter, by their number and proximity, suggest *W. microphylla*, but they are neither so dense nor so far blended as in the species last named. In *W. microphylla*,[1] although the dimensions are very similar, the bands are often difficult of distinction, while the distal margin appears more or less obscurely crenulate. One of the specimens, from West Bay Shore, Parrsboro', Nova Scotia, collected by Dr. Ami in 1899, is somewhat narrower than the two examples figured, though belonging to the same species. Another example, from Harrington River, Station A5 of Dr. Ami's collections, presents, apparently as the result of lateral deformation, a somewhat cuneate form strikingly similar to that of *Whittleseya microphylla*, with which it agrees in size. The same shale fragment contains a normal example to which a part of the petiole is still attached.

Localities.—Harrington River beds, Harrington River, Colchester Co., N. S., Stations A5 and B5; collected by Dr. Ami, 1898. Also on the Harrington River in Cumberland Co., N. S., Station A7; collected by Dr. Ami in 1898. West Bay Shore, Parrsboro, Cumberland Co., N. S.; collected by Dr. Ami in 1899.

The specimens are in the collections of the Geological Survey of Canada.

[1] Pl. vii, Fig. 7.

Whittleseya brevifolia, n. sp.

Pl. VII, Fig. 3, 3*a*.

Leaf very small and very short, fan-shaped, very broadly triangular, less than one cm. in length, and nearly as broad or broader than long at the apex, truncate or slightly truncate at the top, and gently convex laterally ; vascular bands narrow, about 20 or 25 in number, forking once near the base, or derived simply from the marginal nerve, slightly arched near the lateral margins, crowded, somewhat obscure in the middle portion, more distinct near the apex where each band contracts within the limits of a very small, short, obtuse tooth.

The salient features of this species are the somewhat diminutive size, the extremely broadly triangular form and the compactness of the narrow vascular bands. As shown in the illustration, Fig. 3, the lateral margins, perhaps slightly mechanically contracted in this instance, form nearly a right angle at the base. The characters of the vascular bands and of the teeth are shown in Fig. 3a. The specimen figured is but 7 mm. in length, exclusive of the petiole, and 8 mm. in breadth at the apex.

Although the species is represented by but a single example in the collection, it appears to be specifically distinct from *Whittleseya desiderata* by reason of the abbreviated triangular form and the narrow bands. It is possible, however, that a series of intermediate phases may be discovered, which will prove this form to lie within the limits of individual variation in the leaves of the latter species. In the absence of such forms it cannot at present be safely included in the same species. As compared with *Whittleseya microphylla*, the only other distinctiy cuneate species, the leaf in hand differs by its very short form, the more distinct costæ and the well defined teeth.

Locality.—Harrington River beds, Harrington River, Colchester Co., N.S.; Station A12 of Dr. Ami's 1898 collections.

The type is in the collections of the Geological Survey of Canada.

Whittleseya Dawsoniana, n. sp.

Pl. VII, Figs. 4, 4*a*.

Leaf very small, short, squarrose, broader than long, truncate at the apex, round-truncate at the base, thick ; nerve bands very broad, 1.5 mm.-1.75 mm. in width, about 10 or 12 in number, parallel to the lateral borders, apparently undivided, and forming very broad and very low flat costæ which are contiguous or slightly confluent in the interior of the leaf, each band terminating in a short, broad, tooth.

While examining one of the specimens from St. John, N.B., labelled by Sir William Dawson as *Neuropteris Selwyni*, loaned from the collections of McGill University through the courtesy of Prof. D. P Penhallow, the writer observed on the same fragment of shale a small portion of a leaf showing vascular bands similar to those of *Whittleseya*. On carefully removing the matrix from the remaining portion of the fossil, the specimen was found not only to belong to *Whittleseya*, but to represent a new species of that genus This leaf, which is illustrated in Pl. VII, Fig. 4, is about 13 mm. long above the petiole, and about 17 mm. in width at the top, which is slightly wider than the lower portion. The specimen, which is slightly deformed and a little crumpled at the base so as not to reveal the petiole, is well marked by the very low, broad, and flat ribs, whose terminations in the apparently short, obtuse teeth, are very obscurely seen along a portion of the distal border. The characters of the teeth are hardly positively determined.

The species is named in memory of Sir William Dawson, Canada's most distinguished palæobotanist and one of the great palæontologists of the world. It is recognized among other broad-leaved species of the genus by its small size, relatively great breadth and proportionately very broad bands. Further, the teeth along the distal margin appear to be shorter and more obtuse than in *Whittleseya elegans*, while the form of the leaf is not elongate as in *W. undulata*, whose teeth are also short.

The species described above is associated on the same shale fragment with *Alethopteris* and a fragment of *Neuropteris* (labelled *Neuropteris Selwyni*) apparently indistinguishable from a plant

from the upper Pottsville of the Appalachian province described in manuscript by the writer as a variety of *Neuropteris Schlehani* Stur.

Locality.—"Fern ledges," Lancaster formation, near St John, New Brunswick.

The type of the species is with No. 73 (391) in the collections of the Geological Department of McGill University, Montreal, Canada.

RELATIONS AND SYSTEMATIC POSITION OF THE SPECIES.

The species of *Whittleseya* from Nova Scotia and New Brunswick are closely allied to the southern representatives of the same genus. The *Whittleseya desiderata* has the aspect of a diminutive *W. elegans* Newb., an example of which, from the type bed and vicinity, is, for comparison, shown in Pl. VII, Fig. 5. In the small species the teeth are less acute, while the bands are more confluent, more carinate, and less ribbon-like than in the Ohio plant. In respect to the nervation, the former species agrees perhaps more nearly with the material from the roof of the Sewanee coal of Tennessee placed by Lesquereux in *W. undulata*. The compactness of the fascicles also approaches the nervation of *W. microphylla* (Pl. vii, Fig. 7.) In fact, the longer Riversdale species appears, while ranging most closely to *W. elegans* and *W. undulata*, to stand on the side toward the cuneate *W. microphylla*.

The *Whittleseya brevifolia*, though nearest to *W. desiderata*, suggests by both its form and nervation a position between the latter and the *W. microphylla*, an example of which, from the Type locality,[1] is illustrated in Fig 7.

Whittleseya Dawsoniana, on the other hand, is by far most closely bound to *W. elegans*, from the Sharon coal (Upper Pottsville) of Ohio, though its proportionately broader ribs and less

[1] Near Fayetteville, Arkansas, in the "coal bearing shale," a formation representing a part of the Upper Pottsville, not far from the Sharon coal, in the Appalachian trough. The species is also present in the Breathitt formation of Kentucky, and the Upper Lykens division of the Pottsville in the Pennsylvania Anthracite region.

pointed teeth are comparable to the Sewanee form of *W. undulata*. It is worthy of note in this connection that the collections from the Upper Lykens division at the Lincoln mines in the Southern Anthracite coal fields of Pennsylvania contain a *Whittleseya* form[1] whose narrowest leaves are so similar in size and character to that described above from St. John as to suggest slight doubt as to the validity of a specific separation for the Pennsylvania type, although the other associated leaves of the same plant are proportionately very much broader and somewhat longer.

From the foregoing it will be seen that the *Whittleseyæ* thus far discovered in the Riversdale and Lancaster formations pertain to the group with numerous more compact nerve fascicles and broader proportions, in general characteristic of the Upper Pottsville, rather than to the linear group,[2] with comparatively few bands and large teeth, which prevails in the lower portions of the Pottsville in the Appalachian province.

The genus *Whittleseya* is regarded by most palæobotanists as a gymnospermous type, although some difference of opinion exists as to its position among the gymnosperms. As originally published by Dr. Newberry,[3] it was described as perhaps pinnate, and compared with various genera, not all gymnospermic, without suggestion of a definite relationship with any family. By Lesquereux,[4] and Sir William Dawson,[5] it was referred to the *Nœggerathiaceæ*, a family typified by *Nœggerathia*. The latter genus, the original species of which resembles *Archæopteris*, is now generally considered as most closely allied to the Cycads, though some writers have classed it among the ferns. Schenck,[6] in 1884, placed the *Whittleseyæ* in the *Dolerophylleæ*, whose type genus *Dolerophyllum* was put by Dawson in the *Nœggerathiaceæ*.

Almost simultaneously, in 1885, in two important palæobotanical works published by Saporta,[7] and Renault,[8] *Whittleseya*

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[1] *Whittleseya elegans* Newb., var. *minor* D. W., 20th Ann. Rept. U. S. Geol. Surv., Pt. II, 1900, pp. 788, 904.

[2] *Whittleseya Campbelli* D. W., op. cit., p. 905, pl. CXL, figs. 9-11; and *Whittleseya Lescuriana* D. W., op. cit., p. 867 (description not yet published.)

[3] Annals of Science, vol. 1, Cleveland, 1853, p. 116.

[4] Coal Flora, vol. II, 1880, p. 523. Principles of Palæozoic Palæobotany, 1883, p. 97.

[5] Can. Rec. Sci., vol. IV, No. 1, 1890, pp. 26, 27.

[6] In Zittel's Handb. d. Palæont., vol. II, p. 253.

[7] Évol. règ. vég., Phanérog., vol. I, p. 144.

[8] Cours Bot. Foss., vol. IV, p. 69.

was referred to the *Salisburiaceæ*, in which it was ranged with *Dicranophyllum*, *Rhipidopsis*, *Trichopitys*, *Ginkgophyllum*, and *Baiera*, the earlier relatives of the living genus *Ginkgo*. This reference, which was accepted by Schenck,[1] appears to find favour with most foreign palæobotanists[2] who have more recently considered the relationship of the American genus, though Solms-Laubach,[3] regards it as based on too slender evidence.

In the absence of any precise knowledge of the florescence or fruits of *Whittleseya*, any systematic reference of the genus is based almost wholly on the characters and analogies of the leaves, and must therefore be regarded as hypothetical and tentative. Yet the development and the nervation of the leat are such as practically to exclude a comparison with any Cryptogamic type, and to at once suggest a gymnospermic nature. Further, the analogies between the leaf structure of *Whittleseya* and those of *Ginkgo*, and more particularly with the more ancient forms of that type, are so striking as to compel a comparison with both the living and the fossil representatives of the Ginkgoales. These analogies are illustrated by the almost identical characters of the nervation and distal border of the leaf in *Whittleseya microphylla* and in the recent *Ginkgo*. Among some of the additional Appalachian Pottsville material, which will probably receive special attention in a later paper, are several fragments which appear to indicate a probably spiral arrangement of the leaves, the latter forming, in *W. microphylla*, very loose tufts at the ends of the twigs.

There are also two conditions which favour a direct relationship of the American type to the Ginkgoales : First, there is the extraordinary antiquity of the genus *Ginkgo* which is clearly identified in the older Mesozoic, while its antecedents or closer relatives, *Baiera* and *Ginkgophyllum*, are present in the Permo-Carboniferous, in which are also found a number of the immediately allied types. In this connection it will be of interest for the reader to compare the *Whittleseyæ* with the group illustrations of *Ginkgo*

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[1] Die foss. Pflanzenreste, 1888, p. 166.

[2] See Zeiller, Élem. de paléobot., 1900, p. 251. Also see Seward and Gowan, in Annals Bot., vol. XIV, 1900, p. 135.

[3] Fossil Botany, 1891, p. 66.

relatives and *Ginkgo* leaves given by Saporta,[1] Ward,[2] Seward and Gowan,[3] and Zeiller.[4] The other circumstance, lending some minor colour of probability as to the relationship, is the occurrence, in especial abundance in the beds containing *Whittleseya* of numerous types of gymnospermic fruits, some of which represent genera closely analogous in structural characters to those of the living "maiden-hair tree," *Ginkgo biloba*. In the judgment of the writer the *Whittleseyæ* are the oldest representatives of the Ginkgoales stock that have yet been discovered. The fruits of this type are probably included in some of the American species of *Rhabdocarpos*, or possibly in *Cardiocarpon*. The plant from the Upper Coal Measures of Baie de Chaleur described by Dawson[5] as *Nœggerathia dispar*, although fragmentary and very incomplete, appears by its petiolate development, the basi-marginal nerves, and the banding of the parallel, longitudinal nervation to be also referable to the same stock, if not to the same genus. The *Nœggerathia dispar* may perhaps, without too great an assumption, be regarded as a connecting link between the earlier Whittleseyas and the later *Saportæa* of Fontaine and I. C. White,[6] from the Dunkard or supposed Permian of the Appalachian trough. *Saportæa*[7] through its allied genera, *Baiera*, and *Ginkgophyllum*, may perhaps be safely regarded as belonging to the *Ginkgo* stock, while the two genera last named are not only closely related, but one of them is perhaps antecedent to the genus *Ginkgo*, which is unquestionably present with characteristic flowers and fruits in the earlier Mesozoic. During this epoch *Ginkgo*, which in the world of to-day is

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[1] Évol. règ. vég., Phanérog., vol. I, 1885, pp. 142-146.

[2] Science, vol. V, 1885, p. 496.

[3] Annals of Botany, vol. XIV, 1900, pp. 109-154.

[4] Éléments de Paléobotanique, 1900, pp. 248-253.

[5] Quart. Jour. Geol. Soc. London, vol. XXII, 1866, p. 153, Pl. XIII, fig. 91.

[6] Permian Flora, pp. 99, 101, 102, pl. XXXVIII. figs. 1-4.

[7] *Saportæa*, F. and W., antedates and is quite distinct from *Saportia*, a genus of Tertiary Algæ, named by Squinabol in 1891, Contr. Fl. Foss. Terz. Liguria, pt. 1, p. xx.

not definitely known in a wild state,[1] appears to have enjoyed a world-wide distribution including all continents and extending from California to India, from Greenland to Argentina, and from Tasmania to Spitzbergen.

Smithsonian Institution, Washington, 2 May, 1901.

Plate VII.—Canadian types.

Figures 1 and 2.—*Whittleseya desiderata*, D. W., Fig. 1*a*, enlargement (x4) to show the vascular bands of the leaf.
Harrington River, N. S.; Riversdale formation.

Figure 3.—*Whittleseya brevifolia*, D.W., Fig. 3*a*, detail showing the nervation (x4)
Harrington River, N. S.; Riversdale formation.

Figure 4.—*Whittleseya Dawsoniana*, D. W., Fig. 4*a*, enlargement (x4) to show the vascular bands.
St. John, N. B.; Lancaster formation.

Appalachian types.

Figure 5.—*Whittleseya elegans*, Newb., showing the average form and proportions.
Roof of Sharon coal, Akron, Ohio; upper part of Pottsville.

Figure 6.—*Whittleseya undulata*, Lx., slightly narrower than the normal form labelled by Lesquereux with this name.
Roof of Pratt coal, Dolomite, Ala.; Pratt group, Upper Pottsville.

Figure 7.—*Whittleseya microphylla*, Lx.
Near Fayetteville, Ark.; Coal-bearing shale, Upper Pottsville.

Figure 8.—*Whittleseya Campbelli*, D. W.
Lincoln Mines, Southern Anthracite field, Pa.;
Lower Lykens division, Pottsville.

SOME NEW CANADIAN GENTIANS.[2]

By THEO. HOLM.

GENTIANA MACOUNII.—Annual or sometimes biennial, glabrous except the calyx: stem strict, quadrangular, 5 to 30 cm. high, branched from the base: lowest leaves spathulate or oblong lanceo late, the upper linear-lanceolate, acute: peduncles long and stout, 1-flowered: calyx purplish-green, unequally cleft to near the middle, 4-lobed, the longer lobes lanceolate, the shorter ovate with broad membranaceous margins, all acuminate and carinate, scaberulous with minute short papillæ, especially along the keels: corolla deep bluish, 1½ to 3 cm. long, cleft to about ⅓ of its length, 4-lobed, the lobes very veiny, slightly spreading, broad and

[1] The sole survivor of the genus *Ginkgo*, the Ginkgo tree (*G. biloba*), also known as the "Maidenhair tree" on account of the resemblance of its leaves to the Maidenhair fern (*Adiantum*), is the sacred tree of the temple gardens of Japan and China, whence it has been introduced by horticulturists into Europe and America.

[2] These descriptions of new species, formerly supposed to represent *Gentiana serrata*, Gunn., have been extracted from a very valuable paper by Mr. Holm on "Some Canadian species of *Gentiana*: section *Crossopetalæ*, Frœl.", with four plates, received too late for publication in this number of THE OTTAWA NATURALIST. The complete paper will appear in an early number of this journal.

Mr. Holm also proposes *G. serrata*, var. *grandis*, and var. *holopetala*, Gray, as species, viz.: *G. grandis* (Gray Synopt. Flora, p. 117), Holm, and *G. holopetala* (Gray ibid.), Holm.—EDITOR.

fringed along the sides, but merely denticulate across the summit; nectariferous glands 4 at the base of the corolla-lobes: stamens 4 with broadly winged filaments, these ciliate in the middle: anthers at first introrse: pistil fusiform, stipitate with short but distinct style: stigma roundish: mature capsule shorter than the corolla: seeds rough with numerous long papillæ.

Prairies, gravelly soil and margins of marshes. The Geological Survey specimens are from Lees Creek at Cardston, Alberta; Red Deer, Alberta; along the Bow River to Banff, Rocky Mountains, where it is very abundant; Waterton Lake, Lat. 49° 05′; and Fort Pitt, Saskatchewan.

GENTIANA PROCERA.—Annual, glabrous except the calyx: stem erect, angled, 25 to about 50 cm. high, branched above: lowest leaves spathulate or oblong-lanceolate, obtuse, the upper linear-lanceolate, acute: branches 1—3-flowered with 2 or 3 pair of leaves: calyx 1½ to 3 cm. long, unequally cleft to the middle or a little above, 4-lobed, the longer lobes linear-lanceolate, the shorter much broader with membranaceous margins, all acuminate and carinate, scabrous: corolla, deep blue, 2 to 5 cm. long, 4-lobed, the lobes very veiny, roundish with many long fringes along the sides and dentate across the summit: nectariferous glands as in *G. Macounii*: stamens 4, the filaments naked, otherwise as in the preceding species; ovary shortly stipitate with short style and a roundish, somewhat lobed stigma: mature capsule much shorter than the corolla: seeds with long papillæ.

Represented in the Herbarium of the Geological Survey of Canada by specimens from near Sarnia, Ont. (*C. K. Dodge*); Lake Huron (*Dr. Richardson*); Stony Mtn., Man. (*John Macoun*); and in the Gray Herbarium of Harvard University from Goat Island Niagara Falls; shore of Lake Superior, Charlevoix, Mich.; and Minnesota.

GENTIANA NESOPHILA.—Annual, glabrous: stem erect, angled, 6 to 9 cm. high, much branched from near the root: leaves glaucous, densely crowded and forming a rosette, roundish or obovate, tapering into the petioles, the cauline spathulate or lanceolate, obtuse: peduncles sometimes as many as 12, stout, 1-flowered with 2 or 3 pair of leaves: calyx glaucous and wholly glabrous, about 1½ cm. long, unequally cleft to near middle, 4-lobed, the longer lobes narrow and keeled, the shorter much broader with membranaceous margins, but not carinate: corolla pale bluish in dried specimens, 2 to 2½ cm. long, 4-lobed, the lobes roundish with a very few lateral teeth, but no fringes, erosely denticulate across the summit: nectariferous glands 4: stamens 4, with winged filaments: ovary shortly stipitate, the style distinct, with a roundish stigma: mature capsule shorter than the corolla: seeds with short, obtuse papillæ.

Known only from near Salt Lake, Anticosti, Quebec, where it was collected by Prof. John Macoun on low, moist ground; in flower August, 1883.

COMPARATIVE RECORDS OF ARRIVAL OF BIRDS.

	Windsor, Ont.	London, Ont.	Toronto, Ont.	Ottawa, Ont.
Cliff Swallow, *Petrochelidon lunifrons*		April 22		May 10
Olive-backed Thrush, *Turdus ustulatus swainsonii*	May 26	May 13	April 22	,, 16
Loon, *Urinator imber*		April 22		
Duck Hawk, *Falco peregrinus anatum*			April 25	
Brown Thrasher, *Harporhynchus rufus*		April 27	,, 25	May 4
Broad-winged Hawk, *Buteo latissimus*		,, 27		April 28
Chimney Swift, *Chætura pelagica*		,, 28		May 2
Bank Swallow, *Clivicola riparia*		,, 28		,, 10
Greater Yellow Legs, *Totanus melanoleucus*		,, 28		
Gray-checked Thrush, *Turdus aliciæ*			April 28	
Rough-winged Swallow, *Stelgidopteryx serripennis*		April 28		
Water Thrush, *Seiurus noveboracensis*		,, 29	May 16	
Myrtle Warbler, *Dendroica coronata*		,, 29	,, 2	May 10
Yellow Warbler, *Dendroica æstiva*		,, 29	,, 7	,, 9
Magnolia Warbler, *Dendroica maculosa*		,, 30	,, 11	,, 18
Whip-poor-will, *Antrostomus vociferus*		,, 30	April 30	,, 8
Catbird, *Galeoscoptes carolinensis*		,, 30	May 9	,, 16
Scarlet Tanager, *Piranga erythromelas*	May 19	,, 30	,, 9	,, 19
Least Flycatcher, *Empidonax minimus*		May 1	,, 11	,, 7
Warbling Vireo, *Vireo gilvus*		,, 1	,, 15	,, 9
Black and White Warbler, *Minotilta varia*		,, 2	,, 2	,, 10
Pied-billed Grebe, *Podilymbus podiceps*		,, 2		
Yellow-throated Vireo, *Vireo flavifrons*		,, 2	May 11	
Bobolink, *Dolichonyx oryzivorus*		,, 2	,, 10	May 16
Kingbird, *Tyrannus tyrannus*		,, 2		,, 11
White-crowned Sparrow, *Zonotrichia leucophrys*		,, 2	May 11	,, 11
Ruby-throated Humming-bird, *Trochilus colubris*	June 6	,, 2	,, 11	,, 21
Pine Warbler, *Dendroica vigorsii*			,, 2	,, 5

Parula Warbler, *Compsothlypis americana*		May 6	May 2	
Red-headed Woodpecker, *Melanerpes erythrocephalus*		,, 3	,, 10	
Maryland Yellow-throat, *Geothlypis trichas*		,, 3	,, 5	May 19
Nashville Warbler, *Helminthophila ruficapilla*		,, 4	,, 4	,, 12
Crested Flycatcher, *Myiarchus crinitus*		,, 4	,, 7	,, 19
House Wren, *Troglodytes aëdon*		,, 4		April 25
Baltimore Oriole, *Icterus galbula*		,, 4	May 7	May 11
Palm Warbler, *Dendroica palmarum*		,, 4	,, 10	
Blue-gray Gnatcatcher, *Polioptila cærulea*		,, 5		
Black-throated Green Warbler, *Dendroica virens*		,, 5	May 11	May 19
Wood Thrush, *Turdus mustelinus*		,, 8	,, 5	April 25
Wilson's Thrush, *Turdus fuscescens*		,, 8	,, 5	,, 23
Wood Pewee, *Contopus virens*			,, 6	May 15
Lincoln's Sparrow, *Melospiza Lincolni*		May 6	,, 11	
Chestnut-sided Warbler, *Dendroica pensylvanica*		,, 6	,, 11	May 4
Blue-headed Vireo, *Vireo solitarius*		,, 6	,, 8	
Rose-breasted Grosbeak, *Habia ludoviciana*		,, 6		April 28
Oven-bird, *Seiurus aurocapillus*		,, 8	May 7	May 18
Black-breasted Blue Warbler, *Dendroica cærulescens*		,, 8	,, 11	May 9
American Redstart, *Setophaga ruticilla*	May 19	,, 10	,, 10	,, 16
Blackburnian Warbler, *Dendroica blackburniæ*		,, 10	,, 11	,, 12
Cerulean Warbler, *Dendroica cærulea*		,, 10		
Orchard Oriole, *Icterus spurius*		,, 10		
Red-eyed Vireo, *Vireo olivaceus*		,, 10	May 11	
Cape May Warbler, *Dendroica tigrina*			,, 11	May 12
Yellow-billed Cuckoo, *Coccyzus americanus*		May 11		
Red-backed Sandpiper, *Tringa alpina pacifica*			May 13	
Tennessee Warbler, *Helminthophila peregrina*			,, 16	May 12

ORNITHOLOGICAL NOTES. By W. T. MACOUN.

The local bird notes for this month are held over in order that the above table of records may be published. This table gives the dates of arrival of fifty-six species of birds, most of which were observed at London, Toronto and Ottawa, and as the majority of them were probably noticed soon after their arrival the comparison of records is interesting. A similar table giving the dates of arrival of fifty-one other species was published in the June number, with the names of the observers. This month the London notes were, at the request of Mr. W. E. Saunders, furnished by Mr. J. E. Keays.

CORRESPONDENCE.

To the Acting-Editor of THE OTTAWA NATURALIST :

Having been asked by several members of the Ottawa Field-Naturalists' Club why I did not reply to the bitter attack made upon my "Synopsis of the Geology of Canada," published with the sanction of the Editor, and without any opportunity on my part of replying thereto in the same May number of THE OTTAWA NATURALIST, I desire to state that whilst I did feel strongly inclined to reply to it in the same strain, and point out the errors and mistakes it contains as well as the evident motives for the words of the writer, who signs himself "H. F." [who, by-the-bye, from his initials, is evidently not even a member of the Club, yet, was allowed to use our official organ as a medium] and attacks one who, in the course of his geological researches in the field and studies in the department has been compelled to state what he believes to be the truth regarding the geological age of certain strata in Nova Scotia and New Brunswick about which a great deal has been written by a certain writer whose initials are also "H. F." and presumably refer to the same person. These writings, as well as that of "R. W. E." in the January issue of THE OTTAWA NATURALIST for 1900, and an unsigned article in a local journal, all bearing on the same subject and evidently inspired from the same quarter, may be placed along with that "very large mass of geological writing of the present time which is utterly worthless for any of the higher purposes of science, which might quite safely and profitably, both as regards time and temper, be left unread." I do not wish to enter into any personal controversy as that bitter attack would seem to lead. I merely desire to point out facts and natural conclusions that we can draw from them. I had much rather not had to write this letter intended for the members of the Club, who are certainly entitled to consideration in the matter.

After over twenty years' experience in chronological geology in Canada, I have brought out my "synopsis" in the interests of geology in Canada and in accordance with the facts which I have examined for myself during nearly two decades in the Geological Survey Department—not with any preconceived notions or ideas to bolster up, nor yet with any vain theories of mine to uphold.

I do not hesitate to stand by the position I have taken in my "Synopsis" as regards points in nomenclature. As regards nicety of diction and literary skill, I do not claim any.

Sincerely yours,

(Sgd.) H. M. AMI.

Ottawa, June 22nd, 1901.

TOPOGRAPHICAL MAP OF RED RIVER VALLEY, FROM MODEL BY D. B. DOWLING.

PART OF MANITOBA.

Dotted lines show beaches of west side of former lake.

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THE PHYSICAL GEOGRAPHY OF THE RED RIVER VALLEY.

By D. B. DOWLING, B. Sc.

A critical study of the physical features of any region is not complete nor is its full significance understood if there is not added some note referring to the great changes which have contributed to its history. Many of the bolder features such as mountain ranges show in the bending and folding of the beds composing their mass, a yielding to great lateral pressure and consequent upheaval. Similarly all the surface deformations offer evidence as being the result of various agencies; whether changes in elevation, folding and breaking of the crust or the continued action of atmospheric or climatic conditions.

In the district to be discussed the principal movements recorded are changes in elevation during which the sea advanced or retired and was the principal agent in the deformation and subsequent addition to the deposits on the earth's crust.

A reference to the illustration will show the general nature of the valley from the height of-land at Lake Traverse northward to the Manitoba lakes. It broadens toward the north and in Manitoba is seen to include a wide tract—the first prairie steppe—extending from the hills bordering it on the west, to the rougher country lying to the east of Lake Winnipeg.

The general character of the country on both borders is quite distinct and the plain, through which the river runs, forms an area of a still different type. The character of each is primarily caused by the relative hardness and formation of the material forming the crust of the earth beneath.

To the east is a rugged plain sloping gently westward. On this many small lake-basins are seen and the streams winding through it are peculiar in that they have not of themselves worn down valleys but are found winding in various ways seeking the lowest level, passing through lake expansions which are merely hollows filled to the level of the lowest outlet. This area is a part of the original continent formed after the molten mass of the earth had cooled sufficiently to have formed upon it a crust.

A study of this area shows that the original crust suffered many changes—that successive sinkings into the still molten matter beneath, modified much of it or probably remelted all of the original surface. The earliest littoral deposits are associated with eruptive greenstones, and wherever remnants of these are found they are nearly always surrounded by rocks which appear to have been at a later date in a plastic condition and to have enfolded the early sedimentaries. These remnants are of great economic value inasmuch as they have been specially enriched by veins carrying the precious and other metals and minerals. A long lapse of time enabled the surface to become firmer before additional deposits were placed upon it, but the surface suffered great denudation and a large part of it was removed to form the earlier stratified sea deposits. The uneven nature of its present surface is due in a great measure to the varying hardness or brittleness of the constituent rocks.

The country beneath this rough slope and the edge of the plateau to the west of the valley is underlain by limestones placed nearly horizontal and covered by coatings of clay, the nature of which is dependent on the conditions of deposition.

The plateau to the west through which may be seen many deep river channels is composed of a series of soft, dark coloured, easily eroded shales or hardened clays with occasional overlying deposits of sand and clays of a lighter colour containing a few seams of lignite which were deposited in shallow, probably brackish water.

These various deposits indicate a certain part of the history of the continent to be briefly as follows :—

A subsidence of the original continent brought the sea into the central part of the present land area, so that its waters covered perhaps all of Manitoba. The advance was slow and represents a

great lapse of time. Along the margin of the sea the waves and currents were breaking up and carrying away the loosened parts of the former land surface. The heavier material was left near the shore to form the lower rocks which are mainly of sand, while above are the deeper sea deposits; limestones.

That this sea remained for a long time is evident from the great thickness of the limestone beds laid down over its bed, for it is generally supposed that limestone is not formed very rapidly.

The commencement of an upward rise was probably about the time of the great coal period. Traces of rocks formed at this time are found in Minnesota but none so far in Manitoba. As this part rose above the water it probably presented a very even surface or that of a great plain sloping to the south-west, but the fact that near the shore the beds were thinner than elsewhere would cause them to be more easily fractured by any unequal movement of the crust in the general elevation.

There was a long lapse of time during which this part of the continent remained above the sea and it is probable that in this interval the surface of the limestone was worn away and brought near its present contour. Along the eastern margin there was probably a line of cliffs facing the east, and in front of this a line of lakes or a river system the fore-runner of the Lake Winnipeg basin.

The next evidence of change in the elevation shows that the next advance of the sea was caused by a much less depression than in the previous case. In this instance the sea was shallow and apparently the waters very muddy if we are to judge by the amount of silt that was left by this submergence

A preliminary sandy deposit showing the advance of the sea is succeeded by a great thickness of shale or hardened mud which is characteristic of this later submergence. These shales not being here subject to any great pressure except the weight of the upper beds, are not hardened to any degree.

Above these dark shales there is a lighter coloured series of sands and clays holding a few seams of lignite, but as these deposits have been removed from most of the area in the vicinity of the Red River valley they are merely referred to; farther west they are better developed and are of great economic importance.

After the final emergence from the sea was accomplished, the country assumed somewhat the same character which it has at the present time but with several modifications. The plateau west of the present valley extended farther to the east and sloped more regularly eastward while the larger channel was probably also shifted eastward to run along the face of the limestone outcrop or by a series of minor streams running parallel to it corresponding to the basins of the present lakes.

A great change in the climatic conditions next brought about important changes in the surface features and also in the distribution of the soil. Colder winters and cooler summers were succeeded by a long period of continuous winter, in which all the natural drainage was stayed and there gradually accumulated a vast thickness of snow. The area of greatest precipitation and consequent accumulation of ice and snow was at first in the country to the north. As this ice increased in thickness it began to spread slowly towards its outer margin. In this way there was a movement of the ice southward through the valley and as the movement progressed this mass of ice picked up and carried along with it much of the loose material on the surface, at the same time scoring and polishing the harder rocks, breaking off protruding points and deeply plowing along the face of the plateau of soft rocks to the west. When the valley was filled there might have been a halt to the forward movement for a time but it gradually over-rode the edge and spread to the west as far as the Coteau du Missouri and southward over Minnesota.

Warmer conditions returned and the great mass began to melt along its margin. The great amount of debris carried along with the ice was thus left in great heaps where the edge of the ice was stationary for some time or if the retreat caused by melting was rapid the surface would be more or less evenly strewn by this material which is generally called boulder-clay. As the ice melted there would naturally be a vast quantity of water to be carried away, and river channels were formed which appear now to have little cause for origin except for this emergency. Where the slope of the country was toward the ice, large lakes along its margin were formed.

One line along which it is evident the edge of this glacier made a halt as shown by an extra amount of boulder-clay, is along the western margin of the Duck mountains then southward skirting the eastern bank of the Assiniboine river, crossing to the south side through the Brandon hills and by the Tiger hills to the Pembina mountain. There is evidence that a lake filled the valley of the Souris and part of the Assiniboine, while the ice front was at this line. (This is outlined in the second illustration.) The drainage of this lake was to the south-east along the foot of the glacier and the scouring of this large stream wore a great valley through which now runs a small stream—the Pembina river. The change in drainage was accomplished by the further melting of the ice so that the Assiniboine and the Souris rivers united in the present valley.

The retreat of the ice down the Red River valley was accompanied by the formation of a large lake at its southern margin, for the water was obliged to accumulate till it found an outlet, which in this case was to the south through what is now Lake Traverse to the Mississippi. As the retreating front passed farther north the lake grew in dimensions and beaches were formed along its shores. There is evidence that another great invasion of ice this time from the north-east, was threatened but its margin did not probably cover the entire basin. It still held the water, as a long inland sea, from draining to Hudson Bay. During this period the removal of the weight of the former glacier from the earth caused a gradual rising of the land at the north to probably its previous elevation and maintained the flow of the waters of the lake to the southward. This rise was continued as the second glacier disappeared and there came a time when the water found other outlets probably toward Hudson Bay and a gradual contraction of the lake ensued in which successive beaches mark the different stages.

The evidence of the former occupation of this great plain by a vast lake is clearly shown in the beautiful beaches in Manitoba, Dakota and Minnesota. These have been examined, traced and had their levels determined. In the tracing and levelling it was discovered that instead of being laid in level rows, the surface of the higher ones rise to the north at a rate increasing from six inches to one foot in the mile. The lower ones are more nearly level as is the case of the lowest or those at present around the present lakes. This is the evidence of the upward rise of the land to the

north-east which also is shown in the beaches around Hudson Bay at heights up to 500 feet above sea.

As the level of the lake fell, the present lake basins became defined and reached their present dimensions. Examples of beaches at different stages might be cited but they are very numerous in the western part of the basin along the base of the Pembina and Riding mountains. An example of a former island in the lake at a low stage is to be seen at Stony Mountain where the crest of the hill is crowned by good types of lake beaches.

The effect on the value of the farming lands of the valley of this former lake is of great moment. The general boulder-clay covering, which the northern part of the continent has received produces some fine farming land but when this material has been sifted and all its finer constituents spread out over a particular area none but the finest land is to be expected in that area. That the great lake received an enormous amount of sediment especially from the west is evident not only in the soil of the valley itself but in the great valleys worn down through the clay rocks of the plateau. An especially thick deposit would be expected at the mouths of all these streams and particularly of the delta in front of the mouth of the Assiniboine which at one time carried the water of the Saskatchewan river while the latter was ice-dammed at the north. The Pembina river as before noted was at one time a great stream, the outlet of a temporary lake, and brought down a heavy deposit. Farther north, the Valley river spread a sediment over the Dauphin country, while the Swan river helped to fertilize the country north-west of Lake Winnipegosis. Beyond the confines of Manitoba the Great Saskatchewan spread an immense delta deposit over the low country to the west of Cedar lake but the vast amount of sediment still being carried by this stream, as in the case of the Mississippi, causes its bed to be gradually built up above the surrounding country. Great stretches are therefore available in that region as yet as grazing or hay land only during low water.

We have thus some clue to the reasons for the fertility of most of the Red River valley. Other parts that have not been specially fertilized in this way are covered by the ordinary boulder-clay which when disintegrated forms good though heavy soil of fair quality.

The eastern and northern parts are at present well wooded as well as the summits and slopes of Riding mountain and thence northward. The south and western parts west of Red river are generally open prairie though the true forest is bordered by a more or less wide belt of partly wooded country.

MY FIRST NAMESAKE.

By SAMUEL H. SCUDDER.

In the summer of 1860 I made a collecting trip to Lake Winnipeg and the lower Saskatchewan, interesting to me because so far as I went I passed over the exact route taken by the Franklin search party under Sir John Richardson. It will be remembered that the insects collected on that occasion were published in Richardson's Fauna boreali-americana, by Kirby, and I was thus the better able to determine some of his species. Among the butterflies I found at the mouth of the Saskatchewan (collected with incredible difficulty on account of the mosquitoes) was a delicately marked and exquisitely pretty bluet unknown to me, and I sent it to Mr. W. H. Edwards, then just beginning to describe new American butterflies, who pronounced it new and named it *Lycæna scudderii*. It was the first insect named for me and has always held a special place in my affection.

Although first described from specimens brought from the interior of the continent and far north, it has since been taken over a wide extent of northern territory, mostly in Canada, and as far east as Cape Breton; it has been found also in a few isolated localities at some distance from its known general range, as at Albany, N. Y. It was on account of its occurrence at this place (though it has since been recorded from New Hampshire) that I introduced it in my work on the Butterflies of the Eastern United States. Its early stages had been partly described by a Canadian entomologist, but, unwilling to publish my work without a tolerably full account of my namesake and figures of it at every stage, I determined to make a visit at the proper season to the spot near Albany where it had been found, and get eggs from females enclosed over lupines, and so, by rearing it, obtain its whole history. The State entomologist who had first discovered it at Albany kindly accompanied me to the breeding ground, and with an absence from home of just twenty four hours I obtained the material afterward used in my book.

Of course the Reporters got wind of this; a journey of four hundred miles after a butterfly's eggs was not lost upon them! They learned how many eggs I had secured and, easily figuring

up the probable cost of the trip, announced in large head-lines in the Albany papers, that the price of butterflies' eggs had risen to "SIXTEEN DOLLARS A DOZEN." In very truth, many kinds would be cheap at that.

This butterfly appears twice during the year. The first brood flies early in June or even late in May, and continues on the wing through June and often into July. It lays eggs in June, which hatch in seven or eight days, the caterpillars live in that stage for about a month and the chrysalis continues about ten days. Sometimes these figures must be shortened, for though the second brood of butterflies is normally an August brood, it sometimes appears by the middle of July or even earlier. The second brood lays eggs in August, but whether these hatch before spring, or whether it is the caterpillar or chrysalis which hibernates is not yet known.

The turban-shaped and most elegantly chased eggs are laid on the leaves of lupines, usually on the under side, and on the stalks. The caterpillar, which is slug-shaped, eats its way out at the side of the egg ; it has a remarkably extensible head and neck and procures its food in a curious way, at least when young, showing its relationship to some of its brethren which are fruit-borers ; biting a hole through the lower cuticle of the leaf no larger than its own minute head, it devours all the interior of the succulent leaf it can reach by pushing its head through this hole in every direction and leaves the eaten leaf with a blistered look, this blister being eight or ten times larger than the hole by which it is entered. Later in life, it devours also the cuticle on which it rests while feeding, but also devours such softer parts of the leaf between the integuments as it can reach by its protrusile head, and it will bore the softer parts of a cut stem down to the rind as far as it can reach.

The caterpillar is attended by ants according to Mr. Saunders, who first discovered it. He was "surprised by seeing several ants actively running about the leaf" on which he found his first caterpillar, "and repeatedly over the body of the caterpillar, without disturbing it in the least." The discovery of other caterpillars was indeed "made comparatively easy from the invariable attendance of these active attendants." They attend them to lap up the drops of fluid secreted by glands opening externally near the hinder end of these caterpillars, and of which, as of the honey-dew Aphides, the ants are extremely fond ; so fond indeed that they guard the caterpillars from the approach of insect enemies, and thus the gain is mutual.

ON THE AUTUMN-FLOWERING OF VARIOUS WILD PLANTS IN 1900.

By CEPHAS GUILLET, Ph. D.

On account of the remarkably mild autumn of last year, one might have gathered nosegays of wild flowers about Ottawa, not only throughout October, but during the first half of November. We had our first real snowstorm and sleighing the 13th November, but even for some time after that wild flowers were to be found in odd nooks and corners. Berries also were to be seen unusually late. Dr. James Fletcher tells me, he gathered as many ripe red raspberries as he cared to eat, at Kirk's Ferry, on the 27th September, and they were of excellent flavor. I picked a few near Rockliffe Park as late as the 15th October, which were, however, of better color than taste.

It is well known that different plants bloom at different times; that there is, so to speak, a procession of the flowers. Just when or for how long we may expect this or that plant to bloom is not so well known. I am not aware that the order in which the 1,200 odd species of flowering plants, of the Ottawa district, put forth their blossoms has ever been determined. Here is a pleasant and useful task for the students of nature in every locality of our country. As a slight contribution to this end, I submit the following late autumn observations made in the vicinity of Ottawa, together with observations made in other parts of the country by several readers of this "THE OTTAWA NATURALIST," who have been so good as to communicate them to me.

Viper's bugloss or the "blue thistle" (*Echium vulgare*)—said by Prof. Harrison in his "Weeds of Ontario," to be imported from Europe—was quite abundant on October 26th, on a limestone ridge three miles out the Montreal Road. Three other "weeds" (as the farmer justly calls them) I found on November 6th, namely, May weed (*Maruta cotula*) and ox-eye daisy (*Leucanthemum vulgare*) on the roadside, and treacle mustard (*Erysimum cheiranthoides*) in a garden, in Ottawa East. I saw a patch of white clover in Mr. Odell's brickyard on November 6th, and some red clover near the same place on the same day, and again near Hemlock Lake on November 8th and 12th. North of Peterboro' at Stony Lake, I

have observed yarrow (*Achillea millefolium*), golden rod (*Solidago*) and the asters begin to bloom in the order named, yarrow late in June, golden rod early in July, and the asters late in July. These flowers thereafter remain with us until winter sets in. I found golden rod still in bloom on a road in Ottawa East, November 6th ; and near Hemlock Lake, November 9th ; and asters near Green's Creek, October 26th ; while Dr. Fletcher found fresh new specimens of *Solidago Canadensis*, *Aster cordifolius* and *Aster paniculatus* at Brittania on November 9th. The yarrow I found on the uplands near Green's Creek, October 26th ; near Hemlock Lake, Lake, November 8th ; and at Rockliffe, November 12th.

Perhaps the most familiar flowers to every child are the buttercup and dandelion, and little wonder seeing that they display their bright yellow blossoms for seven months of the year. The tall buttercup (*R. acris*), I found on the roadside in Ottawa East, November 6th ; on Beechwood avenue, November 8th ; and at Rockliffe, November 12th ; all bright fresh speciments. Dr. Fletcher found it also at Brittania, November 9th. The dandelion I saw in a field three miles out the Montreal Road, October 26th ; near Hemlock Lake, November 8th ; and again near the same place one plant with two blossoms as late as November 23rd.

The mention of strawberry blossoms and of violets reminds one of spring, for they may be found as early as April, and yet they are also among the last flowers one finds in bloom in the fall. I found strawberry blossoms (*Fragaria virginiana*) in a field near Green's Creek on October 26th, and several plants in bloom at Rockliffe, November 12th. The white Canada violet (*V. canadensis*) I found in a wood out the Montreal Road on October 26th, and in hollows in the beech woods near Beechwood Cemetery on November 9th and 12th in great numbers, while by searching under the leaves two plants were found in bloom even on November 23rd. The downy yellow violet does not commonly flower in the fall, yet last year quite a few were found November 8th, blooming along with the Canada violet in the beech woods, and one good bright specimen was obtained on November 12th.

The cultivated plants also felt and responded to the balmy touch of the last autumn of the century, for on November 8th, Dr.

Fletcher tells me, the guelder rose and Japan quince were in flower on the Experimental Farm.

That the late mild season was general over a great part of the l[illegible] of "Our Lady of the Snows," is shown by the following reports of other observers in northerly regions of our country.

Mr. John A. Dresser of Richmond, Que., sends the following from the phenological observations of the school at Nicolet Falls, Que., (15 miles from Richmond) made by Miss Annie Dresser :—October 30th, buttercup ; October 31st, dandelion ; November 3rd, blue and white violet ; November 5th, creeping buttercup ; November 6th, strawberry blossom. Similar observations, except of the violet, were made three miles from Richmond by Miss Bertha Dresser, and at Richmond in the St. Francis College School by Miss A. L. Beckett.

"On the 2nd October," writes Dr. Robert Bell, "in a brulé 15 miles N.E. of the town of Chapleau (on the C. P. R., N.E. of Lake Superior) I found the blue-berry bushes covered with a profusion of flowers, and in the same brulé a few strawberry blossoms. Young white birch bushes, 2 to 3 feet high, had burst their buds and some of them showed the green of the young leaves. The ground in the brulé was dry and warm with granite rocks cropping out near by and all well exposed to the sun and sheltered from the wind. We had had several days of warm sunny weather just before the above date (2nd October)."

On October 16th, Mr. W. J. Wilson, collected the trailing arbutus (*Epigæa repens*) in flower between Jack Fish and Manitouwick Lake, on the main canoe route between Michipicoten Harbour and Missinabie station on the C. P. Ry. He also saw the shrubby cinquefoil (*Potentilla fruticosa*) in flower in several places up to October 1st.

Mr. J. A. L. MacMurray brought Dr. Fletcher a good large bunch of the flowers of the smooth blue-berry, *Vaccinium Pennsylvanicum*, and marsh marigold (*Caltha palustris*, both of which he had found blooming profusely in the French River Valley, Ontario, in the month of October. He also saw wild strawberries in flower in many places.

Mr. A. W. Hanham, writing from Manitoba to Dr. Fletcher, says : "At Brandon, in October, I noticed stray plants in bloom

on the hill sides, a large percentage being summer bloomers; a botanist would have made quite a decent collection of native plants in bloom. We had no killing frosts until towards the end of the month. About the 1st of November a flower called scarlet [illegible] (*Castilleia miniata*), frequenting marshy lands, was plentiful in bloom. I have this on good authority; some were picked and brought in. Isn't this a July-August species? I fancy I have seen it from the train, when *en route* west to Brandon."

I could not more appropriately close this paper than by quoting a little poem placed in my hands by the genial president of the Ottawa Field Naturalists Club, Dr. Ami. It was written by Albert Bigelow Paine, and is entitled "To a Violet found blooming in November."

Pretty blossom, little stranger, with your modest eye of blue,
  Why in this unusual season are you bravely blossoming?
Did you think the other flowers all had been deceiving you,
  And because the day was sunny that it was return of spring?

Or perhaps you wished to see how the world looked at this season,
  When companions of the springtime, birds and blossoms have all fled,
And the woods are brown and silent—tell me, have I guessed the reason!
  And do you lament, sweet blossom, that you find your brothers dead?

Little violet, pretty stranger, bravely blossoming alone,
  Prize you well the fleeting moment, for so brief will be you stay
That I fear it will have ended with the setting of the sun—
  For the frosts will gather thickly o'er you ere another day.

You will wither, little blossom, when you feel its icy breath
  Fall upon your tender petals that were just unclosed to-day,
As with me, in early youth-time, hope received a blow of death,
  By the frosts of winter falling thickly on my head in May

I am sorry, tender floweret, that so bravely you came hither.
  When all other flowers have faded and the winter winds are nigh,
I am sorry, but 'tis only that you must so quickly wither –
  Sorry that you left the bosom of your mother but to die.

TRINGITES RUFESCENS, BUFF-BREASTED SANDPIPER.

By G. A. McCALLUM, M.D., Dunnville, Ont.

(Read before the Ornithological Sec. of the Entomological Soc. of Ont.)

I write this at the request of a friend to report at greater length the capture of a female of this species and her nest, which I was fortunate enough to take near Dunnville, Haldimand Co., Ontario on June 10th 1879. The only particular point of interest being the latitude in which this nest was found, since, heretofore, this bird has generally been credited with breeding only in high latitudes. A short report was published in Mr. McIlwraith's work on the "Birds of Ontario" a number of years ago and were it not that the fact of its breeding in this locality is very remarkable the published report already given would be sufficient. However, as the identification of my specimen has been doubted by Prof. Macoun and it has been suggested by him in his Check List of the Birds of Canada that I evidently had mistaken the bird for the Spotted Sandpiper, *Actitis macularia*, I felt somewhat nettled that an old fellow like myself who has closely observed birds all his life should be credited with not knowing a Spotted Sandpiper, one of our most beautiful as well as one of the very commonest of our shore birds.

I find however, that I am not the only observer who has been doubted when he reported seeing or taking the nest of this rare little bird the Buff breasted Sand-piper. Dr. Heerman claimed to have found its nest in Texas made of grasses placed in a hollow in the ground and containing four eggs but Prof. Baird said "but as this bird breeds in high northern regions up to the very border of the Arctic Ocean he may have been mistaken in his identification."

As far as I can make out it has always been a very uncommon species, only one or two birds having been seen at a time in any locality. It was entirely unknown to Wilson and Buonaparte and was first made known as a species by Vieillot from a specimen taken in Louisiana, but Audubon had not noticed it there and the first one he ever saw was a specimen in the hands of the Arctic explorer Capt. James Clark Ross who had received it from a sailor who had secured it on one of his inland excursions in the

far north. "From all this Audubon conjectured rightly" so Prof. Baird says "that this bird bred within the Arctic Circle." It is said to winter in South America and the West Indies. Gundlach reports it as a winter visitant in Cuba making its appearance there from the north from August to November. Mr. Salvia reports that he received a specimen from Bogata, and Natterer obtained examples from Brazil between November and March. Henshaw reports taking a specimen in Boston harbour and Boardman found it at Calais, Me. The dates for these last are given as about August 20th which would probably be the time of its southern migration.

My capture was on June 10th, 1879. While walking along the bank of the Grand River below the dam on the evening of June 9th a bird arose in a hurried manner from near my feet. I saw at once that it was not the common Spotted Sandpiper from its color, size and manner of flight. I noticed too that it evidently had a nest and looking where it arose I easily found it, between two large tussocks of coarse marsh grass which grows in such localities. There was a distinct depression in the soft ground and although there was not much of a nest, some bits of moss were gathered around the edge helping still more to form a nest. It contained three very dark colored eggs lying with the small ends pointing to the centre as is usual with most birds of this family. Being anxious to secure the bird herself I did not take the eggs then, but returned in the morning and having shot her I went to the nest and was somewhat disgusted to find that during the night two of the eggs had hatched and their places had been taken by two pretty little creatures spotted with dark spots on a light fawn-colored ground. They were all brought home and mounted and are now in my collection. The egg although far advanced, I was able to make a good cabinet specimen of and it also is in my collection. It measures 1.25 x .95, and is very pyriform in shape. The ground color is buff thickly covered with spots of two shades of dark brown or sepia, the markings being much larger on the large end, the general color being very dark.

The location of the nest was on the bank of the river four or five feet above the water and a short distance from the edge. I did not see the male bird, in fact this is the only specimen I ever saw outside of a collection, and I was at the time naturally very proud of the find. The bird had little or nothing in her stomach besides some bits of some small insects.

THE WOODCOCK'S LOVE SONG.

By L. H. SMITH

(Read before the Ornithological Sect. of the Entomological Soc. of Ont.)

The woodcock so much admired by sportsmen as a game bird, has traits of character which have never been read either by the sportsman or the naturalist. His habits being principally nocturnal perhaps to some extent account for this.

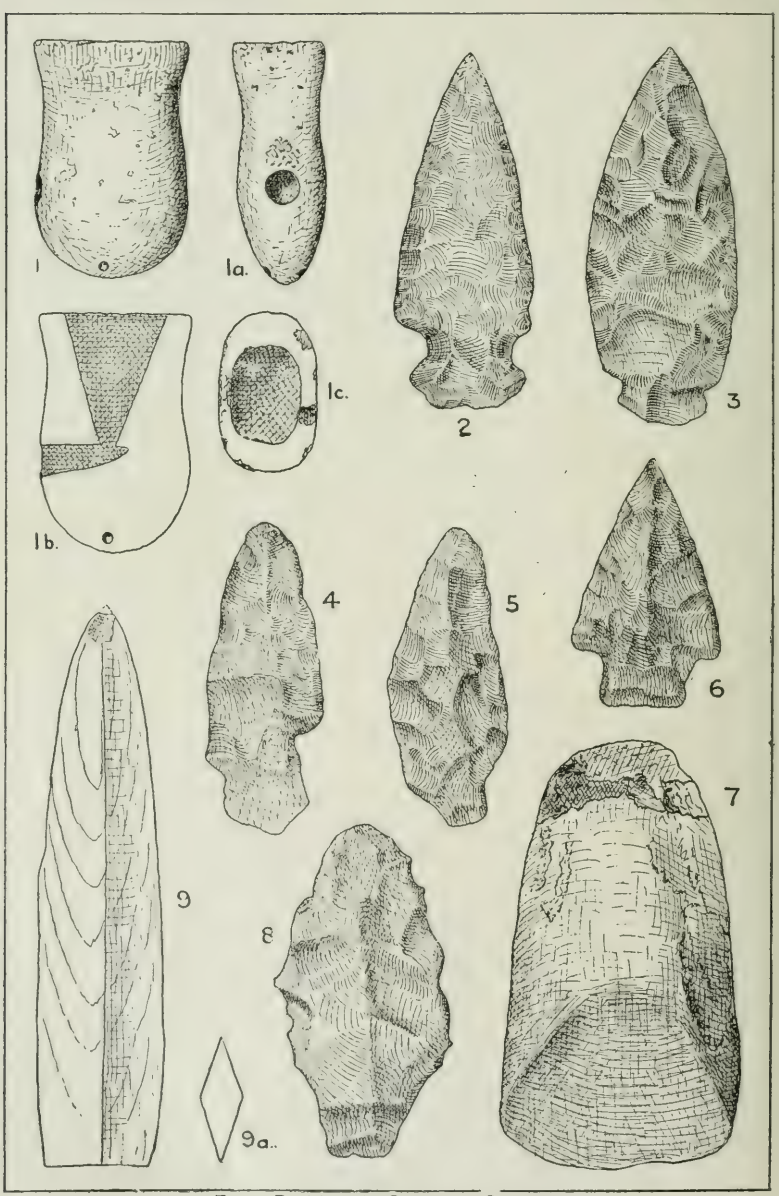
His peculiar shape and make up, so different to that of the grouse or partridge family, or to any other game bird, mark him as a strangely unique specimen. His long bill, peculiarly shaped head, in which his large black eye is set so far back, his breast-heavy body, and short excuse for a tail, all mark him as a delightfully curious and uncommon bird. His color is beautiful, velvet and russet; none of our game birds is clothed in richer plumage.

The haunts of the woodcock are in keeping with his general character. Our deeply shaded swales and glens are the places he loves to make his home. He is seldom found unless in a spot so beautiful that the sportsman-naturalist could imagine he is the companion of "wood nymphs"; no other birds frequent and live in such lovely sylvan retreats.

"The woodcock's love song" is a strange performance and is known to comparatively few. Any fine warm evening about the middle of April, if you take your stand at dusk, by the side of a good piece of woodcock cover, and remain perfectly still for a few minutes, you will soon hear a sound, perhaps not twenty yards from you, from some bird on the ground. If you never heard the same before you would be inclined to think it was a nighthawk, for the sound is a sort of drawn-out "pâte" very similar to the night-hawk when on the wing. The bird will emit this note "pâte," "pâte," several times at short intervals, and then take wing, when you will at once recognize the author of the weird notes, for no one who has ever heard the wing-whistle of the woodcock as he rises in cover can mistake him for any other bird. The bird mounts in the air by a circular flight; you can easily keep track of him, although he is not visible to the eye, by the incessant twittering noise he is making with his wings. When he arrives at the summit of his flight, he commences a sharp twittering whistle and after describing a few circles he commences a rapid descent, and pitches to the ground very close to the spot he ro e from two or three minutes before. He soon commences his "pâte," "pâte" again and repeats his aerial gymnastic flight over and over again. By listening very attentively you will hear a low gutteral note just preceeding the pâting note; a note very similar to the crowing note of a hen made just as she is getting her chicks nestled snugly beneath her for the night. How long on a fine spring night he will keep his antics up I cannot say, but quite long enough for you to get the whole performance thoroughly engraved on your senses, so that at any subsequent time you would not possibly mistake it for that of any other bird.

THE LATE DR. ELEANOR A. ORMEROD.

Press cablegrams of the 19th July announced the sad tidings of the death of Miss Eleanor A. Ormerod, of Torrington House, St. Albans, England. This accomplished and estimable lady was a recognized authority on economic entomology, and had during a long series of years prepared and published numerous Reports and Manuals upon injurious insects, and of great value to the agricultural interests of Great Britain, As a recognition of prolonged and valuable work, she was created an LL.D. of Cambridge, and she was a fellow or honorary member of many scientific bodies. As one the few Corresponding Members of the Ottawa Field-Naturalists' Club she evinced much interest in its progress and in the investigations of its members —W. H. H.



From Prehistoric Camping Grounds.

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FAT IN THE ANIMAL BODY, ITS FUNCTIONS AND ORIGIN.

By A. T. Charron, B. A.

(Read March 12th, 1901.)

This evening I would invite your attention for a few moments to the discussion of a subject that lies on the borderland between chemistry and physiology. We are to consider the nature of fat as revealed by chemistry, its origin and the role that it plays in the animal economy.

What does the word fat convey to your mind? Have you ever thoughtfully asked yourself what fat really is? Ladies handle it every day, men are very often annoyed at the stains it leaves on their clothing as evident proofs of their carelessness, and yet very few enquire into the very nature of that most common substance.

If I were to ask you, what is fat? Some undoubtedly would answer me with Webster that fat is "an oily substance," and if I were to question you further and ask what is an oil, you would again follow Webster and inform me that "an oil is an unctuous substance expressed or drawn from various animal or vegetable substances." Of course, I would have to be satisfied with this definition, which is the only one given in the dictionary.

A true student, anxious to understand the very nature of the substance he has to deal with, is, however, not satisfied with such an ambiguous empty definition. I am positive that the members of this Club who are always so active in scrutinizing nature, are not satisfied with such a hazy knowledge. Let us, therefore, try to elucidate the question of the nature of fat.

To a chemist a fat is a glyceride of a fatty acid. In the formation of a fat two things therefore are necessary, namely, glycerine and a fatty acid. The fatty acids are a series of acids

derived from the monatomic alcohols by oxidation. Thus common acetic acid which is derived from ordinary ethyl alcohol by oxidation is a fatty acid.

Every one here present knows what glycerine is. Many times has it been applied to delicate hands and to charming lips to repair injuries caused by cruel cold winds. When applied to the lips that inodorous, colourless, viscid liquid is found to possess somewhat of an agreeable sweet taste. Several no doubt would have hastily thrust it away from them had they known that sweet, inoffensive looking substance to be an alcohol. True, however, it is that it is just as much an alcohol as the accursed beverage which brings unhappiness to so many homes. It is an alcohol, but of somewhat different constitutional composition, for it is what chemists call a triatomic alcohol. Each person carries stored up in his body a rather considerable quantity of that special alcohol. Let our prohibitionists be not alarmed, for this alcohol produces none of the nefarious effects of the so-called fire-water. Its action is only beneficient, for it combines with the fatty acids to form that very necessary substance: fat.

Fat is found widely disseminated in nature. Plants contain a certain amount in the form of oil. It is found in most of the animal tissues. The following table from Gorup-Besanez gives the percentage in the organs and fluids of the body:—

Sweat	0.001	Cartilage	1.3
Vitreous humour	0.002	Bone	1.4
Saliva	0.02	Crystalline lens	2.0
Lymph	0.05	Liver	2.4
Synovia	0.06	Muscles	3.3
Liquor amnii	0.06	Hair	4.2
Chyle	0.2	Brain	8.0
Mucus	0.3	Egg	11.6
Blood	0.4	Nerves	22.1
Bile	1.4	Adipose tissue	82.7
Milk	4.3	Marrow	96.0

Fat being found in the body must necessarily be derived from the food which is absorbed. All foods whether animal or vegetable contain three distinct classes of compounds which deserve special notice, namely: protein, carbohydrates and fats.

Protein is a class of substance characterised by the presence in its composition of nitrogen to the amount of about 16 per cent. Like the carbohydrates and the fats it contains carbon, hydrogen and oxygen, but it stands apart from these two on account of its nitrogen content. Carbohydrates consist of those substances like sugars, starch and fibre, which are composed of carbon, hydrogen and oxygen united in such a way that the relation of the latter to the former is in the ratio of one atom of the latter to two atoms of the former, as in water.

Fat is a substance composed of exactly the same elements as the carbohydrates, but whose atoms are arranged differently in the molecule. The atoms of hydrogen to those of oxygen are not in the same proportion. It contains no nitrogen and is thus quite distinct from protein.

Now do you believe that fat as it is found in the animal body is a simple compound of always exactly the same definite composition? If so, allow me to inform you that you are mistaken. Fat is not a simple compound, but a mixture of three, sometimes more compounds of analogous nature. The three principal compounds are stearin, palmitin and olein. The first two are solid at ordinary temperature and the latter is a liquid. The amount of olein is always more or less in excess of the other two, and it with the help of the heat of the living body keeps them in the liquid form. Olein really acts as a solvent towards stearin and palmitin You must have noticed that in the living body fat exists in the liquid state. As soon as death occurs there is a gradual falling off in the temperature of the body, *rigor mortis* sets in, and the fat becomes solidified. The mixture of those three substances is more or less firm according to the smaller or greater amount of olein it contains.

I told you that fat is one of the component parts of food. You are perhaps anxious to know what part it plays in the nutrition of the body, and what transformations it undergoes previous to becoming an integral part of the same.

Fat is one of the best producers of heat, in fact, it is the most powerful heat producer of all the food stuffs. A glance at its composition will convince you as to the truth of this assertion. The composition of one of the fats (olein) is expressed by the

formula C_{57} H_{104} O_6, whilst that of protein is indicated by the formula C_{72} H_{112} N_{18} SO_{22}, and that of carbohydrates by C_6 H_{12} O_6. From a comparison of these formulæ it is evident that in fats the ratio of the carbon and hydrogen (taken together) to the oxygen is greater than in the protein and carbohydrates. Now you are aware that the heat in the body is produced by combustion, and as carbon and hydrogen are the only two combustible substances in these compounds (with the exception of a small amount of sulphur in proteins), that class of compounds in which these two elements (not already combined with oxygen) predominate must necessarily be the greater heat producer. Rubner has very carefully estimated the relative heat value of fat, carbohydrates and protein with the following results :—

100 grammes of fat are equivalent to 211 grammes of protein, to 132 grammes of starch, to 234 grammes of cane sugar and to 256 grammes of grape sugar.

Besides being used as fuel to keep up the body temperature and produce energy, fats are stored up in the body as fat.

Perceiving that fats are absorbed with the food and deposited in the body. physiologists have asked themselves whether there is a direct transposition into the adipose tissue without any previous decomposition. Radziejewsky, Subbotin and others endeavoured to solve the problem.

Radziejewsky fed a dog with erucin, the glyceride of erucic acid, but could find only small quantities of it in the tissues.

Subbotin fed another dog with spermaceti and found none at all in the fat cells, and only traces in the intestinal fats and internal organs. What conclusions could he draw, if not that in the case of carnivora the fat in the food does not pass directly into the cells of the body ?

These experiments were repeated by I. Munk, who fed a dog, which had fasted a long time previously, with erucin and he got contrary results finding a considerable amount of the neutral fat. This, however, does not prove that the fat is transferred directly without previous decomposition, for is it not possible that the fat may be saponified and absorbed as a soap, and the neutral fat of the same composition afterwards synthesized in the epithelium cells ? In fact the most credited and better experimentally sustained idea

is that none of the fats are stored up in the body without previous decomposition. After the fatty material is introduced into the alimentary canal, the first liquid it meets on its way is the acid gastric juice which, as far as we know, has no effect whatever upon it. This juice has the carbohydrates and the proteids to contend with and enough has it to do. The fat, therefore, passes unheeded, but a little further it meets its most bitter enemy, namely, the alkaline pancreatic juice which wrestles with it until its entire decomposition is effected. By its action the fat is resolved into glycerine and a salt of the fatty acids, which salt is known as a soap.

Now as you well know soaps are usually soluble. This one is very similar to that so often called into domestic use and like it is soluble. It dissolves and is readily absorbed by the numerous villi, capillary filaments lining the small intestine, whose functions consist in absorbing the thus dissolved foods. In this way the soap is introduced into the circulating system and carried to the epithelium cells where it in turn suffers decomposition into its organic acid and an alkali. The organic acid again unites with the glycerine which has been absorbed at the same time as the soap and the fat is reformed.

The fact that the fat of an animal fed entirely on a certain kind of fat is not identical in composition with the fat fed, seems to indicate this double decomposition and a certain power of selection on the part of the little villi foraging for their proper food. Undoubtedly if an exclusive diet of a certain fat is given some of the reformed fat will inevitably be of the same composition as the one fed.

The great objection to the absorption of fat in the form of soaps has been that the reaction of the fluid in the small intestine where the absorption takes place is not alkaline but acid, and that a soap cannot persist in the presence of an acid liquid. Carb investigated the reaction of the intestine in three experiments on dogs, and found the intestinal contents to be acid all the way from pylorus to caecum. The indicators used were litmus and phenol phtalein. Moore and Rockwood have recently studied the reaction of the intestine making use, besides the indicators mentioned, of methyl orange, which is not affected by carbonic and weak organic

acids. With phenolphtalein the reaction was invariably acid all the way, whilst it was alkaline to methyl orange, thus showing that the acid reaction was due to a very weak organic acid probably to dissolved acids set free from fats. The alkaline reaction indicated by methyl orange can only be due to weak organic acids combined with alkalies *i.e.* in all probability to dissolved soaps. Such a weak acid would not decompose the soap, and so the objection to the theory falls to the ground.

Another objection is that the amount of the alkali required for the saponification would simply be enormous. Munk reckons that to so combine with the fatty acids of 200 grammes of fat about 40 grammes of sodium carbonate would be required. Now a dog weighing 25 kilogrammes can easily digest from 200 to 350 grammes of fat in twenty-four hours. Supposing only 200 grammes are digested and that all this is absorbed as soap and glycerine, about 40 grammes of sodium carbonate will be required for the purpose; now the total blood only contains, in such an animal, alkali equivalent to 6 grammes of $Na_2 CO_3$. If the other fluids of the body be supposed to contain an amount of alkali equivalent to another 6 grammes, the total alkalinity is equal to 12 grammes of $Na_2 CO_3$.

In this objection Munk loses sight of the fact that during the process of absorption of fat as soap and glycerine and its subsequent synthesis in the epithelial cells, the alkali combined in the first portions of the soap absorbed is again set free immediately after absorption, and what is to prevent that alkali from being, in some way, in the natural course of circulation, brought back to the intestine there to unite again with some more fatty acid to form soap and thus keep up the continuous action of composition and decomposition!

Whatever may take place the consensus of opinion seems in favour of the theory that fats are absorbed as soaps and glycerine and reformed by synthesis in the epithelial cells and then deposited in the cells of the adipose tissue.

Another problem about fat which has puzzled many a physiologist is its origin. From which class of food compounds is fat derived?

There is no difficulty for anyone in admitting that the fat of the body *may* be derived from the ready formed fat absorbed as food. But is that the only source of fat?

In 1742 Beccaria, in Bologna, advanced the idea that animals take the substances which form their tissues ready made from the vegetable kingdom. This theory was supported by many prominent men, amongst whom may be mentioned Prout, in England, and Dumas, in France. The chief point of the theory was that animal fat is derived from the fat of plants. This appeared so simple and probable, that for a long time nobody questioned its truth. Liebig was the first (in 1848) to dispute this deep seated belief of over one century old. He observed that if by lack of exercise or otherwise, respiration is hindered in Herbivora, fat deposits in greater quantity and thence he argued that as there was no more fat absorbed in the food than previously, that greater deposition must be due to the formation of new fat from the fat free substance of the food. Hindering respiration he thought diminished the combustion of the carbohydrates and the protein, the unburnt carbon was retained in the body and used up in the formation of fat.

As a natural consequence Dumas and Liebig entered into an active controversy, and this set them and their supporters at work experimenting to discover additional proofs to uphold their respective pretentions. Milne Edwards sided with Dumas.

It is not my intention to give you an account of all the experiments undertaken. A few will suffice to make the results and the conclusions drawn therefrom clear to your mind.

Upon instituting experiments it occurred to Voit that fat might possibly be formed from protein. He had noticed that adipocere is often formed from nitrogenous tissue, muscles, etc., when portions of the animal body are kept under water. Wishing to ascertain whether really albumin could be changed into fat, he kept glass tubes, containing pieces of meat, in a water bath at a constant temperature of 40°C. for 3½ months. At the end of this time he found a small increase in the fat content of the substance. The increase was small, but nevertheless the fact was established that fat *could* be formed from protein substances. Further investi-

gations regarding fatty degeneration by Wettick, Forster and others, confirmed Voit's results.

Dumas and Milne Edwards jointly instituted an experiment with bees to find out out whether fat can be produced from fat free substance.

A swarm of bees were fed with honey for 32 days with the following results :—

Amount of wax produced.....	11.515	grammes.
" fat in honey.....	0.667	"
" fat produced from fat free substance	10.848	"

This opened their eyes to the truth of Liebig's statemeut and they acknowledged that fat could be formed from fat free substance. With Voit they supported the view that it was derived from the pre-existing fat and the transformed protein matter.

Other experiments were therefore instituted with the especial object of ascertaining whether or not carbohydrates play a part in the formation of fat.

Berlepsh experimented with bees feeding them on 117 grammes of pollen and honey. The 117 grammes of pollen contained 22 grammes of protein ;—

22 grammes protein = at the most.....	12	grammes wax.
Amount of wax produced by the bees ...	33	"
" " from other sources.....	21	"
Possible amount of wax in bodies of bees.	10	"
Amount of wax necessarily formed from carbohydrates	11	grammes.

E. Erlenmeyer, in 1878, wishing to prove conclusively that the fat could come from carbohydrates alone, fed a swarm of bees solely on rock candy. From each 8 grammes of sugar consumed there was produced 1.589 grammes of wax, which could not have possibly been formed from protein. The nitrogen and fat content of the bees remained unchanged during the experiment.

Henneberg, Kern and Wattenberg experimented with sheep :

A sheep was fed for 70 days with lucerne hay, maize meal and turnips :—

Amount of fat formed	9730 grammes.
Possible amount of fat from fat and protein	6872 "
Fat from carbohydrates	2858 grammes.

The experiment which sets the question at rest, however, is that undertaken by Lawes and Gilbert, at Rothamstead, with pigs. Without giving all the details of the experiment which were scrupulously attended to by these most reliable experimenters, I may only say that they fattened the pigs during 8 to 10 weeks, keeping a record of their composition at the outset and at the finish and of the food consumed, all of which was of accurately known composition. On examining the results obtained they discovered that 29 per cent. of the fat produced must necessarily have had its origin from carbohydrates.

Another experiment, deserving of special notice proving the same fact, has recently been made by Jordan and Jenter, at the New York Agricultural Station.

The experiment was made with a young and vigorous Jersey cow. The cow was fed during 95 days with food from which the fat had been extracted:

Quantity of fat fed during the 95 days.....	11.6 lbs.
" " not digested	5.9 "
" " digested	5.7 "
Quantity of fat in the milk.....	62.9 lbs.
" " consumed	5.7 "
	57.2 lbs.

Therefore 57.2 lbs. of fat have to be accounted for otherwise than by the fat contained in the food. Moreover at the end of the experiment the cow weighed 47 lbs. more and was much fatter than at the start.

The increase in flesh could certainly not have been large for during 59 days of this period an accurate record of the nitrogen income and outgo showed that the nitrogen income was represented by 124.3 lbs. of protein and the nitrogen outgo by 125.7 lbs.

During this period (59 days) the amount of protein digested was sufficient to form at the most 17.1 lbs. of fat, and the fat in the food which was assimulated amounted to only 3.3 lbs., so that the total possible amount of fat from protein and ready formed fat was 20.4 lbs. The milk from the cow during that period contained 38.8 lbs. of fat, so that at least 18.4 lbs. of fat must necessarily have been derived from carbohydrates.

Strange it seems, does it not, that I should be proving to you that fat *must* be derived from carbohydrates without having first told you whether it is *possible* for carbohydrates to be transformed into fat.

In this I have followed the emperical method whlch first establishes a fact and then endeavours to explain it.

The observations of H anriot and Richet, two French scientists of wide reputation, furnish indirect proofs of the transformation of the carbohydrates into fat. These observers found that with the administration of the carbohydrate food there is a greatly increased output of CO_2 without a corresponding increase of oxygen intake. This fact Hanriot explained by a transformation of carbohydrates into fats in conformity with such an equation as the following :—

$$13\,(C_6\,H_{12}\,O_6) = \underset{\text{(Oleo-stearo-palmitin)}}{C_{55}\,H_{104}\,O_6} + 23\,CO_2 + 26\,H_2\,O.$$

Fat therefore *can* and *is* derived from the three distinct classes of compounds absorbed for the purpose of nourishing the body. We can satisfactorily explain how the fat of the food can be transformed into the fat of the body, but how this formation occurs from protein and carbohydrates is still a problem unsolved. It is one of those secrets which the Creator has not yet revealed to any human being. May we not hope that, as there are at present so many scientific investigations in the field of physiological chemistry in various parts of the civilized world, there may be worked out ere long a satisfactory solution of these complex problems?

PREHISTORIC CAMPING GROUNDS ALONG THE OTTAWA RIVER.

By T. W. Edwin Sowter.

The evidences of Indian occupation that are met with along the Ottawa River, between the City of Hull and Pointe à la Bataille, on Lake Deschênes, consist, for the most part, of the prehistoric camping grounds that occur at frequent intervals along the shores of the lower part of the lake.

Now, just at this point, the "practical man" as Huxley would call him, comes forward with the very pertinent query: "How do you know that these places were Indian camping grounds?

In the first place, it may be said that the grim warriors of our brethren of the Indian race, who repose in their ancient burial places on Lake Deschênes, regard not such poetic license as that which elicited from a Newport skeleton the weird confession of an armored viking; but these lords of the forest have left behind them such traces of their methods of living as cannot fail to be profoundly interesting and widely instructive to those who wish to study the conditions under which a primitive people were slowly struggling, upward and onward, along the highway of civilization.

In a former paper upon the "Archæology of Lake Deschênes," reference was made, among other places, to the traces of Indian occupation that are met with at Raymond's Point, on the Ontario side of the lake opposite Aylmer, Que. Let us take this place as an example, and see if we can prove that it is the site of a prehistoric Indian camping ground.

At this point, following the water-contour of Raymond's Bay, the lake shore consists of a well defined outcrop of Calciferous limestone holding in great abundance the typical gasteropodean fossils of that formation.

Resting on this Calciferous outcrop, we meet with the ubiquitous Laurentian boulder, which the merest tyro in geology would recognize as the legacy of the great glacier which, in its descent from the Laurentian highlands, traversed at this point at least the present course of the Ottawa River.

Where the alluvial soil has been washed away, at high-water mark, the Calciferous rocks are thickly strewn with fragments of

black or dark-colored flints, from 2 to 3 inches in diameter down to the finest particles, such as may have been flaked from an arrow-head in the finishing process.

Mingled with these rough fragments are some that bear unmistakable evidence of having been worked, together with roughly as well as finely finished arrow-heads and spear-head shaped knives of the same material. In other words we find these implements, in various stages of completion, along with the raw material from which they were fabricated.

The question which now arises, in regard to the presence of these flints, is somewhat similar to that once propounded by a novice upon seeing some large boulders at Deschênes station: "Have them stones been brought there or have they just growed"?

It is evident that this flint was not "growed" at Raymond's Point as it is not found *in situ* either in the Calciferous outcrop upon which it is strewn or in the contiguous Chazy, so that it must have been brought there, but from whence and by what means are other questions.

It does not appear to have been brought there by glacial action, as it is not found in the glacial drift on the main land or adjacent islands. It is not even found in the dark boulders which line the opposite shore of Chartrand's Island and which, a sapient friend of mine once suggested, may have been pine knots which had been washed ashore and petrified at the time of Noah's flood.

In the Trenton formation in the City of Hull, however, nodules of this flint are found in great abundance, especially along Brigham's Creek, both *in situ* and in detached masses of the same limestone from which latter they may have been removed with but little difficulty. Let some of this flint be broken up and mingled with similar fragments from Raymond's Point and I doubt if the most skilful geologist could distinguish the former from the latter by other evidence than the recency of the fracture.

This, therefore seems to be one of the several obvious reasons for supposing that the flint from both places is identical. That it was picked up or quarried at Hull or Ottawa and carried up the river by Indians who, at Raymond's Point, among places, fashioned it into their arrow-heads and knives. That the aforementioned

glacier did not take up the red man's burden is apparent from the fact that it moved down the river instead of up, so that the flint could not have been carried to Raymond's Point by its agency.

If our practical man wishes us to give proofs of what we know about the direction of the glacial movement, we may show him the grooves below the boat-house on Mr. Watt's farm in the township of Nepean, Ont., and again near the Presbyterian Manse, at Aylmer, Que., where the glacial plough has furrowed up the rocks in its passage down the Ottawa valley. To prove that its passage was down, instead of up the river, a number of places may be shown, notably among which the one on Main street, Aylmer, in front of the Methodist Church. Here, where a section of rock was laid bare by the water-works excavations, it was observed that boulders had been forced under the Chazy strata from the westward, leaving large masses of these beds hoisted up and dipping towards the east.

That the flint was not carried by white men is obvious, from the fact that the pale-face, on his arrival in this country, was supplied with his musket and steel knife and the only flints he carried were those for the hammer of his musket or the larger ones for use in the preparation of his fire.

And the palæolithic Indian, it is only reasonable to suppose, went to the nearest and most convenient place to procure such material for the fabrication of his implements, and where it could be obtained in the greatest abundance with the least expenditure of labor, just as his civilized descendant of to-day will do when in search of rim ash or red willow for working into his baskets.

It is also a reasonable supposition, that the palæolithic Indian had acquired such a knowledge of what was good for himself, as to take the precaution of carrying the raw material, for use in his primitive arts, to some such judiciously selected camping ground as Raymond's Point, where, from its strategic and secluded position, he would be the better enabled to stand upon his dignity and defend himself against an enemy, or make himself scarce as prudence or necessity might dictate. An Indian clung to life and wanted his days to be long in the land just the same as a white man, and his natural instincts warned him against sitting down in any exposed position to flake out his flint instruments, where

attracted by the noise of his labor, an inquisitive member of some hostile tribe might come and look over his shoulder to see what he was doing and, incidentally, remove some of his hair, together with any tribal prestige he may have acquired as a cunning warrior.

And now for the reasons which point to Raymond's Point as an aboriginal camping ground. We have adduced what seems to be fairly conclusive evidence that the flint was brought there by Indians for purposes of palæolithic manufacture. From the presence of finished and unfinished palæolithic implements in various stages of fabrication, mingled with the debris of the aboriginal workshop, we are convinced by circumstantial evidence, that this primitive industry was carried on upon the spot, just as much so as after an examination of the flat at the mouth of Breckenridge's Creek, higher up the river, we would recognize it as the abandoned site of a modern brick-yard. We also find the worn out and discarded celt, or stone tomahawk, and observe, in its blunted and dilapidated condition, the reasons which led its former owner to cast it aside for a new one.

Following the denundation edges of the alluvial soil, we find fragments of rude pottery made out of a mixture of clay and coarse sand or gravel, which has been imperfectly burnt and bears other evidences of crude fictile workmanship.

If our practical friend is desirous of knowing where the Indian procured the material for the manufacture of this ancient pottery, there is little difficulty in pointing out to him the source from which it was derived.

At Noël's Bay, Coghlan's Creek, Winter Point and several other places in the immediate vicinity, the clay and sand on the lake shore are mixed together in about the same proportion as in the fragments of pottery already alluded to and, as our primitive artificer was the graduate of a rough-and-ready school of art, he made use of this ready-to-hand matrix, instead of going miles out of his way to get better, as the fragments of his work most clearly indicate.

Another important feature of Raymond's Point is the presence of arrow-heads of what we might term foreign manufacture, for although, as a rule, the arrow-tips found at this place are made

from the Trenton flint of Hull or Ottawa, we sometimes meet with some that are made from a more compact and lighter-coloured flint than that found in the Ottawa district. And one reason why these latter seem to be of foreign rather than of local manufacture is, that we do not find in the debris of the Raymond's Point, or any other Indian workshop on Lake Deschênes, any of the raw material from which they were fabricated.

Within the memory of the generation passing away, this was an ideal spot for the aboriginal hunter. The forest was alive with red deer, the bay teemed with fish and the adjacent creeks were well stocked with beaver, otter, muskrat and other fur-bearing animals. So that this prodigality of nature, in thus supplying the wherewithal to keep the wolf from the wigwam, together with the evidences of Indian occupation already enumerated, seem to be ample proof that the place was an Indian camping ground. And the foreign arrow heads would favor the conclusion that it was also a halting place for roving bands of natives, who made use of the great water highway of the Ottawa River.

Last summer, Harold Nelson, a student in Woodstock College, and a son of Mr. Frank Nelson of the Interior Department, at Ottawa, was good enough to send me some arrow-heads from Paris, Ont. In comparing these with those in my collection, I was surprised to find that some of them were of the same "make" as well as of the same flint, in color and texture, as what I have called the foreign ones, found a few weeks previously, at Raymond's Point.

The presence of flint implements of foreign, as well as of local manufacture on these palæolithic camping grounds of the Ottawa River, seems to present an interesting field of investigation in comparative palæolithology, that might throw some additional light upon the ramifications of intertribal commerce, or the migratory movements of the native races which occupied this country in pre-historic times.

It might be possible after an exhaustive study of the subject, extending over wide areas of occupation, to point with such a degree of accuracy either to the occurrence or to certain peculiarities of material or workmanship of palæolithic implements, as to be able to identify them as the relics of this or that particular tribe

that may have been the temporary or more or less permanent occupant of these pre-historic camping grounds.

The palæolithic knife found at Raymond's Point and described in the former paper on the "Archæology of Lake Deschênes," as a "squaw's knife," is without doubt of Indian origin. This implement is also known as a "woman's knife" and is very often mistaken for a spear-head which it very much resembles.

This particular form of knife is not by any means peculiar to this part of the American continent, for it is found on the village sites of western Ontario and even as far south as San Geronimo, in the Isthmus of Tehuantepec, Mexico, according to an article on Aztec relics, by Mrs. Wm. Stuart, in the Ontario Archæological Report of 1899. It is also met with amongst aboriginal tribes in the remotest parts of the world.

Since the spear, as a weapon, is supposed to have been unknown to our Indians, it is just possible that this implement may represent the survival of a knife-form that was, and is to-day, used by primitive peoples to serve the purposes of both knife and spear-head.

As an interesting instance, in this connection, of the same instrument serving different purposes in a rude condition of the arts, H. N. Moseley, Naturalist to the Challenger Expedition, informs us that the obsidian-headed spears of the Admiralty Islanders are used as knives, being cut off just below the ornamental mounting which acts as a handle. Col. A. Lane Fox also observes, in reference to these same implements, that "the shapes of the obsidian spear-heads found, just as they happened to flake off, are interesting as showing the natural origin of such forms and the remark that these spear-heads are used as knives reminds us of like customs in Africa where the Kaffirs, the Watusi described by Grant, the Fans of the Gaboon and others use their iron spear-heads in a similar manner and which accounts for the form of knife and spear-head amongst savages being so commonly the same.

Since the publication of former reports, in the OTTAWA NATURALIST, upon centers of Indian occupation on Lake Deschênes, I have had the good fortune to discover two more ancient camping sites on the Ottawa River, one at Squaw Bay, in Tètreau-

ville, a suburb of the City of Hull, and the other at Powell's Bay, about 10 miles above Aylmer, Que.

I have also been informed by Mr. Gainsford, of March township, that from 1 to 2 miles from the entrance to Raymond's Bay, on one of the creeks that run into it, Indian relics such as stone celts, flint arrow-heads and pottery have been found in great abundance at different times by people living in the vicinity.

As the camping grounds so far examined have, without an exception, been situated on the high water shore line of the river, it would be extremely interesting to verify the existence of an inland village site such as Mr. Gainsford describes; and I feel certain that, as my informant is a thoroughly reliable person, he has indicated a place where we may ultimately unearth a store of important information.

The slate knife, figured in the accompanying plate, was found at this place on the farm of Mr. John Armstrong, and was collected by George Burland of the Ottawa Field-Naturalists Club. Flint arrow-heads were also found in the vicinity by Albert Smith.

Second hand information is all very well in its place if you know the party with whom you are dealing; but, I met a man last summer who has such a loose rein on his imagination that I fear he sometimes allows it to run away with his better judgment. My friend told me that he had found a large stone axe and the head and bust of a squaw carved in stone. When he took me to inspect these Indian relics, I found that the former was a piece of limestone that had a fanciful resemblance to an axe; but, as it weighed about 15 lbs it seemed to me that, if it could be proved that any pre-historic Indian could have wielded such a mighty weapon, it would confirm an opinion that is current among a certain class of our people, that there were giants in those days. The graven image turned out to be a mass of water worn Calciferous limestone that some wag had embellished with a few artistic touches of red chalk. It occurred to me at the time that, if it were a true likeness, the original might have been worshipped, without any imputation of idolatory, as there could have been nothing like her in the heavens above or in the earth beneath, for she must have been fearfully and wonderfully made. I have merely referred to the above for the purpose of showing how extremely cautious one

should be in accepting second-hand information without verification.

The worked flints at Powell's Bay, like those met with at similar places lower down the lake, have been derived from the Trenton formation at the Chaudière. They are strewn along the river side of a long narrow rocky and sandy point that reaches down the river and shelters the mouth of a low marshy creek, which runs into the bay. This point, which is of Laurentian formation, is still a resort for trappers and fishermen.

The north shore of the Ottawa, at the entrance to Squaw Bay, is a bold outcrop of limestone which rises 15 or 20 feet perpendicularly from, and in places overhangs, the swift current of the river, a short distance below the Little Chaudière Rapids. The bay, which forms an indentation in this cliff of about 100 yards in width, extends northward, a distance of 800 feet, to the southern end of Mountain street, or the foot of the declivity which slopes downward from the Hull Electric Railway tracks. The banks of both sides of the bay are bold and rocky, but not so abrupt as the main shore-line of the river. From the upper end of the bay right out to the rocky point which forms its southern extremity, the western shore is strewn more or less, throughout its entire length, with fragments of worked flint, just as we meet with them at similar places on Lake Deschênes higher up the river.

So far, I have only made a casual examination of this camping site, for the purpose of ascertaining its extent and general features, rather than for the discovery of such details as might throw some light upon its origin and subsequent history.

To all appearance, it seems as if this spot had been a landing place at the foot of an old Indian carrying-path, which led up to the head of that break in the canoe route of the Ottawa River caused by theLittle Chaudière Rapids.

There is no doubt that, in pre-historic times, there were periods of tribal inactivity, during which an Indian community may have lived in such peace and comparative security, at Squaw Bay, as to have led even its younger members to indulge in the contemplation of making old bones; but the situation of the dwelling sites of these palæolithic people bear indubitable evidence that no dream of lasting peace ever found them off their guard

against possible contingencies, for these makers of flint arrow-heads and stone axes were, as the Pathfinder would call it, "judgmatical" in the selection of their camping grounds.

Occupying a strategic position, between the upper and lower portages of the north shore of the Ottawa, this rocky and well wooded inlet possessed exceptional facilities for the formation of an ambuscade, that would not fail to be taken advantage of under the conditions of primitive warfare.

Standing amidst the debris of this pre-historic Indian workshop, one cannot fail to be carried back, in imagination, to a time, when this intricate system of islands and channels, rapids and falls was clothed in the sombre garments of the primæval forest. One pictures to himself the peaceful condition of this northern wilderness ere the once powerful Algonkin-Huron combination, that claimed sovereignty over it, had dwindled into insignificence before the superior military and diplomatic genius of the five confederated nations to the south of the great lakes; ere the Algonkin name, which once carried terror to the council fires of its enemies, had become a term of contempt, through that lack of military organization which led to the downfall and final dispersion of that nation.

One sees a dense cloud of spray hovering over the spot where the downward sweeping waters take their final plunge into the lower river, with a green tree-clad eminence in the background, and is reminded that this place was known to the Mohawks as "Tsitkanajoh," or the "floating kettle; while the Onondagas called it "Katsidagwehniyoh," or the chief "Council Fire."* So that either of these names may have been a shibboleth on the Ottawa during the closing acts in that tragedy of the middle of the 17th century, which resulted in the wiping out of the once dominant Algonkin-Huron confederacy.

But, by the subtle magic of these names, the retrospective scene is changed and the inner circle of the council fire of this ancient camping ground is occupied by the grim war chiefs of the Iroquois. For this wonderful race of sagacious warriors, in conformity with a well planned and far reaching scheme of conquest, has sent war-parties to secure among other places the passes of the Chaudière and intercept the Huron traffic with the French

*See Ontario Archæological Report of 1898.

settlements on the St. Lawrence, whilst the main force of the confederacy is directed against their tribal strongholds in what is now western Ontario.

In imagination, this romantic and picturesque spot is transformed into a cleverly constructed ambush. Wary sentinels posted at the upper end of the portage pass the word that the enemy is approaching from the upper reaches of the river and is about to run the rapids. The council is broken up, the canoes are manned and with ready musket and uplifted paddle the warriors await the signal of attack. Once within the rift of the Little Chaudière and all retreat, for the luckless Huron or Algonkin is out of the question. Retreat up the river is hopeless, for the foot of the portage is held by the enemy. Escape by the lower portage is equally futile, for the same implacable foe will intercept them before they can reach it, or overtake them before they can pass it. The attack is delivered with the usual results, and the Iroquois return to their concealment laden with the spoils of war, with scalps and prisoners.

Now the manufacturer of yellow literature would like to describe the torture and death of these prisoners at the hands of their captors; but we know that the Iroquois were not always given to vengeance and that they adopted large numbers of Hurons that were thus taken in battle.

Mr. William E. Connelly, in his excellent papers on "The Wyandots," in the Ontario Archæological Report of 1899, in writing of "the oldest branch of the Iroquoian family," informs us that the clan system in the Five nations was the feature of real strength. He goes on to say that: "The clan system was responsible for much of the fierce warfare made by one tribe upon another. It was a religious duty to keep the clan full, *i.e.* every name in the clan list of proper names. No name was allowed in ancient times to become wholly obsolete. The animal from which the clan claimed descent was always angry when these names were not in use, for they were not in his honor. To suffer a clan to become extinct was a reproach to the nation or tribe. It was followed by dire calamity. This both the old Wyandots and Senecas have often told me. War was often undertaken to replenish the depleted ranks of a decaying clan. White men were eagerly adopted and to such an extent had this practice been carried by the Wyandots that after the year 1820 there was not a full blood Wyandot alive. Few women and girls were slain in battle or tortured as prisoners even in ancient times. They were adopted into the different clans of the tribe."

"The Wyandots claim that as late as 1800 at least, the Wyandots and Cherokees made war upon each other for the sole purpose of obtaining women and children for adoption."

PLATE X.

Figure 1—Side view of crystalline limestone pipe, ½ diameter, with perforation at base of bowl, from Pointe à la Bataille, Lake Deschênes, Torbolton township, Ont. Collector, Narcisse Noël, Aylmer, Que.

,, 1*a*.—Front view of Fig 1, showing stem-hole and ends of perforation at base of bowl.

,, 1*b*.—Section of Fig. 1. Shaded portion shows stem-hole and tobacco cavity.

,, 1*c*.—Top view of Fig. 1.

,, 2.—Flint arrow-head, ¾ diameter, from Ottawa River, Bryson, Que. Collector, E. J. Leroy, Bryson, Que.

,, 3.—Flint arrow-head, ¾ diameter, of foreign make, from Raymond's Point, Ont.

,, 4.—Flint arrow-head, natural size, from Paris, Ont. Collector, Harold Nelson, Ottawa.

,, 5.—Flint arrow-head, natural size, from Raymond's Point, Lake Deschênes, Ont. This point and Fig. 4 so closely resemble each other in size, shape and the peculiarly streaked flint from which they are fabricated that it is difficult to distinguish them apart.

,, 6.—Black flint arrow-head, natural size, from Raymond's Point, Lake Deschênes, Ont.

,, 7.—Dark stone celt, ½ diameter, from beach in front of Hotel Victoria, Lake Deschênes, Aylmer, Que.

,, 8.—Buff-coloured flint arrow-head, natural size, from Pointe aux Pins (Queen's Park), Lake Deschênes. A recent fraction at the tip reveals a rind or crust which encloses a lighter-coloured interior.

,, 8—Dark slate knife, ½ diameter, from farm of Mr. John Armstrong, March township, Carleton Co., Ont. Collector, Geo. Burland, Ottawa.

,, 9.—Cross section of Fig. 9.

NOTES ON THE WINTER BIRDS OF THE CARIBOO DISTRICT, B.C.

By ALLAN BROOKS.

I spent the winter of 1900-01 in the western portion of the Cariboo district, and as I was in the field the whole season, I had ample opportunities to note the birds of both the Upper Fraser river valley and the more heavily timbered mountains to the eastward.

The whole district, both in fauna and flora shows a decided infusion of the Hudsonian element, but this is less marked in the case of the winter birds than in the summer residents and the spring and fall migrants, many of which do not occur to the southward, except perhaps as stragglers. Such species as Bartram's Sandpiper, Tennessee, Black poll and Magnolia Warblers, and *Empidonax alnorum* probably migrate east through the Yellowhead pass and down the Mississippi valley.

Many of the mammals found in the district are identical with, or closely allied to those found east of the Rockies, for instance *Arctomys monax* and *Microsorex hoyi*.

The southern range of the Moose in British Columbia will approximately define the limit of the Hudsonian element.

The season was a very poor one for winter birds. Redpolls and Snowflakes, which are very abundant as a rule, were comparatively scarce, and Hawks and Owls were almost entirely absent. The northern portion of Ontario—Algoma district—will approximate very closely to western Cariboo both in climate and physical features.

299. *Dendragapus franklini*. Franklin's Grouse.

Abundant in suitable localities. To the northward it will probably intergrade with the Canada Grouse, as many of the specimens secured showed a decided infusion of *Canadensis* blood, the tail often being narrowly tipped with fulvous or white.

300*b*. *Bonasa umbellus umbelloides*. Gray Ruffed Grouse.

Most of the Ruffed Grouse could be referred to this form, but some specimens were closer to typical *umbellus* or to *togata*.

304. *Lagopus leucurus*. White-tailed Ptarmigan.

Only occurs at high altitudes. The only species of Ptarmigan observed.

308. *Pediœcetes phasianellus*. Sharp-tailed Grouse.

The form occurring at Quesnelle is apparently the typical northern species.

Richardson's Grouse occurs in the district both along the Fraser river and at timber line in the high mountains, but not in the intervening country, and was not observed during the winter.

334. *Accipiter atricapillus*. American Goshawk.

The only hawk observed during the winter months.

352. *Haliaëtus leucocephalus.* Bald Eagle.

349. *Aquila chrysaëtos.* Golden Eagle.

Both eagles occur sparingly.

371. *Nyctale richardsoni.* Richardson's Owl.

372. *Nyctale acadica.* Sawwhet Owl.

366. *Asio wilsonianus.* American Long-eared Owl.

367. *Asio accipitrinus.* Short-eared Owl.

With the probable exception of the last these are resident throughout the winter.

375. *Bubo virginianus.* Great Horned Owl.

375*a*. *Bubo v. subarcticus.* Western Horned Owl.

375*c*. *Bubo v. saturatus.* Dusky Horned Owl.

All three forms occur and intergrade.

376. *Nyctea nyctea.* Snowy Owl.

Several mounted specimens seen. I also heard of the Great Gray Owl being shot near Parkerville.

393*a*. *Dryobates villosus leucomelas.* Northern Hairy Woodpecker.

Tolerably common.

400. *Picoides arcticus.* Arctic three-toed Woodpecker.

Scarce throughout the winter; the greater number seemed to migrate southwards.

This should be the western form lately described by Mr. Bangs, but specimens taken seemed to correspond in measurements with the typical form.

401 *Picoides americanus.* American three-toed Woodpecker.

Much commoner than the last. Both species are among the hardest of birds to collect; they are shy and retiring, especially the last species, and when shot almost invariably remain clinging to the tree by their powerful claws, even if they fall they generally manage to catch on to a small twig or festoon of moss and remain suspended by one or both feet long after death. I shot a male of the Arctic species as it clung to a small stump; though killed quite dead it did not drop. On examination I found the feet were five inches apart and the tail firmly braced. The head and body falling backwards had brought considerable pressure on the tail. It required considerable force to detach the bird.

405. *Hylotomus pileatus.* Pileated Woodpecker.

Scarce. This is probably the northern limit of its range.

475. *Pica hudsonica.* American Magpie.

Tolerably common.

486*a*. *Corvus principalis.* Northern Raven

Common. The first crows were observed early in March.

478. *Cyanocitta stelleri anectens.* Black-headed Jay.

Common.

484*a*. *Perisoreus canadensis capitalis.* Rocky Mountain Jay.

Abundant. All my efforts to find the nest failed From dissection of a number caught in Marten traps I came to the conclusion that not 20 per cent. were breeding birds, and that the eggs were laid about 25th March.

515*b*. *Pinicola enucleator alascensis.* Alaskan Pine Grosbeak.

Common.

521. *Loxia curvirostra minor.* American Crossbill.

522. *Loxia leucoptera.* White Winged Crossbill.

The latter the most abundant. Both species seemed to migrate from the district before the close of the winter. Both were common during summer of 1900.

524*a*. *Leucosticte tephrocotis littoralis.* Hepburn's Leucosticte.

Typical examples taken during the winter. The form that breeds in the high mountains near Barkerville is typical *tephrocotis.*

527*a*. *Acanthis exilipes.* Hoary Redpoll.

528. *Acanthis linaria.* Mealy Redpoll.

I carefully examined all flocks of Redpolls seen and only secured one specimen that showed any approach to *exilipes.* During former winters Mr. Sidney Williams has taken several fairly typical *exilipes* at Quesnelle. I did not observe the Pine Siskin during the winter months.

534. *Plectrophenax nivalis.* Snowflake.

701. *Cinclus mexicanus.* American Dipper.

Found in the neighbourhood of open water throughout the winter.

726*b*. *Certhia a. montanus.* Rocky Mountain Creeper.

Tolerably common throughout the winter.

728. *Sitta canadensis.* Red-breasted Nuthatch.

Less common than the last.

735*a*. *Parus a. septentrionalis.* Long-tailed Chickadee.

Common.

738. *Parus gambeli.* Mountain Chickadee.

Occasionally observed at Quesnelle.

740*b*. *Parus hudsonius columbianus.* Columbian Chickadee.

Abundant in the heavy spruce timber and on high elevations.

748*a*. *Regulus satrapa olivaceus.* Western Kinglet.

A few of these delicate little birds remained throughout the coldest weather.

The birds enumerated in the foregoing list were all actual winter residents with the possible exception of the Short-eared Owl. Bohemian Waxwings were observed in large flocks during the late fall and again early in March. A single Butcher bird was also noticed in February, probably only accidental, as no others were seen between October and March. Winter Wrens *(pacificus)* remained until the end of October and returned 6th April. The first Robin was seen on the 6th March, but no more were observed for some time, but as I went into the heavily timbered region to the northeast of Quesnelle about that date I had not much chance to observe the migration of the spring birds, which did not begin to show up there till well on in April, the Winter Wren on the 6th being followed by a considerable influx of migratory Goldcrests and Tree Creepers. First Geese *(canadensis)* were seen on 9th April, Snowfinches *(Juncos)* and a Pigmy Owl were seen on the same date, though the latter (the Californian form) might have remained all winter and been overlooked. A considerable number of Robins, Arctic Bluebirds and Red-shafted Flickers were seen on the 12th, and first Varied Thrushes on the 17th. The big rush of spring arrivals came in after the 20th April, when the winter had fairly broken up.

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SOME OF THE BIRDS OF ALGOMA.

(Read before the Ornithological section of the Entomological Society of Ontario.)

By C. T. SCOTT, Aylmer, Ont.

We were a party of four who had planned to spend our summer vacation in the wilderness of Algoma. We took boat at Collingwood for Killarney, and during this twenty-four hour trip, not the least of our pleasure was in watching the gulls which sailed around the boat with an air of proprietorship. When doing justice to the excellent *menu* of the boat, we did not forget these birds, but invariably carried off some tid-bits to make sport for them. When a morsel was dropped into the water, the nearest gull turned in a short but graceful curve until he stood just tip-toe on the waves, deftly picked up the food, then rising would almost regain his place at the head of the flock. When the birds were close together there would be a race for the food, and some of them would drop with a hovering movement of the wings striking the water with a splash in their eagerness to be first. But never could we deceive them. They could distinguish a chip or a piece of paper at the highest altitude. Occasionally some noisy one would straighten out his neck, open a capacious mouth, and utter a cry decidedly irritating to the nerves. One gull, of dark gray colour—so dark as to look black when at a distance—seemed particularly anxious to exhibit his musical talents. At nightfall they dropped behind resting upon the water, but they were following us again in the morning with the earliest streaks of day.

When at Killarney we learned why the Ontario Government have imposed a fine of $20 upon anyone convicted of killing a gull. Along the shores of Georgian Bay the fishermen are prohibited from throwing refuse into the water. All the offal left from a "clean-up" of the fish is dumped into barrels placed along the shore, where it is speedily devoured by the numerous gulls and the almost equally numerous ravens, which are ready to dispute title to the dainty feast. These two birds form the natural scavengers to this region, and doubtless are to be credited with helping to preserve the splendid fisheries around Georgian Bay.

We stayed just long enough at Killarney to change travelling for camping suits, to rent a large birch bark canoe, and to engage a small steam launch to tow us, with our impedimenta, five miles out into a cove on the northwest shore of Killarney bay. Here we pitched our tent on a portage path leading back to an inland marsh, and prepared to spend our first night in this pleasing solitude. Whist! What was that? A wild duck! But our guns were not at hand, so we couldn't determine the variety. As we lay around the camp-fire that night, our voices subdued almost to a whisper by the impressive silence of the forest, suddenly a shrill, weird cry just above our heads nearly froze the blood in our veins. It was the cry of a loon coming into our cove, but we scarcely knew how to interpret it. Was it a laugh or a wail? We debated the question, and concluded that much depended on the mood of the listener. More loons passing over our camp wakened us in the morning. After breakfast, and the more difficult task of dish washing, we strolled over the trail into wooded gullies and up ascending terraces of quartzite rock. Who knocked just then? We looked in the direction, when lo! I caught my first glimpse of the pileated woodpecker. It was but a moment, then came a flash of red and black in the sunlight, and he was gone. We followed in his direction, but our pursuit was in vain. We tramped all forenoon, but one or two golden-winged woodpeckers, conscious of intruders, were the only other feathery friends we chanced to meet.

Whilst trolling down the bay in the afternoon a wild-duck passed us again. This time we felt sure it was a wood-duck, and

we concluded it might have a family somewhere in the vicinity. We forgot all about the duck until some hours after when, passing an inlet, we saw something moving in the reeds. Through the field glass we distingeished them as a whole family of young duck. Thinking to approach them by guile we passed the inlet, landed farther up on the shore, and stealing over the rocks, careful to step only on the moss so our approach could not be heard, we sought a closer vision No duckling was in sight. We afterwards entered the inlet and searched for some trace of our game, but again the birds proved themselves too wary for men. Paddling up the cove to our camping ground a solitary kingfisher passed us uttering his rubber doll squeak.

The second day we paddled up the bay for two miles in search of a portage that would take us into a chain of lakes which lay north of the mountain range. Several wild ducks passed us, but flying too high for identification. The only portage we crossed was one that led up precipices so steep as to preclude the possibility of carrying the large canoe across. Climbing this path we were suddenly halted by a covey of partridge who with ruffled neck feathers seemed to ask us to get out of their way. They finally concluded to give us the road and moved aside with no more fear than so many chickens. It was in climbing this elevation that we noted the singular absence of small birds through this region. No other birds met our eye until we were pushing off our canoe to return to Killarney, when we disturbed a small sandpiper who evidently felt he was the sole possessor of this long-stretching beach.

The next morning, having exchanged our one large canoe for two smaller ones, we paddled out on a heavily rolling sea to cross four miles of Georgian Bay into the entrance of Collins' Inlet. After three hours paddling we made the lee of the first island where we landed to caulk our canoes and dry our water-soaked cargoes. This island known as One Tree Island, proved a perfect rendezvous of the gulls, who protested against our lighting a camp fire. The castings of the birds showed that they frequently lunched on the blue-berries, with which these rocks abound. We cooked our supper five miles up the inlet, and whilst gathering some blue-

berries a couple of chickadees took an interest in our work, and a hairy woodpecker rapped out his compliments from some neighboring trees. We proceeded up the Inlet by moonlight. The almost oppressive silence hushed our conversation, and only the swish of our paddles woke the echoes of the nearly perpendicular walls which closed us in. Once some heavy animal, probably a deer, broke the branches in the dark forest of the right bank; again we saw a porcupine move up from the waters' edge from the left, but for hours these were the only sounds that broke the stillness. Just as we were looking about for a landing place, two whip-poor-wills on opposite sides of the inlet struck up a cheery duet. This music brought us back to the world of reality. We landed, made camp, and not even the droning of the mosquitoes could rob us of the pleasure of this midnight litany from the whip-poor-wills.

We rested Sunday, and on Monday portaged past Collin's Mills, paddled up the Mahzenazing River, and by dinner time had had put the last habitation ten miles behind us. Whilst eating our lunch at a dam, made to raise the water in the river for logging purposes, we enjoyed the company of about a score of cedar waxwings. Up the river we went, finding that this six-foot dam had made miles of marsh, and "drowned" land. Nothing could be more desolate than this marshy stream bordered everywhere by dead trees holding their bare arms rebelliously towards heaven. Repeatedly a large crane got up in front of us and moved lazily on in advance. Black ducks, singly or in pairs, would start up at our approach and quack the announcement of others hidden in the reeds. Once a bittern, startled by the noise of our gun, flew away southward as though determined to leave the region forever now that man had invaded the solitude. We reached the shore of Johnny Lake at midnight, tired, thirsty and wet, for the rain had commenced to fall. To add to our discomfort the little clearing where we were trying to get some wet wood to burn, was literally choked with mosquitoes. No wonder the garrulous chatter of a flock of crow black-birds roused our wickedness. We resolved on a black-bird pie. They must have suspected our intentions, for we never got within gun range.

From this point on for several days we had uniform experience of travel through lakes and portages, full of interest as a canoe trip, but almost void of ornithological specimens. An occasional duck on the lakes, with partridge and golden-wings on the portages composed our whole experience with the feathery tribe. Once when two of us got lost in the forest and had spent the greater portion of the day without food, we counted it a providential thing that we stumbled on a little lake where two small saw-bills were sailing around. We killed one and wounded the other, but failed to reach the wounded one. When we got back to camp at eventide, nearly exhausted, a loon was laughing at us from across the bay.

Passing out of Lake Panache on Saturday—a large lake beautifully indented with promontories and sprinkled with islands —we entered a marshy lake known as Lake Levasse. Here ducks were abundant. A coot gave us so much trouble in identifying him, that we didn't stop to classify any other specimen. Besides, there seemed to be so many miles of this lake, and it was so overgrown with rushes that it became difficult to find the channel and we must get through before dark. Pushing on, we entered a a picturesque river which brought us, after an hour's paddling to the falls of Round Lake. Here a few cedar wax-wings that had not yet gone to roost watched us pitch our tent and prepare for another Sunday's rest.

Sunday morning found a gale blowing from the east, and there, riding majestically above us, was a beautiful fish-hawk. That day whilst sauntering over rocks and tracing the boundaries of a great diorite upheaval, we disturbed a pair of hairy woodpeckers. But what was that larger woodpecker beyond? The field-glass showed us that he had a bright orange-yellow crown and black back. To us this arctic woodpecker was such a novelty that we thought of collecting him. But then it was Sunday, and we had no fire-arm with us but a 44 calibre rifle. We concluded that to kill and skin a bird with one shot was too delicate an operation, so we only aimed our field-glass until he went dipping away into the depths of the forest.

Two days more and we reached the C. P. R. line. We put our canoes on the train sending them east to Wahnapitae station, whilst we got off at Sudbury to visit the mines. Here the ubiquitous English sparrow had followed the settlers in great numbers. The surrounding country, made almost as barren as Gehenna by sulphur fumes from the mines, seemed all the more desolate by being infested with great flocks of the common crow.

At Wahnipitae station, where we rested for a day, my attention was arrested by great numbers of the barn swallow. At times they seemed to fairly cover the telegraph lines for the distance of six or seven posts. Here, too, we saw the only attempt at farming we had met in our journey. Between two great granite ridges one man had brought about forty acres of land under cultivation. Yet such familiar birds as the robin and bluebird did not come under our observation even here. Though personally not in a fit condition for observation during this day's rest, owing to sudden illness, none of the party noted any representatives of the warbler or sparrow families. In the twilight, as I lay on my back with my face to the sky, I saw the swallows gradually withdraw and an occasional night-hawk skim through the gathering shades. Now and then the whirr of a duck passing up the river made a pause in the supper preparations, but soon the stars came out and camp-fire stories took the place of Nature's quiet delights.

We had left ourselves but three days and a Sunday rest to cover the sixty miles which lay between us and French River port on Georgian Bay. Passing down this river with its varying panorama, its sudden turns enabling us to startle deer and moose, we found only monotony in the study of ornithology. Ducks, more ducks, and ducks again, at every bend of the river. Amongst these we identified the larger saw-bill, grey duck and blue-winged teal as well as black duck in abundance. These black ducks seemed to prefer a diet of snails, for each one we opened had a number of snail shells in his crop. Whilst examining one, some twenty miles down the river, our attention was drawn upward by a passing shadow. There was a bald-headed eagle sailing leisurely past. About dusk on Saturday evening a large bird crossed the river silently in front of us. We paddled

close to the shore to get a better look. As he sat on a tree far above us he looked like a snowy owl, so we thought we would put the matter beyond dispute by "collecting" him. The gun made a noisy report, but a few feathers scattered in the wind were not enough to confirm our identification.

Sunday whilst resting near an interesting waterfall on the river I saw two flycatchers plying their calling. A dull haze made accurate observation impossible, from size and form I judged them to be olive sided flycatchers. Here the sense of my ignorance made me dejected. Whether from this cause, or the exciting rapids we had to run, or the exhausting portages we had to make, I found no other bird I could enter on my list for the districts of Algoma and Nipissing.

When we turned into the middle channel of French River we were in the land of the loon and the gull once more. Crossing our last portage just before entering French River village a whole covey of partridges stood on the tramway chuckling defiance at our attempts to "Shoo!" them into flight. About midnight we stepped aboard the "Atlantic" with tickets for Killarney port, but we were such doubtful looking "birds" ourselves that the steward hesitated about giving us respectable berths.

ENTOMOLOGICAL NOTE.

PIERIS PROTODICE. While walking along the "perennial border" in the botanical garden at the Experimental Farm at Ottawa on September the 21st last, I was surprised to see a fine specimen of the Checkered White butterfly (*Pieris protodice*, Bdv.) I had not a net with me but was lucky enough to catch it in my hands. It is a fine female and this is the first time the species has ever been taken at Ottawa or as far as I know so far East in Ontario by a hundred miles. The caterpillar, like those of most of the white butterflies feeds on the various cruciferous plants including occasionally the cultivated cabbage.

J. FLETCHER.

RATTLESNAKES AND SCORPIONS.

During a recent trip in the interior of British Columbia I fell in with an old acquaintance, Mr. E. Bullock-Webster, from Keremeeos, on the Similkameen River, near the southern boundary of the province, on the mainland. This part of the country seems to be a continuation of the desert regions which extend through the adjoining States and California down to Mexico ; the theory being borne out by the existence of some of the plants and reptiles peculiar to those regions, for instance, *Purshia tridentata* as well as various members of the *Artemisia* family, burrowing owls, horned toads, rattlesnakes, scorpions, &c.

Being aware of the existence of scorpions in the hot rocky hills in the vicinity of his ranch, having seen one from there in captivity some years ago at New Westminster which had been kept in a glass jar with only some gravel, and without food or water for several months, I asked my friend if he could obtain a specimen for me. He promised he would do so when opportunity offered ; but the season, he said, was past for obtaining them to the best advantage. He then explained that during the dormant season the scorpions shared the dens of rattlesnakes, *Crotalus lucifer* (Baird and Girard) and in the spring time when the sun began to attain some power, the snakes come out to the mouths of their dens, in horrid coiling masses, the scorpions running over them on apparently quite friendly terms. Mr. Webster described several of these dens in the rocky defiles of the mountains of Similkameen very graphically.

One, which from accounts received from Indians, seems to be the headquarters of all the rattlesnakes, is situated in an ideal inferno, a weird defile that would have appealed to the imagination of Doré. It appears that the Indians from superstitious motives do not kill snakes, and from the same motives do not go near their dens. Mr. Webster, however, induced an old Indian to conduct him to the spot, which he did, but would not go nearer than about two hundred yards. Mr. Webster entered the horrid place alone. He says it is indescribably weird, the entrance of the den proper being partly stopped up with bunch-grass, apparently carried there by the snakes, presumably for protection against cold. It

was too late in the season, however, the snakes having all left for summer quarters, and all that was to be seen were some skins that had been shed and a dead snake, probably an interloper, which had apparently been killed by the others. Mr. Webster expressed the belief that the snakes belonged to different communities, and that an individual who attempted to force its company on a community to which it did not belong, suffered the penalty of death at the fangs of the members of the invaded colony.

The bull snake (so-called), *Pityophis catenifer*, a harmless variety, is described as being a deadly enemy of the rattlesnake, which the former devours whole. The bull snake is therefore carefully preserved. Mr. Webster says that since the advent of miners and settlers the number of rattlesnakes has sensibly decreased.

A curious account of a snake fight was described by Mr. Webster, the witness being a Mr. Richter, a man well known to him, and of whose veracity he can vouch. It appears that during a cattle hunt Mr. Richter, feeling tired, dismounted, and fell asleep, but was awakened by a rustling noise in the grass near him. He raised himself carefully and saw a bull snake holding on to a garter snake, a species of *Eutænia*, by the head. The latter was making frantic efforts to get away by winding itself about the body of the larger snake, nearly succeeding several times, when the bull snake loosened his hold in the attempt to get the smaller snake "end on," so as to begin the swallowing operation. At length the bull snake, apparently tired of this way of trying to capture its prey, reared itself on its head and began twirling itself violently with a spiral motion. This continued for about a minute, after which the garter snake seemed quite paralyzed, and the bull snake proceeded to swallow him at his leisure.

J. R. ANDERSON.

Victoria, B.C., 1901.

BOTANICAL NOTES.

ACER DASYCARPUM.—I have for seven years kept a careful note of the time of blooming of a healthy tree of the Silver Maple (*Acer dasycarpum*) which stands on the north side of James street, Ottawa, in front of my house. Thinking that these dates might be of interest to others as well as myself, I send them to THE OTTAWA NATURALIST. On the following dates the tree was fairly well covered with blossoms :

1895—April 18th.
1896— " 16th.
1897— " 11th. First flowers April 8th.
1898— " 2nd.
1899— " 20th.
1900— " 15th.
1901— " 15th.

W. J. WILSON.

A NEW MEADOW-RUE.—Mr. M. L. Fernald examined the Geological Survey specimens of *Thalictrum* a few months ago and among them found a new species which he has named *T. confine*, and described and figured in *Rhodora* for Dec. 1900. It was collected by Prof. Macoun in thickets at Hemlock Lake near Ottawa, in flower Aug. 8th, 1894. Fruiting specimens of this species were collected by Mr. Fernald in Sept., 1900, in Maine. *T. occidentale* has also been found to be common in the Maritime provinces, and it is not unlikely that it too will be found at Ottawa where *T. dioicum* and *T. polygamum* are common. The meadow-rues should always be collected in fruit.

AGRIMONY.—The two species of Agrimony, *A. hirsuta* and *A. Brittoniana* should both be found in the Ottawa district though only the former species is represented in the herbarium of the Geological Survey. *A. hirsuta* has short, turbinate fruit, the dilated marginal rim of the convex disk bearing numerous reflexed spreading hairs ; in *A. Brittoniana* the disk is flat or concave, the bristles short, crowded, inflexed and connivent over the sepals, the fruit is long-turbinate. In the former species the leaves are thin with the margins and nerves beneath ciliate, in the latter species the leaves are thickish, rugose and softly pubescent beneath, the margins finely scabrous-ciliolate.

J. M. M.

REVIEWS.

CATALOGUE OF THE MARINE INVERTEBRATA OF EASTERN CANADA. By J. W. Whiteaves, LL.D., F.G.S., F.R.S.C. Geological Survey of Canada, pp. 271. 1900.

The publication of this catalogue will be hailed with genuine delight by zoologists the world over, and especially by marine biologists on this continent. Dr. Robert Bell, the eminent head of the Geological Survey, in his introductory note, modestly expresses the hope that it may stimulate to renewed activity Canadian naturalists, who have taken up marine researches, and he very appropriately refers to the opportuneness of the appearance of this catalogue soon after a Marine Biological Station has commenced its work on our Atlantic shores.

Dr. Whiteaves would be the first to disclaim for this catalogue its title to be considered a *magnum opus*, yet such it is, and as such it will be regarded by American naturalists in the future. Hitherto reliance had to be placed on scattered and fragmentary lists and notices by Canadian workers, or to the memoirs and catalogues published in the United States, and protessedly dealing less with Canadian than with United States' local faunas. Now we have a faunistic list of our own so far as marine invertebrates are concerned. Two features at once strike the appreciative reader on perusing this catalogue,—first, the extensive geographical area it covers, and the large amount of material it embraces (the species enumerated being over a thousand in number) and second, the care and accuracy revealed on every page of the publication. This latter characteristic the scientific world has long recognised in all Dr. Whiteaves' work and any one familiar with the reports, now somewhat venerable for they date back thirty years, in which Dr. Whiteaves summarised the results of his dredging expeditions in the estuary and Gulf of St. Lawrence, the Bay of Chaleurs, and the Bradelle and Orphan banks as well as parts of the coast of Cape Breton and Prince Edward Island during the years 1871, 1872 and 1873, which reports were published by the Department of Marine and Fisheries, will experience no surprise at the extent of the coastal waters covered by Dr. Whiteaves in the present catalogue. What an infinite amount of labour is represented by

the 271 pages of this work only those who have attempted faunistic lists can realise. True, it is largely drudgery: but it is pioneer work without which no future progress is possible. That a large proportion of the species of Sponges, Echinoderms, Worms, Hydroids, Mollusks, Crustaceans, Ascidians, etc., have passed through the author's own hands—a considerable proportion dredged by himself, is clear from the references: but in the preparation of so ambitious a list as that covering the invertebrate fauna of our Atlantic coast, reliance has also been placed upon the reports published by various United States workers, and many of the determinations of these workers are already undergoing revision. It seems, for instance, hardly credible that our Atlantic waters can boast at least nine distinct species of *Spirorbis*, the sedentary, almost ectoparasitic, habits of this Polychæte, when adult, favouring variations in the form and physical characteristics of its coiled tube, which may not justify the creation of so many species. As Verrill has pertinently remarked, and Dr. Whiteaves quotes the observation on p. 68, "The animals of the various species of *Spirorbis* are still very imperfectly known, and many species have been described from the tubes alone. Accurate descriptions or figures of the animals are necessary before the species can be determined satisfactorily." The Marine Biological Station founded in 1898 by the Dominion Government, freely opening its doors to all qualified scientific workers in the Dominion, will no doubt render substantial aid in confirming or in correcting current diagnoses of such species, a station of this character facilitating the study of the animals in a living or, at least, in a fresh condition, and providing the needed facilities for the accurate determination of species. It is revealing no secret to say that several marine invertebrates and vertebrates secured by the staff of the Canadian Station at St. Andrews, N.B., in 1899 and 1890, and at Canso in 1901, are not referable to any recognized Canadian species, and will of necessity be announced as additions to our marine fauna. A *Priapulus* dredged at Canso last August did not appear to resemble any known Canadian species.* But while such additions

* Dr. Whiteaves appears to be in doubt as to the identity of the specimens he secured in adjacent N. S. waters, and places a query after *Priapulus caudatus*. Lmk. (p. 89).

are to be expected for some years to come, there is every probability that many lengthy lists of species will be cut down, when the life-history of the young, and the anatomy and morphology of the adult stages, of many species have been studied in detail by Canadian zoologists.

The following enumeration gives a tabulated summary of the species set forth in Dr. Whiteaves list :

		No. of species.
PROTOZOA.		
Foraminifera,	63 species	
Radiolaria,	1	
		64
SPONGES.		
36 (exclusive of 2 Hudson Bay species.)		36
CŒLENTERATA.		
Hydromedusæ,	66 species	
Scyphomedusæ	5	
Anthozoa,	44	
Ctenophora	4	
		119
ECHINODERMATA.		
Crinoidea,	3 species	
Holothurioidea	15	
Asteroidea	29	
Ophiuroidea	21	
Echinoidea	3	
		71
MARINE WORMS.		
PLATYHELMINTHES		4
NEMERTEA		21
CHÆTOPODA		106
GEPHYREA		7
BRACHIOPODA		428
POLYZOA		3
MOLLUSCA		115
Pelecypoda,	100 species	
Scaphopoda,	5	
Gasteropoda,	164	
Cephalopoda,	13	
		282
ARTHROPODA.		
Crustacea		198
ARACHNIDA		11
CHORDATA.		
Urochordata		27
		1064

Our Atlantic waters, it cannot be doubted, abound with animal life, indeed in some localities there is a plethora which is almost incredible. Those naturalists who were privileged to pursue researches in the new marine station at St. Andrews, during the two seasons when it was located there, were familiar with the spectacle which Dr. Whiteaves describes in a passage from Dr. Stimpson on p. 44. The large reddish or blackish purple sea-cucumbers, resembling the garden vegetable in shape, but soft, slimy and elastic to the touch, were so abundant that the dredge often came up heavy and packed tight with their plump and writhing bodies. Considerable areas in the waters of Passamaquoddy Bay are indeed black with the crowded assemblages of these curious Echinoderms. The delicacy so much coveted by the Chinese called "trepang" is really the dried and prepared bodies of these interesting animals. In our utilitarian age a catalogue such as this may even stir some enterprising business man to create a "trepang" industry on the Atlantic coast. Hyrtl it was who showed a visitor a stained section of a kidney under the microscope, and the visitor straightway designed an attractive wall-paper based on the stained histological section shown to him. Dr. Whiteaves need not be alarmed if, while his valuable catalogue is of infinite worth to his brother scientists, it prove also an incentive to a new fishery enterprise! In contrast with the large fleshy *Pentacta frondosa* is the small delicate and transparent *Pentacta minuta* of Verril, a species first distinguished as *Cucumaria minuta* by Otto Fabricius in 1780, but which there is every reason to believe, now, is the small immature stage of *P. frondosa*. Dr. Martin Duncan and Mr. Sladen suggested this, as Dr. Whiteaves mentions on page 44, and the numerous specimens examined alive at St. Andrews in 1899 and 1900 support the suggestion. The curious "Sea Orange," *Lophothuria Fabricii*, Duben and Koren, a congener of the sea-cucumbers, is recorded by Dr. Whiteaves as occurring all the way from Grand Manan to Temple Bay in Labrador. Its somewhat flattened shape, (not unlike a small shoe with the opening for the foot closed up) and covered with dense overlapping scales, renders it one of the most peculiar of littoral prizes; but it is strange

that the much more familiar *Psolus phantapus* is recorded only from Grand Manan, at 40 fathoms depth, and at Eastport and in the St. Lawrence estuary. Of the Sea Urchins, three Canadian species are here placed on record, while the Starfishes embrace eight species, Dr. Whiteaves rightly concurring in the view that the huge specimens of "Five fingers," measuring 12 or 15 inches across are simply over grown *Asterias vulgaris*, which usually measures 4 or 5 inches across. The six-rayed Starfishes, abounding below Rimouski, have been by many observers regarded as abnormal "five-fingers," but they are referable to *Asterias polaris* Müll and Trosch, and range from the Nova Scotia banks to Cape Chidley in Labrador. Of special interest are the three species of *Antedon* occurring in Nova Scotian and southern New Brunswick waters. Future dredgings may add to this list of species, as well as extend their Canadian distribution, though the Crinoidea belong to a past epoch, and of the 1500 species existing in Palæozoic times a meagre remnant now remains in our seas. Their stalks and ovate or globular bodies abound in the rocks upon which Ottawa stands and testify to their abundance in the old-time seas.

It is impossible in a short notice like the present to refer even in the briefest way to many of the suggestive thoughts aroused by a perusal of Dr. Whiteaves' catalogue. One point, however, may be referred to as possessing a very general interest. It bears directly on the fascinating problems of animal distribution. A great proportion of species named in this list are Unistoniam, to adopt the Dominion Statisticians' uncouth yet expressive adjective (as a substitute for the misused term American), or at any rate they are regarded as peculiar to this continent. Our lobster is *Homarus americanus* not the *H. vulgaris* M. Edw., of Europe, yet the differences would be difficult to define. Prof. Knight of Kingston found that a small cephalic gland present in our lobster is absent in Scottish specimens, and Prof. Herrick states that the European lobster's stages of larval development have been abbreviated, so that it is of larger size at a corresponding age than our species. Further study will show whether the differences are essential and specific, or unimportant and varietal merely. Certainly the common whelk of our shores though called *Buccinum undatum*, L., may

ultimately justify Reeves' name *B. labradorense*, for features shown in the egg-masses, and in early stages of development exhibit differences quite marked as compared with the British form. Dr. Whiteaves' comparison of living adult specimens, however, from both sides of the Atlantic showed them to be practically undistinguishable from each other. The ten species of *Buccinum* mentioned in this catalogue would well repay renewed study, especially if the study included the ova and the embryonic stages. Curiously enough the small Dog-whelk (*Purpura lapillus*, L.) arouses such question. Its adult stage as well as its characteristic vase-shaped egg cases are identical with those of the European form, nor does the periwinkle (*Litorina literea*, L.) stir up any doubts. Indeed its identity with the East-Atlantic form has been so long recognized that Nova Scotian naturalists have for more than a quarter of a century supported its non-indigenous character. Dr. Whiteaves (p. 173) seems inclined to favour the view that it has been introduced from Europe. If so its dispersion and its local abundance everywhere are most astonishing. There are few rocky spots on our Atlantic shore where the periwinkle does not occur in countless myriads. The allied species *Litorina rudis* (Maton) is recorded only for our more northern coast extending into Hudson Bay, but no doubt it will be yet found further south.

Just as so many of our mammals, birds and fishes correspond to but are not identical with European species—our moose differing from the European elk, though not extremely so ; our whitefish, sturgeon, pike and trout unlike, yet in many respects resembling, the corresponding species in Europe, and our eastern salmon being according to the authorities not distinguishable from the British salmon (*Salmo salar*, L.), so our invertebrate forms differ in so many respects yet may in some cases be essentially undistinguishable.

A recent remark by the famous British zoologist, Professor McIntosh, to whom Dr. Whiteaves was indebted for diagnosing the Annelids, emphasizes this point and shows how much our naturalists have to do before the determination of many zoological species can be regarded as final. Dr. McIntosh says : "The exact relationships of the American Phyllodocidæ to European forms have yet to

be more rigidly determined. Further, more accurate figures of the brist'es and other parts are required." In a recent paper in the "Annals of Natural History" (London, September, 1901) Prof. McIntosh publishes some notes on at least six species of marine worms procured by Dr. Whiteaves, and though the British authority is the most eminent expert in that group of invertebrates, and has diagnosed myriads of specimens from all parts of the world and established numberless new species, yet of these specimens of Canadian Phyllodocidæ only one species is in every detail identical with a European form, viz., the ubiquitous *Phyllodoce grœnlandica*, Œrsted," taken abundantly on Bradelle Bank and 15 miles southeast of Bonaventure Island. Other specimens closely resembled *P. laminosa*, Sav., and others again differed from both. Of three species of Eteone, one, *E. spetsbergensis*, Mgrn., was unquestionable, but two other species approached either *E. lentigera*, Mgrn., or *E. cinerea*, Webs. and Bened. An appropriate means of escape from the dilemma so often presented by Canadian species is to call them *Canadensis* or to do as Professor McIntosh did in the case of the graceful Polynoid worm, *Malmgrenia whiteavesii*, or as Professor Verrill did in naming a pretty shell *Cerithiella whiteavesii*, and a unique zoophyte *Actinopsis whiteavesii*.

The author in his prefatory remarks points out that most of the invertebrates were obtained on the floor of the sea or collected in littoral regions, hence such widely scattered species as the aberrant Chætognath *Sagitta* does not occur in the catalogue, though pelagic Ctenophores like *Pleurobrachia*, *Bolina* and *Idyia* are mentioned on the authority of certain United States observers, and the interesting occurrence of the lovely sea butterfly (*Clione limacina*, Phipps) is recorded near Belle Isle Straits on the authority of Dr. Deeks, other specimens being also referred to, from more northerly regions.

The usefulness of this catalogue, if it is permissible to make the suggestion, would be vastly increased by the addition of an index. An index would save time and would certainly facilitate reference to its pages by those not familiar with marine zoological nomenclature, and many such, it is to be hoped, will use this excellent work of reference.

Dr. Whiteaves in the early pages of his work adverts to the faunistic regions indicated by the distribution of species included in the catalogue. We know too little of the local disposition of the marine vertebrate and invertebrate life of our Atlantic waters to arrive at any satisfactory solution of this interesting problem as yet. The influence of the Gulf stream on the one hand, and of Arctic currents bearing their annual burden of icebergs, on the other, complicates the problem greatly. The occurrence of *Clio limacina* within the Gulf and the capture in the Gut of Canso of Scomberoids and other fish belonging to a southern range almost Mexican in its limits, sufficiently indicates the complexity of the conditions presented.

It is however the difficulty and complexity of the problems to be solved which stimulate scientific inquiry, and within the next decade more will he done in marine biological research in Canada than has been done for half a century. The scientists who will carry on valuable and luminous work and who will reveal to us more and more fully the marvels of life in our Canadian seas will have no basis so ample and trustworthy—none so indispensable as Dr. Whiteaves' Catalogue of the Marine Invertebrata of Eastern Canada. It is a work in Canadian Zoology worthy to mark the first year of a new century.

E. E. P.

A CHAPTER ON THE PLEISTOCENE GEOLOGY OF NORTHERN ASIA. RECENT GEOLOGICAL CHANGES IN NORTHERN AND CENTRAL ASIA. By G. Frederick Wright. Quart. Journ. Geol. Soc. London, Vol. 57, pp. 244-250. 1901.

This paper is the result of an examination of "those portions of the Asiatic continent which most nearly correspond in general superficial conditions to the glaciated portions of America." Prof. Wright has ascertained that the actual agency of wind in the deposition of the loess is evident throughout the mountainous track to the east of the border of the high plateau; further, that there were other areas of loess so large and so level that wind

would seem incompetent to produce them as the writer adds, "it seems therefore necessary," from the occurrence of strata of gravel and pebbles in the loess, "to invoke both wind and water, in order to fully explain the distribution of that formation." This loess, over Eastern China, Prof. Wright states was deposited "at a very recent geological date."

"*The period of the loess in China corresponds roughly with that of the continental glaciers in Europe and North America.*" No signs of glacial action were found in south-eastern Mongolia. The Amur River is compared with the St. Lawrence, which it resembles very much, besides being in nearly the same latitude. Prof. Wright concludes "that there was no general glaciation of the lower Amur Valley south of the 53rd parallel." The region about Lake Baikal was also examined. It is surrounded by mountains "rising from 3000 to 4000 feet above it, except at one narrow depression through which the Angara River carries off its surplus waters." Around Samarkand and west, evidence of a submergence was present. Lake Balkash, 1000 feet above sea, and the Sea of Aral have no outlets. The waters of the former are said to be nearly fresh, "those of the latter are only brackish." The saltness of the Caspian Sea is only one-third that of the ocean.

These and other associated phenomena observed furnish valuable data for the interpretation of the problems of post-Pliocene geological movements in that part of the world. At Nebizond on the Black Sea, Prof. Wright found direct evidence of the great continental submergence. Regarding the discovery of stone implements below the loess at a depth of 53 feet, the author remarks that "thus it appears that the continental submergence which aided in the wide distribution of the loess was subsequent to the appearance of man, and so another chapter is added to those which connect the ancient history of the human race with the more recent phases of the geological story." The author thinks it likely that "the depression of the land in Asia was coincident with the elevation in America."

H. M. AMI.

ON A NEW OSTRACODERM (*Euphanerops longævus*) FROM THE UPPER DEVONIAN OF SCAUMENAC BAY, PROVINCE OF QUEBEC, CANADA. By A. Smith Woodward. Annals and Mag. Nat. Hist., 7th Ser., Vol. V, No 29, pp. 416-419, pl. X, figs. 1, 1*a*, 1*b*, May, 1900.

This new Ostracoderm is based on an imperfect specimen in the Jex collection from the *Scaumenac* formation (Neo-Devonian) of Gaspé Peninsula, at present in the British Museum. Of the head, "a pair of small skeletal rings" appear to indicate orbits. Shagreen-like granules are seen within these supposed orbits. The abdominal region shows small, narrow and deep scales in straight rows, inclined forwards and downwards instead of backwards and downwards, as is usually the arrangement in fishes. There is also a suggestion of calcified neural spines of an endoskeletal axis. No traces of paired fins or supports are present. The caudal region is well preserved in side view and is covered with scales disposed as in abdominal region, scarcely overlapping, "invested with enamel and marked with a few antero—posteriorly—directed ridges and grooves." There is a small remote dorsal fin, low and triangular. This species is related to *Cephalaspis*, but is distinguished by absence of a continuous head-shield. It is the latest survivor known of the earliest type of Ostracoderm armour. It is the "first example of an Ostracoderm in which traces of the axial skeleton of the trunk have been detected. Dr. Woodward erects the family "Euphaneropidæ usually referred either to the Osteotraci or to the Anaspida."

H. M. A.

BUTTERCUPS.—The only typical specimens of *Ranunculus acris* in the herbarium of the Geological Survey are from Newfoundland and Greenland. The common Buttercup found in Canada is *R. Steveni* but it is doubtful whether this plant should rank as a species though it is so considered in Europe. In *R. acris* the leaf segments are linear; in *R. Steveni* they are broad. Both species may be common in Canada but among thirty sheets examined only the two mentioned above were typical, *R. acris*.

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ON SOME CANADIAN SPECIES OF GENTIANA: SECTIO CROSSOPETALÆ, FRŒL.

By THEO. HOLM.

(With four Plates.)

That very natural group of North American species of Frœlich's section *Crossopetalæ*[1], the so-called "Fringed Gentians," has long been in need of careful revision. The latest treatment of the genus, as it occurs in North America, is the one presented by Asa Gray in the Synoptical Flora[2], wherein the species, however, are described with much the same distinctions as in other works of the same author. Writers of a more recent date have generally felt so much influenced by that author's decisions that they have not seemed to question the correctness of his pronouncements, and have not examined the diagnoses further. Consequently the same species are enumerated and the diagnoses faithfully reproduced in the manuals and local Floras, on the strength of which botanists abroad have finally attributed a geographical range to some of these species extending throughout the northern hemisphere.

Among these *Gentianæ* is Gunner's *G. serrata*, which by Gray and subsequent authors is unanimously regarded as an inhabitant of North America, and its geographical distribution is by Gray (l. c.) given as "Newfoundland, Canada and N. W. New York to Saskatchewan and northward, and west to Colorado and W.

[1] Frœlich, Joseph Al. De Gentiana dissertatio Erlangen, p. 109. 1796.

[2] Gray, Asa. Synoptical Flora of North America, Vol. 2, p. 116. New York. 1886.

Nevada, Siberia, Norway and Greenland." Two varieties, *grandis* and *holopetala*, are said to occur in S. E. Arizona, California and Oregon, and since Pallas' *G. ciliata*[3] is by Gray considered as identical with *G. serrata*, the species should occur also in the mountains of Caucasus.

When high northern or arctic plants are found farther south, they are as a rule confined to very high mountains and above the timber-line, but if the plant described by Gray were the true *G. serrata* it would be equally abundant much farther south and at low elevations, in for instance, Canada and the United States. It was not, however, this incredible geographical distribution alone that made the writer suspicious in regard to the identity of the American so-called *G. serrata* with that of Europe, but also the fact that our material, which we some years ago collected in the Rocky Mountains of Colorado, differed so very much from our European specimens. The difference appeared to us so striking that the question of considering the Rocky Mountain plant as a mere geographical variety was at once excluded. This view became especially strengthened when we learned from our friend, Professor Wille in Christiania, that none of our specimens could in any way be considered as belonging to the species "*serrata*" as this occurs in northern and arctic Norway. By studying the several specimens of the true *G. serrata*, which Professor Wille kindly sent to the writer, we felt convinced that the diagnosis in the Synoptical Flora was based on specimens from America of some allied species without being compared with the European plant. In order, however, to make our investigation as careful as possible, the writer applied to the Geological Survey Department at Ottawa for the loan of the entire collection of this group, as represented in the British provinces, which was courteously granted through the kindness of Mr. James M. Macoun. Being unable to find any trace of *G. serrata* in this comprehensive collection we felt obliged to consult, also, the herbarium of Gray and of the United States' National Museum, of which the complete material of the American *G. serrata* was kindly placed at our disposal.

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[3] Pallas, Peter Simon. Flora Rossica. St. Petersburg, 1784. Vol. 1, p. 101, plate 92, fig. 2.

The specimens identified by Gray were of special importance, and we might state at once that none of these represented the true *G. serrata*, nor was the plant to be found in the collection of the United States' National Museum. How it happened that Gray could make such a mistake is not difficult to explain, since the most exhaustive diagnosis of *G. serrata* is not only published in the Scandinavian language, but, moreover, it is not very complete. The original description in Latin by Gunner is so short that it might well apply to the American plants of this group. By comparing the structure of the flower and especially the stamens and the nectariferous glands, besides the leaves, it is not difficult to find important differences between the European and American plant, but these organs should not be studied from dried material alone, and especially not from specimens that are pasted to the sheets. The attempt to identify our *Gentiana* from Colorado has, thus, resulted in an investigation of these various collections, and we have reached the conclusion that *G. serrata* is not represented in any of these. Inasmuch as most of the material examined was from the British provinces, we have thought that Canadian botanists might care to learn what *G. serrata* is, and what it is not.

In considering the literature upon this subject, there are not a few works to be consulted, those of Wahlenberg[4], Fries[5], Blytt[6] and Hartman[7] being the most important as concerns *G. serrata*.

The monographs by Frœlich (l. c.), Bunge[8] and Grisebach[9]

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[4] Wahlenberg, G. Flora Suecica. Vol. 1, p. 153. Upsala. 1824.

[5] Fries, Elias. Summa vegetabilium Scandinaviæ, Sectio I, p. 190. Upsala. 1846.

[6] Blytt, M. N. Norges Flora, Vol. 1, p. 712. Christiania. 1861.

[7] Hartman, C. J. Handbok i Skandinaviens Flora, p. 57. Stockholm. 1870.

[8] Bunge, A. Conspectus generis Gentianæ, imprimis specierum Rossicarum.

Nouveaux mém. soc. imp. natur. de Moscou, Vol. 1, p. 225. Moscou. 1829.

[9] Grisebach, A. H. R. Genera et species Gentianearum, p. 256. Stuttgart. 1839.

are of special interest in regard to the supposed synonyms, and Pallas' work (l. c.) gives an excellent description and figure of his *G. ciliata*, which is known now as *G. barbata* Frœl. A very comprehensive treatise of the various sections of *Gentiana* is presented by N. Kuznezow in Engler and Prantl's Natuerliche Pflanzenfamilien. But as we have stated above, the diagnosis of *G. serrata* Gunn. does not seem to have been fully appreciated, and moreover there are some salient points in its floral structure which have not been mentioned by Scandinavian authors. The diagnosis may be written as follows :

GENTIANA SERRATA, Gunn.

Annual or biennial, glabrous ; stem erect, quadrangular, 5 to 16 cm. high, branched from the base: leaves mostly crowded near the root, obovate-lanceolate or the upper linear-lanceolate, acute : peduncles long and quite stout, 1-flowered : calyx about 2 cm. long, unequally cleft to near the middle, 4-lobed, the longer lobes lanceolate, the shorter ovate, all acuminate with membranaceous margins, but none carinate : corolla deep blue, 3 to 4 cm. long, 4-lobed, cleft to about ⅓ of its length, the lobes nearly erect, oblong, erosely denticulate across the obtuse summit, mostly without lateral fringes and destitute of basal nectariferous glands*: stamens 4 with slender filaments : ovary fusiform, stipitate with an almost sessile 2-lobed stigma : mature capsule longer than the corolla: seeds scabrous from short papillæ.

Said to bloom in July or August, and has been collected on the sea-shore of Norway from 66° 10′ to 70° 50′ N. lat., and on the west coast of Greenland at 61° N. lat., where Vahl first collected it. The plant is also said to be frequent in the northern parts of Iceland, but we have seen no specimens from there, and are, therefore, not certain whether the Icelandic plant is identical with the Norwegian, the former having been described by Rottbœll as *G. detonsa.*[10]

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* Hartman (l. c.) describes the flower as tetramerous or, but seldom, pentamerous. None of the Scandinavian authors mention nectariferous glands in this species, and they were totally absent in our material from Norway and Greenland.

[10] Acta Acad. Hafn., Vol. 10, p. 435. (Not seen.)

If we compare now the Canadian allies of *G. serrata*, formerly considered as representing this species, we might point out at once some of the most conspicuous characters possessed by these: the frequently carinate and scabrous calyx, the very veiny and fringed corolla lobes, the broadly winged stamens, the constant presence of nectariferous glands at the base of the corolla, the more or less conspicuous style, the roundish stigma and the strongly papillose seeds. These characters appear to be constant and taken together with some habitual differences warrant the segregation of the following species:

GENTIANA MACOUNII, Holm.

(Plate XI, Figs. 1 and 2.)

Annual or sometimes biennial, glabrous excepting the calyx: stem strict, quadrangular, 5 to 30 cm. high, branched from the base: lowest leaves spathulate or oblong-lanceolate, the upper linear-lanceolate, acute: peduncles long and stout, 1-flowered: calyx (fig. A) purplish-green, unequally cleft to near the middle, 4-lobed, the longer lobes lanceolate, the shorter ovate with broad membranaceous margins, all acuminate and carinate, scaberulous with minute short papillæ, especially along the keels; corolla (fig. B) deep bluish, 1½ to 3 cm. long, cleft to about ⅓ of its length, 4-lobed, the lobes very veiny, slightly spreading, broad and fringed along the sides, but merely denticulate across the summit: nectariferous glands 4 at the base of the corolla-lobes: stamens 4 with broadly winged filaments, these ciliate in the middle; anthers at first introrse: pistil (fig. C) fusiform, stipitate with short but distinct style; stigma roundish: mature capsule shorter than the corolla: seeds rough with numerous long papillæ.

The specimens examined are from Fort Pitt, Saskatchewan; Bow River at Blackfoot Crossing, Lees Creek, Waterton Lake and Banff, Alberta (*Macoun*), and Red Deer, Alberta (*H. H. Gaetz*). Habitat given as: Prairies, gravelly soil and margins of marshes. Flowers from July to September.

GENTIANA PROCERA, Holm.

(Plate XII, Figs. 3, 4 and 5.)

Annual, glabrous except the calyx; stem erect, angled, 25 to about 50 cm. high, branched above; lowest leaves spathulate or

oblong-lanceolate, obtuse, the upper linear-lanceolate, acute: branches 1-3 flowered with 2 or 3 pair of leaves: calyx (fig. G) 1½ to 3 cm. long, unequally cleft to the middle or a little above, 4-lobed, the longer lobes linear-lanceolate, the shorter much broader with membranaceous margins, all acuminate and carinate, scabrous: corolla (fig. H) deep blue, 2 to 5 cm. long, 4-lobed, the lobes very veiny, roundish with many long fringes along the sides and dentate across the summit: nectariferous glands as in *G. Macounii*: stamens 4, the filaments naked otherwise as in the preceding species: ovary (fig. I) shortly stipitate with short style and a roundish, somewhat lobed stigma: mature capsule much shorter than the corolla: seeds with long papillæ.

Collected near Sarnia, Lambton County, Ontario, by C. K. Dodge, and in a swampy place at Stony Mountain in Manitoba, with flowers from August to September.

Several specimens from United States are preserved in the Gray herbarium of Harvard University from the following stations; Goat island and Strawberry island, Niagara Falls; shore of Lake Superior; Charlevoix in Michigan.

GENTIANA NESOPHILA, Holm.

(Plate XIII, Fig. 6.)

Annual, glabrous: stem erect, angled, 6 to 9 cm. high, much branched from near the root: leaves glaucous, densely crowded and forming a rosette, roundish or obovate tapering into the petioles, the cauline spathulate or lanceolate, obtuse: peduncles many to 12, 1-flowered, with 2 or 3 pair of leaves: calyx (fig. K) glaucous and wholly glabrous, about 1½ cm. long, unequally cleft to near the middle, 4-lobed, the longer lobes narrow and keeled, the shorter much broader with membranaceous margins, but not carinate: corolla (fig. L) pale bluish in dried specimens, 2 to 2½ cm. long, 4-lobed, the lobes roundish with a very few lateral teeth, but no fringes, erosely denticulate across the summit, nectariferous glands 4: stamens 4, with winged filaments: ovary (fig. M) shortly stipitate, the style distinct with a roundish stigma; mature capsule shorter than the corolla: seeds with short, obtuse papillæ.

Collected by Prof. John Macoun in low, moist ground near Salt Lake, Anticosti Island, Quebec; with flowers in August, 1883. The only known locality for this species.

These are the species which have been collected in Canada, and which were formerly supposed to represent Gunner's *G. serrata*. They are all very different from the plant we collected in the Rocky Mountains of Colorado, and of which we have, also, received some specimens from Wyoming through the kindness of Professor A. Nelson, who some years ago described it as *G. elegans*. It is more than probable that this species occurs, also, in the British provinces, thus we take the opportunity of presenting a diagnosis and an illustration of this excellent species in connection with the Canadian.

GENTIANA ELEGANS A. Nels.[11]

(Plate XIV, Figs. 7 and 8.)

Annual, glabrous excepting the calyx, very robust: stem erect, angled, 20 to 40 cm. in height, branched from near the base: leaves forming a rosette, broadly spathulate, the upper lanceolate, obtuse: peduncles often numerous, until 20, erect, 1-flowered: calyx pale green with purple spots, about 3 cm. long, unequally cleft to the middle or below, the longer lobes narrower than the others, all with membranaceous margins and very sharp and prominent keels, scabrous only along the keels: corolla (figs. N and O) bluish to deep purplish, until 5 cm. in length, 4-lobed, the lobes very broad and veiny, erose across the summit, fringed along the sides: nectariferous glands 4: stamens 4, the filaments broadly winged, the anthers as in the preceding species at first introrse (fig. O), but later on extrorse (fig. N): ovary (fig. P) stipitate, the style distinct, but short, stigma (fig. Q) roundish and 4-lobed: mature capsule shorter than the corolla: seeds with short, obtuse papillæ.

Collected in Wyoming at 9—10,000 feet elevation and in Middle Colorado near Long's peak at 8,600 feet, where it grew abundantly in meadows in the Aspen Zone, with flowers in August.

It has, furthermore, been collected in Southern Colorado near Pagosa peak at 11,000 feet.

[11] Nelson Aven. New plants from Wyoming. (Bull. Torrey Bot. Club. Vol. 25, p. 276. 1898.)

Var. BREVICALYCINA Wettstein (*in litteris*).

Differs from the type by its much shorter calyx and by the very deep purple colour of the corolla, the lobes of which are denticulate, but destitute of fringes.

Collected in a swamp on Mt. Massive near Leadville, Colorado, at an elevation of 11,000 feet, near timber-line.

Among the other North American species, which by Gray were referred to *G. serrata* Gunn., are the two varieties : *grandis* and *holopetala*, none of which, however, are referable to this or any of the other species that occur in this country. They represent several vegetative and floral characters by which they appear to be distinct from all the others, and may consequently be considered as independent species ; *G. holopetala* (Gray) and *G. grandis* (Gray).

It would, thus, appear as if *G. serrata* Gunn. has not, so far, been collected in North America, judging from the collections, which have been examined, but we do not think it improbable that it may be found on this continent, since it occurs on the west-coast of Greenland ; it should be looked for on the north Atlantic coast in the immediate vicinity of the sea-shore and north of the arctic circle.

The American species, which we have described in the preceding pages, represent members of the section *Crossopetalæ* Frœl., to which *G. serrata* Gunn. belongs, but they exhibit a marked difference from this by the carinate calyx-lobes, the presence of nectaries and by the winged stamens ; their habit is, also, somewhat different, if we consider *G. procera* and *G. nesophila*. Small, one-flowered specimens have been found of all these species, but such individuals do not deserve rank as even varieties. Their small size, lesser developed foliage and the single flower may depend on their development from poor seeds, on their occurrence in drier soil or, finally, on the fact that they are developed as root-shoots. Such root-shoots are not uncommon in *G. holopetala* and have, furthermore, been recorded as characteristic of the European *G. ciliata* L. in accordance with Irmisch.

EXPLANATION OF PLATES.

Plate XI.

Fig. 1.—Gentiana *Macounii*, natural size.

Fig. 2.—Same, a small specimen, natural size.

Fig. A.—Calyx of same, laid open.

Fig. B.—Part of the corolla of same, laid open and showing the ciliate stamens and 2 nectaries at the base of the corolla-lobes.

Fig. C.—Pistil of same.

Fig. D.—Calyx of *G. serrata* Gunn., laid open.

Fig. E.—Part of the corolla of same, showing the slender filaments.

Fig. F.—Pistil of same.

Plate XII.

Fig. 3.—*Gentiana procera*, showing the habit, much reduced in size.

Fig. 4.—Same, the base of the stem and the roots, natural size.

Fig. 5.—Same, the flower, natural size.

Fig. G.—Calyx of same, laid open.

Fig. H.—Part of the corolla of same.

Fig. I.—Pistil of same.

Plate XIII.

Fig. 6.—*Gentiana nesophila*, natural size.

Fig. K.—Calyx of same, laid open.

Fig. L.—Part of the corolla of same.

Fig. M.—Pistil of same.

Plate XIV.

Fig. 7.—*Gentiana elegans*, the base of the stem with leaves and roots, natural size.

Fig. 8.—Flower of same, natural size.

Fig. N.—Part of the corolla of same.

Fig. O.—Part of the corolla of same, taken from a bud.

Fig. P.—Pistil of same.

Fig. Q.—Style and stigma of same.

AN AFRICAN DIPNOID FISH.

(Protopterus annectens.)

By ANDREW HALKETT.

In an issue of the *Fishing Gazette*[1] a paragraph appeared under the title, "Digging for Fish," of which the following is the substance :

"The natives of Kottiar, in Africa, are in the habit of digging every year, in the summer, the dry banks of the Vergel River for fish, which they dig out by hundreds, just as they would potatoes. The mud lumps are broken open, and the fish, perhaps eight or ten inches long, will always be found alive, and often frisky, as if just removed from its supposedly native element—the water. In the dry beds of several African rivers a similar practice is often pursued. A kind of mud fish buries itself while the bottom is still moist, and remains there all the summer, waking up when the rains begin again."

Preceding this paragraph were words to the effect that the above was "a new fish story," a bait, in fact, "to lure the unwary summer boarder to the swamps and sandhills of Suffolk County." But knowing better, I wrote to the editor of the *Gazette* corroborating the fact of the existence, during the dry season, of living fishes encased in capsules of mud awaiting the return of the rainy season when the pools and rivers are refilled with water. He published my letter[2] under the title, "The Dark Continent Fish," and the following quotation in full is its import :

"In regard to the 'new fish' 'credited to the Dark Continent' which appeared in your issue of January 7, under the title of 'Digging for Fish,' permit me the following space in your columns concerning a very remarkable group of fishes.

"These are the Dipnoids, distinguished from others by the possession of a rudimentary lung in addition to the ordinary gills. This lung is simply a modification of the air-bladder. The group contains four[3] existing species, and several extinct ones. The names of the existing species are these :

"*Lepidosiren paradoxa*, a very rare fish of the River Amazon.[4]

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[1] *The Fishing Gazette* [203 Broadway, N. Y.] Saturday, Jan. 7, 1899.

[2] Ibid, Saturday, Feb. 4, 1899, p. 71.

[3] During my visit in Great Britain I learned of a fifth (a recently discovered) Dipnoid, but am not yet in possession of any particulars about it.

[4] "*Lepidosiren* has recently been found in abundance in swampy localities of the Chaco, Paraquay." Guide to the Galleries of Reptiles and Fishes, British Museum, 1898.

"*Ceratodus miolepis* and *C. forsteri*, from the rivers of Queensland, Australia.

"*Protopterus annectens*, from the rivers of tropical Africa.

"The species alluded to in your columns is the last mentioned, *Protopterus annectens*, of tropical Africa. This fish inhabits the rivers of that continent, and while it has sufficient water there is nothing extraordinary concerning its function of respiration, as it breathes just like other fishes, by gills; but during the dry season it encases itself in capsules of mud and mucus, and then breathes through its lung. While thus encased it can be transported alive to great distances, and when replaced in water the gills again assume their normal function.

"The Dipnoids are a sub-order of the Ganoids, to which the sturgeons and garpikes belong. I have seen sturgeons breathing atmospheric air by putting their snouts out of the water, and on examining a specimen of the garpike found an approach to a rudimentary lung, the air-bladder being cellular, thus revealing even in these North American fishes certain dipnoid characteristics.

"Petrified remains of other genera of Dipnoids are found in Devonian formations."

Since the above was published I have been fortunate enough to see several living specimens of Dipnoids, during my visit some time ago to Great Britain. Two of *Ceratodus* in one of the aquaria of the Zoological Gardens, Regent's Park, London; and one of *Protopterus annectens* in the aquarium of the Liverpool Public Museum, which had been successfully transported from Africa in its mud-capsule. Furthermore, Dr. Forbes of the latter institution very kindly gave me a specimen of *Protopterus* also encased in its capsule, and which I brought with me across the Atlantic; with the intention of dissolving it, and liberating the fish on my arrival in Ottawa. So of late I have had additional incentives for prosecuting my studies of the Dipnoids.

The group receives its name from the double character of the respiratory organisation: these remarkable fishes breathing not only under water by gills, but at times, as has been stated in the letter to the *Gazette*, when the waters dry up, atmospheric air by rudimentary lungs. They belong to the Ganoid group of fishes, and are referable to three existing genera: *Ceratodus*, *Lepidosiren*, and *Protopterus*; and to a few extinct ones. The existing species differ exceedingly from other Ganoids in the character of the paired fins; there being in the pectorals and ventrals an axial skel-

eton, which is most fully developed in *Ceratodus*; these fins in *Lepidosiren* and *Protopterus* being filamentous. The tail, as in Chimæras, is diphycercal; but in at least one extinct species: *Dipterus helwdus* the tail was heterocercal. The scales are cycloid, and in the several species they differ much in size. In general shape and character *Protopterus* approaches more closely to *Lepidosiren* than either do to *Ceratodus*. The scales in the two former genera are small, whilst those of the latter are very large. Again in the two former the vertical fin begins before the middle of the fish, and, as has been stated, the paired fins are converted into long filamentous organs; whilst in the latter the vertical fin begins behind the ventrals, which are placed of course as they are in all Ganoids abdominally, and the paired fins are proportionately shorter and paddle shaped.

Unfortunately the specimen of *Protopterus annectens*, and another for Prof. Ramsay Wright of Toronto University, which I brought from Liverpool did not survive; and on dissolving the capsule the former had all the appearance of having been dead for some time. However, after placing the dead fish for a short time in spirits diluted with water, I succeeded in sufficiently softening out the specimen so as to enable me to make an examination of its structure.

This species is elongated and compressed in shape. The gill-cleft and the eye are small. The filamentous pectorals and ventrals are fringed down the sides—the fringes according in plan with the rays of the verticle fin: which fin bears a multitude of close fitting rays throughout its length. Adjacent to the gill-cleft and immediately above the pectorals, there are branchial appendages. The scales, being small, are numerous, and embedded in the skin. Each jaw has a large tooth, a molar, with cusps.

The following recorded characters of structure, in this specimen were more or less obscure, owing to its shriveled condition. The lateral line runs nearly straight from the gill-cleft to the caudal portion of the vertical fin. There are two pairs of nostrils. The lung agrees with that of *Lepidosiren* in being "divided into lateral halves," and differs in that respect from *Ceratodus* in which genus the lung is single.

Previous to dissolving the capsule of mud, that object presented a hard and baked appearance, and had seemingly been firmly attached to the dried up bed of the river or pool in which the fish had previously carried on its gill breathing function; and had been broken off by the collector. In this capsule the fish had coiled itself up: a circular opening communicating between its interior and the outer atmosphere, enabling the dipnoid to breathe. The opening was rounded at the entrance, and led inwards by a zig-zag channel. On dissolving the mud the capsule was found to be intermixed with vegetable fibres, which tended to support the capsule.

Protopterus annectens is said to attain a length of six feet.

BIRD MIGRATION.—A bird migration of exceptional magnitude was noticed by many people during the night of October 15th. Several smallpox guardians who were questioned by the writer informed him that birds had passed south in great numbers for several nights previous to the 15th, but that on that night there seemed to be millions of them The writer's observation covered from about ten o'clock until nearly daylight, and during the whole of that time an unbroken stream of birds passed over the city at a very low altitude. Two distinct kinds of bird-note could be distinguished, one the chippering of small birds, the other the calls of plover, snipe, etc. It was this last sound which attracted general attention, but the other was just as distinct, and could be easily separated from the shorter call of the larger birds. All were probably waders. Doctor Oscar Klotz, who carefully noted the course of the birds, says that it was about southeast. The night was very cloudy and on that account the birds could fly at a low altitude without being seen.

J. M. M.

BRUE OR SOAP BERRY.

My attention has been directed to an article which recently appeared in one of the eastern papers headed "Where they eat soapsuds." Evidently the writer of the article in question was not well informed and it always seems to me a pity that people should publish any information of doubtful authenticity which if properly enquired into might really prove at least interesting if not of scientific importance.

The berry from which the so-called soapsuds are made is that of a shrub, botanically known as *Shepherdia Canadensis*, called by the French Canadians "Brue" and in the Chinook jargon "Soap Oolalie," i.e. Soap Berry, and from which latter name I presume the writer of the article has arrived at "Sapoliti," a term quite unknown in this province. I am not aware that it is used by the natives on festive occasions but it is used as a common article of food. It has really a very pleasant flavour and is relished by almost everyone when properly prepared. The mode of preparation is shortly as follows. The berries, if fresh, are strained through a cloth so as to separate the seeds from the juice and if dried they are first soaked and then strained. The juice is placed in a bowl, earthenware by preference, and sweetened with sugar, it is then beaten up either with a bunch of twigs or an egg-beater until it attains the consistency of ice-cream of a beautiful light pink colour, when it is fit for use

From the fact that all utensils used in the preparation must be scrupulously clean and free from any taint of grease to ensure success, it is obvious that the remark that it is prepared "in a not over clean manner" is to say the least not strictly according to fact.

The brue berry is about the size of a red currant and generally of about the same colour, but many are of an orange colour. It has the peculiarity of being sweet, acid, bitter and aromatic all at the same time. To some people it is disagreeable but many acquire a liking for it both in its natural and prepared state.

Before concluding let me set another fairy tale at rest, viz, the use of a fish for light. I have no doubt the fish alluded to is the Oolahan or Oolachan which is about the size of a smelt, very fat and when dry it will burn for a time, but that it was ever used for a light

by the natives is purely a traveller's tale. In any case the fish is only obtained in some of the coast rivers, and therefore to the majority of interior indians it is unknown. Let me assure the readers of this short article that the time-honoured custom of a fire of wood on the floors of their abodes was the usual way of obtaining light and that now most of them use coal-oil lamps.

·J. R. ANDERSON.

Victoria, B. C.

October 10th, 1901.

NOTE.—Mr. Anderson's statement regarding the use of the candle-fish may be true enough to-day when the labour of the west coast indians is utilized by the whites, and they are able to indulge in such luxuries as parafin candles and coal-oil lamps, but there can be no doubt that formerly the Oolachan was frequently used by these indians for lighting purposes. Writing in 1866 of this fish Lord says, in "The Naturalist in British Columbia,": "It is next to impossible to broil or fry them, for they melt completely into oil. Some idea of their marvellous fatness may be gleaned from the fact that the natives use them as lamps for lighting their lodges. The fish, when dried, has a piece of rush-pith or a strip from the inner bark of the cypress-tree drawn through it, a long, round needle made of hardwood being used for the purpose; it is then lighted and burns steadily until consumed. I have read comfortably by its light; the candlestick, literally a stick for the candle, consists of wood split at one end, with the fish inserted in the cleft."

EDITOR.

NOTE ON SOME ERRATA IN THE REVIEW OF DR. WHITEAVES' LIST OF EASTERN CANADIAN INVERTEBRATES.

A number of errors, some very apparent others less so, appeared in the review of Dr. Whiteaves' Catalogue on pp. 165-172 of the October number of THE OTTAWA NATURALIST. Circumstances, which it is not necessary to detail, necessitated a very hurried reading of the first proof, and absence from Ottawa prevented a careful and thorough correction of the final proof, hence

some errors were no doubt unavoidable, though others it is more difficult to account for, especially such an obvious misprint as "Dr. J. W. Whiteaves," instead of the correct and familiar "Dr. J. F. Whiteaves," in the heading of the review. "Marine Worms" in large type on p. 167 requires elision, as also the figures 428, opposite the word "Brachiopoda." Canadian waters are rich in Invertebrates, but they would be a veritable zoological Eldorado if they harboured 428 species of Brachiopods. The actual number of Brachiopod species is 3, and the Polyzoa 115, the figures 3 and 115 being one line below their proper place. The 9th line, on page 170, states exactly the reverse of the fact and the sentence should end: "the Dog-whelk (*Purpura lapillus*, L.) arouses no such question." It is difficult to account for the statement in lines 20, 21, and 22, that *Litorina rudis* is recorded only for our more northern coast extending into Hudson Bay, unless it is due to the circumstance that the review was based on notes, made while reading Dr. Whiteaves' Catalogue, and the author's statement was overlooked that the species has a widespread abundance as well as a northern distribution. Happily these *errata* do not affect the reviewer's attempt to express the genuine feeling of appreciation with which the publication of the Catalogue will be regarded in scientific circles at home and abroad.

Readers will do well, however, to make note of the following errors in the review :—

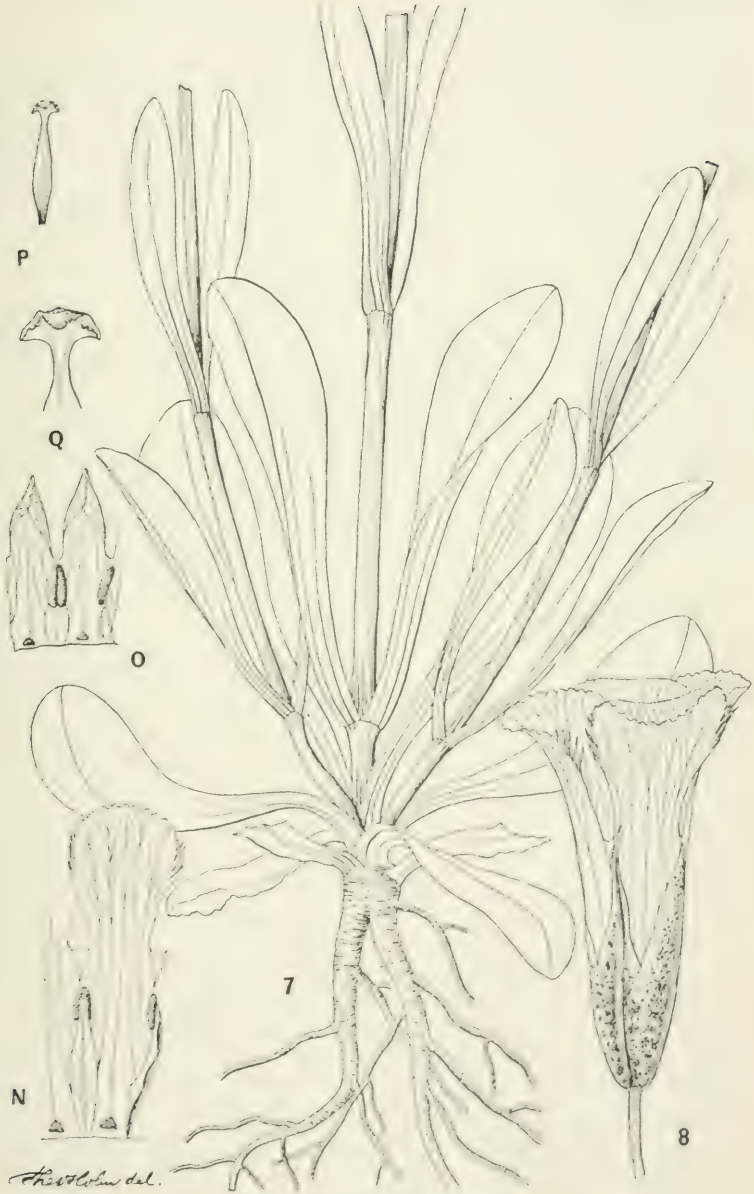
p. 165, line 5—"J. F. Whiteaves, LL.D.," &c., not "J. W. Whiteaves."
p. 167, line 28—"Marine Worms" to be elided.
,, ,, 33—"3" not "428."
,, ,, 34—"115" not '3."
,, ,, 35—"115" to be elided.
,, ,, 43—After ARACHNIDA insert "(*Pycnogonida*)."
p. 170 ,, 10—"arouses such," to read "arouses no such."
,, ,, 12—"*litorea*" not "*literea*."
,, ,, 22 and 23 to be elided and to read "not only for our more northern coast extending into Hudson Bay: but is abundant almost everywhere on rocks, sea-weeds, &c."
p. 171, line 15—"*spitsbergensis*" not "*spetsbergensis*."
,, ,, 19—"*Canadensis*" not "*Cauadensis*."

THE REVIEWER.

Gentiana Macounii Holm.

Gentiana procera Holm.

Gentiana nesophila Holm.



Gentiana elegans Nelson.

THE OTTAWA NATURALIST.

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CERTAIN CANADIAN VIOLETS.

By EDW. L. GREENE.

In a recent issue of Pittonia* I published a number of Canadian violets of that caulescent group to which the following belong, and the paragraphs here presented would have found their places in that paper, but that I was unable to find the manuscript, which, at that time, had been written more than a year and a half, and had become misplaced, as it then seemed quite hopelessly. Lately, quite unsought, it has come to light, and I hasten to offer it for the pages of THE OTTAWA NATURALIST.

V. LEUCOPETALA. Perennial, caulescent, leafy, the many stems ascending, 3 to 5 inches high; herbage wholly glabrous: leaves cordate-reniform and ovate-cordate, ½ to ¾ inch long, crenate; stipules lacerate-toothed, or the uppermost ciliolate and entire; corolla pure white without even a coloured venation; odd petal as long as the others, somewhat broader, obtuse or retuse or almost obcordate, spur nearly straight, obtuse, compressed laterally, lateral petals notably differentiated into blade and claw, densely bearded, the hairs narrowed upwards rather than clavellate, and somewhat tangled: style papillose-hairy all around under the stigma.

The above description is drawn in part from fresh specimens sent me by Mr. J. M. Macoun from near Ottawa, in May, 1899, and partly from specimens grown in my garden at Brookland, D.C., a year later. The species has been referred to *V. Muhlenbergii* (now called *V. Labradorica*) as an albino variation; and, albino states of that may well occur, but this is something quite different. Mr. Macoun himself first intimated this, assuring me that the

*Pittonia, Vol. IV, p. 285 et seq.

plant has its own habitat, quite apart from that of the other, and flowers two weeks earlier.

While the above, and two other closely allied species, all sent from Ottawa by Mr. Macoun in 1899, were flowering in my garden in May, 1900, I took the following notes as to their respective floral structures; and those notes may well be given here.

V. LABRADORICA, Schrank. In this the flowers are distinctly smaller than in *V. leucopetala*. Only two of the petals are bearded, and these with a small tuft of straight slender somewhat flattened hairs ; the odd petal is here not only smaller than the others but also acutish rather than truncate or retuse ; the style is papillose on the back and sides only.

V. SUBVESTITA, Greene. Distinguished from both the foregoing by its bractlets, these being linear, appendaged at base (laterally) with 2 or 3 gland-tipped awn-like processes, and notably auriculate at the very base, the whole bractlet only its own length below the flower : sepals faintly 1-nerved, strongly auricled, the auricles dentate : petals deep-violet, three of them bearded with slightly flattened hairs : style short, sparsely muriculate all around.

Doubtless these notes may serve as a hint to others to examine carefully in fresh specimens the particulars of floral structure in other violets of this group. Only thus may we hope to ultimately establish firmly the limits of the species.

Washington, D.C., Nov. 1st, 1901.

NOTE.—The three species referred to above may be found at Ottawa, within half a mile of one another. *V. Muhlenbergii* is common everywhere about Ottawa, but by entering Rockliffe Park at Governor's Bay it will be found near the Electric Railway line, and by then walking to the river bank just east of Governor's Bay *V. Labradorica* will be found in abundance. *V. leucopetala* grows along the road connecting Buena Vista road with the eastern approach to St. Patrick's bridge.

J. M. M.

ALLIGATOR AND TURTLES AS PETS.

By W. S. Odell, Ottawa, Ont.

In November of last year a small alligator (*Alligator Mississippiensis*) and three turtles were placed together in an aquarium. Only a few features descriptive of the alligator need to be mentioned. The skin is now used for so many purposes that by this means it has become known.

This reptile is carnivorous, head broad, flattened and having teeth of the lower jaw fitting into pits in the upper. The bright yellow bands so marked in the young, lose their color to a large extent in the adult. Tail about half the entire length of animal, and laterally compressed, terminating in a blunt point.

Approaching cold weather had a marked effect in his loss of appetite and vigor. During daytime the aquarium was placed in sunlight, at night on hot water coils in the room, with a glass cover, to retain heat and prevent escape. Remarking to a friend his loss of appetite, the suggestion was jokingly made: "Why not try cod liver oil?" The alligator's mouth was forced open and a few drops poured in. No bad results following, this novel article of diet, varied at times with fluid beef, was continued twice per week through the winter. It is questionable whether any benefit resulted from this treatment.

Early in May, he for the first time, snapped at a piece of meat which was being fed to the turtles. From this time onward all kinds of meat, small toads, young tadpoles, newly hatched catfish, etc., were fed him. Fish cut into small pieces was greatly relished, but earthworms were preferred above all else. On receiving food it was carried into the water and was there eaten, considerable motion being made in swallowing, the throat appearing too small to admit of its passage. While feeding, his usual torpid appearance underwent a change. The pupils of his eyes, at other times contracted to a narrow slit, now become greatly dilated; and with open mouth and tail gracefully curved upward his appearance was rather formidable. A hissing noise when disturbed, and a sort of grunt in a high key, were the only sounds he appeared capable of making.

At night he sleeps with the body hidden under the plants, leaves, etc., of aquarium, the nostrils and part of head only being visible ; but in day time he prefers to bask in sunlight on a small raised landing. At this time a small common turtle, probably for warmth, generally slept perched on his back.

Efforts in taming have not been very successful. One attempt to bite was made.

Although considerable attention is required in changing water frequently in warm weather, and watchfulness in keeping the aquarium at all times covered to prevent escape, still the pleasure derived from observing his habits, more than compensates for the trouble taken.

A Japanese turtle and a Chinese turtle were companions to the alligator. The Japanese was a fine specimen, kindly donated by one of the curators of the New York Aquarium.

They would have hibernated, if given opportunity. Most of their time was spent hidden under the leaves, weeds, etc., of the aquarium. When called they only extended their necks, occasionally taking a little meat, but on bright days, they came out to enjoy the heat of the sun. When spring came they were lively and became quite tame, taking flies from the hand as long as one had the patience to catch them, but tearing off and rejecting the wings. They were called Jap and John, the former being the livelier and responding to a whistle or to his name when called.

Everything of a carnivorous character seemed to suit their palates ; their food while in mouth was torn into pieces by the claws. It was great amusement feeding them worms ; each taking hold of an end, a tug-of-war would follow, lasting till the worm was torn asunder. The best sport was when a turtle tried to take a worm from the alligator ; if the worm were strong enough to stand the strain the former would be towed round and round the aquarium and handled very roughly.

Some Salamanders (*Spelerpes bilineatus*) were placed in the aquarium, as companions, but inside of an hour the turtle had bitten a large piece out of the tail of one : they had to be at once removed. Fish were placed with them as companions, but the turtles gave them no peace. Turtles are very courageous and

will tackle everything that comes in their way, and will eat everything they can hold. *Sagittaria* and lily leaves put in for shade were relished for food, and were supplied while available.

Our common turtle (*Chrysemys picta*) is, in many localities, not rare. Its bright red markings along the margin of the shell make it an attractive object. It is hardy and easily kept. After a short time it will become quite tame and be a source of instruction, and amusement as well. To any one wishing to start an aquarium it will be a good specimen.

NOTES ON THE WOODCOCK'S LOVE SONG.

By WM. H. MOORE, Scotch Lake, N.B.

(Read before the Ornithological Section of the Entomological Society of Ontario.

[Transcript from field note-book.]

May 17, 1898.—Woodcocks are about at nights now. They begin their antics soon after sunset. On the ground the male struts about the ♀ uttering a note sounding like zeet, and much like the nighthawk's note but finer (not so harsh and loud). Then with the whistling twitter takes flight, and in gradually widening circles mounts high in the air—to a height, I should say, of 200 yards. Near the last of this upward flight he begins his song—which is a pleasant twitter, and more of a musical call than many song birds have—which sounds like chip-t chee chip-t chee tweep. This is given forth several times, and towards the last the bird's flight is undulating in narrower circles, when of a sudden the song stops and the bird descends to its mate on the ground. Descending in nearly a straight line, at varying angles to the earth, he again begins the nighthawk call and so on. The ♀ evidently feeds while the ♂ is on his honeymoons. The notes, as you say in the O. N., are somewhat ventriloquil. I attributed this to the circling of the bird, and assisted by the fact that one must have things sort of convenient (such as light sky and distance) to see the bird. When I was able to see the bird during flight the ventriloquil effect was not so much in evidence.

May, 1, 1901—Heard the woodcock singing this evening. The day was cloudless, so I could see him plainly.

A SIMPLE ILLUSTRATION OF THE CONSERVATION OF ENERGY.

By J. C. SUTHERLAND, B.A., Richmond, Que.

The other day when blowpiping some silver nitrate on the "charcoal splinter," I observed what seemed to be a good, although simple, illustration of the law of the conservation of energy. It is possible that the phenomenon has been observed many times before, but I cannot recall any instance of the particular explanation which I believe to be the correct one having been offered for it.

As possibly some readers may not be acquainted with the reduction process which is carried on by means of a charcoal splinter, it may be well to give a brief account of it before proceeding to the particular phenomenon and the offered explanation.

To prepare a charcoal splinter, the head of a common match is broken off and the wood is then smeared for about an inch of its length with ordinary washing soda melted in the flame of a spirit lamp. The smeared end is then gently heated in the flame for a few moments until a charred mass of wood and soda is obtained. Upon this is placed carefully a small mass of the particular substance to be reduced, mixed with some fused soda. The blowpipe is then directed on the flame, the mass being held in the "reduction" part of it. In a few minutes separation of the elements is obtained, and in the case of silver nitrate a beautiful small sphere of metallic silver is left upon the splinter.

But in the first few seconds of the operation, the unsmeared part of the match tends to burst into flame. Once, however, that the reduction process is fully started, this does not occur. This is the phenomenon. What is the explanation?

It is possible that in some instances, and then in part only, it is due to the formation of combustible gases at the outset which cease to be formed as the reduction proceeds. But I think the more general explanation of the fact is to be found in the consideration that during the first few seconds of the blowpiping, the only work that is done by the flame is that of raising the temperature of the mass and driving off moisture—comparatively light work

compared to that which immediately follows. The moment the real reduction begins, an enormous amount of work is being done. In the smallest mass of silver nitrate treated before the blowpipe, millions of atoms of silver are torn from the strong embrace of millions of atoms of nitrogen and oxygen. May we not conclude that in the first few seconds of the process, the small amount of work done allows a surplus of heat to raise the uncharred part of the match to combustion but that when the genuine work of reduction has begun all of the available heat is required to work at the one point? If this explanation is tenable we have here an incidental, if simple, illustration of the correlation of the physical forces.

THE KING EIDER IN MIDDLESEX COUNTY.

By ROBERT ELLIOTT. Bryanston, Ont.

(Read before the Ornithological Section of the Entomological Society of Ontario.)

The capture of the first specimen of *Somateria spectabilis* known to have been taken in this county was effected under the following circumstances :—

On the 24th November, 1900, my young friend Mr. Roger Hedley, of Lobo, walking for his mail, being on game intent, brought his gun along and visited Duncrieff mill-pond —a sheet of water which covers about six acres, and is near his home. That morning he saw one duck only, and shot it at a range of sixty yards. He preserved it and lately very kindly presented it to me.

I find, after carefully consulting Ridgeway's Manual, that it is a genuine specimen of the King Eider. It is a young bird, and as the sex was not determined by dissection, I cannot pronounce on the question, although probably a reference to a more detailed work on our birds, such as that of Baird, Brewer and Ridgeway, would settle this point. Mr. Hedley further informs me that the bird was in very thin condition and that strong and cold westerly winds prevailed at the time.

NOTE ON THE OVIPOSITION OF THE MUD TURTLE.

By MAILES COWLEY, Bristol, Que.

In the month of October, 1896, my hired man was ploughing near the Ottawa River in the Township of Clarendon, and about nine feet above the level of the water he ploughed up a mud turtle's nest, which contained about fifty eggs. They were about eight inches under ground and covered with a solid grass sod, there being no entrance to the nest except from the top, where there was a hole about one inch and a quarter in diameter. The field in which the nest was situated had not been cultivated for more than forty-five years. The nest was shaped like an inverted soup-tureen, the hole being in the top of the dome, and how the young turtles got out when hatched is not easy to guess. These eggs were seen in the fall and not a thing was found in the shells when the snow was going off in the month of April, the following spring. Were they hatched by the early spring sun, or did some animal eat them?

One of my neighbors, Mr. John Telfer, a reliable man, who has done much hunting and fishing, says that some years ago he came across a good sized turtle about six acres from the Ottawa River at Clarendon Front, in the county of Pontiac, and as its movements were peculiar he decided to watch it. He climbed a leaning tree and from his position a few feet above the ground he saw the turtle lift up her hinder part and drop an egg. Then with one of her hind legs she took the egg and reaching far down in the hole placed it in the nest. After about a minute the same process was again gone through with, and so on until she had laid about a dozen eggs. Mr. Telfer says that he is satisfied that a turtle lays all its eggs at one time, not at intervals like a hen. He affirms that they hollow out the nest first and then cover it over, leaving a small hole in the top large enough to allow a hind leg to enter it with an egg. Mr. Telfer also expressed his wonder at the length to which a turtle could stretch her leg and the care she displays in placing the eggs in the nest. Though he never saw a young turtle come out of a nest his belief is that the mother watches the nest, and when the young are hatched, either pulls the

top off the nest or puts down her claws and lifts the little ones out. Mr. Telfer also says that he once dug a turtle up in the spring in a cow-path that had been walked over daily by fifty head of cattle for four or five months. All that could be seen of the turtle was a claw sticking up out of the clay, and when he dug it out it was still living.

The eggs of the turtle are richer and better flavoured than those of a hen. Mr. McKillop, whom I know to be a reliable man, tells me that he once killed a large "moss-back," and when he had cut her open he took from her sixty eggs, which he boiled. Most of them were eaten by a neighbor and himself and found to be excellent.

AUTUMN NOTES ON BIRDS, SABLE ISLAND, N.S., 1901.

By RICHARD BOUTELIER.

The list of birds which follows, though not complete, will give a pretty good idea of the bird migrants which visit Sable Island in the autumn. We are not sure about the Knot, but the bird we have so named was larger than the Jack Snipe and agrees well with the illustration and description in the bird book we use.

Incidentally it may be mentioned that we have a tame black duck here which we raised during the summer of 1900. It flies all over the island but always comes home again. Once it was away for two months, but when it flew home it came under the window to be fed as usual. We have two other black ducks with clipped wings, and attracted by them what looked like a pintail nearly settled down in our yard a few weeks ago.

1. Kingbird, one, Aug. 3rd.
2. Crossbills, in flocks, Aug. 19th.
3. Various kinds of hawks, in numbers, Aug. 30th.
4. Buff-breasted Sandpiper, in numbers, Sept. 2nd.
5. Flicker, one, Sept. 25th.
6. White-throated Sparrow, in numbers, Sept. 26th.
7. Orchard Oriole, one, Sept. 28th.
8. Pine Warbler, in numbers, Sept. 28th.
9. American Pipit, in numbers, Sept. 28th.
10. Knots, (?) in numbers, Sept. 30th.
11. Horned or Shore Lark, one, Sept. 30th.
12. Hermit Thrush, one, Oct. 1st.

13. Blackbird, one, Oct. 1st.
14. Slate-coloured Junco, two, Oct. 2nd.
15. House Sparrow, in flocks, Oct. 4th.
16. Yellow-headed Blackbird, one, Oct. 5th.
17. Heron, one, Oct. 5th.
18. Swallows, in numbers, Oct. 5th.
19. Snowflake, two, Oct. 5th.
20. Connecticut Warbler, one, (found dead), Oct. 6th.
21. Kingfisher, one, Oct. 8th.
22. Robin, one, Oct. 16th.
23. Bluebill, seven, Oct. 18th.
24. Pipits,
25. Warblers, } in numbers, Oct. 18th. Left the Island.
26. Sparrows,
27. Semipalmated Sandpiper, in numbers, Oct. 22nd. Leaving the Island.
28. White-rumped Sandpiper, in numbers, Oct. 22nd. Leaving the Island.
29. Long-tailed Squaw, in numbers, Oct. 20th.
30. Ring-necked duck, five, Oct. 20th.
31. Golden-eye, three, Oct. 20th.
32. Vesper Sparrow, one,
33. Juncos, in numbers,
34. Golden-crowned Kinglets, in numbers, } Oct. 22nd. { These all came during a strong N. W. gale (60 miles.)
35. Hermit Thrush, one,
36. King Bird, one,
37. Brown Creeper, one, Oct. 28th.
38. Snowflake, in numbers, Oct. 28th.
39. Kittiwake, in numbers, Oct. 28th.
40 White-winged Crossbill, one, Oct. 28th.
41. Lapland Longspur, one flock, Nov. 2nd.
42. Stormy Petrel, one, (found injured in the Island), Nov. 4th.

Sable Island, N. S.,
Nov. 10th, 1901.

THE GLAUCOUS GULL IN MIDDLESEX COUNTY.

During the last week in January, 1901, a large white gull was seen on the Thames river, six or eight miles west of London. After staying there for a few days it found a carcass on the farm of Mr. Elson, a few miles from Byron on which it fed for two or three days, when it was shot by Mr. Will Elson, on February 1st, who kindly let me have it, and it is now in my collection. It proved to be a female glaucous gull in the plumage of the second year, white, uniformly speckled with light gray all over. Considering that there is no definite record of the herring gull in Middlesex, it is rather surprising that this should be the first of the larger species of gulls to be obtained in the country.

W. E. SAUNDERS.

THE OTTAWA FLORA.

In working up the flora of Ottawa the writer has been much impressed with the narrow limits ascribed to some species, and the few localities that have been even cursorily examined. The intention of this note is to encourage beginners and show how much is yet to be done in this vicinity.

The herbaria of those who worked in past years show that most of their work was done in the seventies. Mr. R. B. Whyte did his work chiefly in 1875, 76, 77, 78 and 79. Dr. H. M. Ami in 1879, Dr. James Fletcher chiefly in 1878 and 1879, though he has been doing active botanical work ever since. My own work and that of my son, J. M. Macoun, commenced in 1883 and has been continued ever since. Mr. William Scott, Head Master of Toronto Normal School, did a great deal of good work from 1891 up to the time he left for Toronto. The above names are given because the collections made by each of them may still be studied. Each collector had apparently his own "beat."

Mr. R. B. Whyte, first in the field, did most of his collecting on the east of the city, but the Gatineau river, Hull, Beechwood, and the Bank street road on the Glebe property, were his chief hunting grounds. Dr. Fletcher made his earliest collections in old Stewarton and the vicinity of Billings' Bridge. Later the writer collected in the Beaver Meadow beyond Hull, and the above with Dow's Swamp, Rockliffe Park and Beechwood are the only localities which have been exhaustively examined by him around the city.

Dr. Fletcher, in his *Flora Ottawaensis*, intended to include a radius of 30 miles from Ottawa, but outside of five miles from the city scarcely anything has been done. The only points we have specimens from are Eastman's Springs, Casselman, South Indian, Carleton Place, Stittsville, Aylmer, Chelsea, King's Mountain, Kirk's Ferry, Templeton and Buckingham.

Since the building of electric roads and the multiplication of railways there is no difficulty now in getting about, and the writer makes an earnest appeal to the members of the Ottawa Field-Naturalists' Club to commence active work in all branches in the spring, and he can assure them that in no branch is the field exhausted.

JOHN MACOUN.

Nov. 30th, 1901.

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By H. M. AMI, of the Geological Survey of Canada.

In a new country like Canada, pioneer scientific work must of necessity be of a general rather than of a more specialized and restricted type, and the numerous contributions to the scientific lore of the Dominion from the pen of Dr. George Dawson partake essentially of the former type, though in not a few instances has that eminent geologist and thinker left behind him a record of facts of a particular and special nature which show clearly that he had a mind capable of grasping the minutest details of a critical study.

His scientific activities extend over a period of some thirty-two years, and during that time not a single year elapsed without some contribution from his pen. His writings are chiefly geological, but they also include important reports and papers on the natural history of Canada. He devoted much of his leisure hours in preparing succinct reports on the economic resources of the Dominion, but first and foremost with regard to the mineral products of British Columbia and adjacent portions of the North West Territories.

Dr. Dawson's contributions to forestry are well known and supply a fund of useful and ready information whose value cannot be overestimated. The climatic conditions which prevail over the wide areas which he explored have been carefully tabulated and described, and will serve as a permanent record of the greatest interest and value. In the varied and abundant nature of his researches, Dr. Dawson was ever looking to the future growth and development of Canada and the Empire.

In preparing the accompanying list of Dr. Dawson's writings the writer has made liberal use of the bibliographies published by the Royal Society of England, the Royal Society of Canada, and N. H. Darton's Index of Contributions to the Geology and Palæontology of North America, supplemented references from his own card Catalogue.

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* For Biographical sketch of Dr. Dawson, see OTTAWA NATURALIST, Vol. XV, No. 2, pp. 43 to 52, May, 1901.

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In the Assembly Hall of the Normal School.	Dec. 10.—	President's Address, "*On the Extinction of Useful Animals in Modern Times.*"
		Short addresses by Dr. J. A. MacCabe, F.R.S.C., Professor Macoun and others.
		Conversazione, with exhibition of Natural History objects and Microscope slides.
	1902.	
In Y. M. C. A. Hall.	Jan. 14.—	"*On the Relation of Geology to Geography,*" illustrated by lantern slides, by Professor R. A. Daly.
		Report of the Geological Branch.
In Y. M. C. A. Hall.	Jan. 28.—	"*Whales and Whale Hunting,*" illustrated by lantern slides, by Professor E. E. Prince.
		"*The Natural History of Honey Bees,*" by Mr. Percy H. Selwyn.
		Report of the Entomological Branch.
In Y. M. C. A. Hall.	Feb. 11.—	"*The Ferns of Canada,*" illustrated by lantern slides, by Rev. Robert Campbell, D.D., Montreal.
		Report of the Botanical Branch.
In the Assembly Hall of the Normal School.	Feb. 25.—	"*The Present Position of the Evolution Theory,*" illustrated, by Professor E. W. MacBride, McGill University, Montreal.
		Report of the Zoological Branch.
In the Assembly Hall of the Normal School.	Mar. 11.—	"*Native Birds: their Characteristics and Habits,*" illustrated by lantern slides, by W. E. Saunders, Esq., London.
		Report of the Ornithological Branch.
In Y. M. C. A. Hall.	Mar. 18.—	ANNUAL MEETING. Reports of Council and election of officers.
		"*Notes on the Arboretum at the Central Experimental Farm, Ottawa,*" by Mr. W. T. Macoun.

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FAUNA OTTAWAENSIS.

HYMENOPTERA—Superfamily II.—SPHEGOIDEA.

By W. HAGUE HARRINGTON, F.R.S.C., Ottawa.

The proceedings of our society have recently made little reference to the local insect fauna, but it seems important that this branch of our natural history should not be altogether neglected. Abundant material exists in our cabinets, but unfortunately records have to be fragmentary, as so many forms are still undetermined or imperfectly classified. Last winter a start was made toward a rearrangement of my hymenoptera according to the admirable scheme of classification published by Ashmead, but the work has progressed slowly. Under his system the very extensive order of the hymenoptera is divided into ten easily recognized superfamilies as follows :—Apoidea, Sphegoidea, Vespoidea, Formicoidea, Proctotrypoidea, Cynipoidea, Chalcidoidea, Ichneumonoidea, Siricoidea. and Tenthredinoidea, which are subdivided into ninety-four families and many hundred genera. It would be preferable to commence with the Apoidea and to publish the superfamilies in consecutive order, but this is rendered impossible by the difficulty of determining the numerous bees belonging to such groups as Halictus, Andrena, Osmia and Megachile, and the supertamily Sphegoidea has been selected as a commencement. The species included therein are commonly known as solitary, or fossorial wasps, because they do not form communities as do some of the Vespoidea and because they usually construct their egg cells in burrows in the earth or in dead wood. The cells thus formed are stored by the industrious wasps with provisions for their prospective young. This food supply does not consist of pollen and honey, as stored by the bees, but of

insects, which vary in kind according to the wasps collecting them. Any observant person may, during the summer months, watch the agile mother-wasp hunting for its special prey, which when captured is paralyzed by the potent venom injected by the captor's sting. Thus the grubs, when they hatch, have fresh meat provided for their voracious appetites, and at the same time are secure from injury by their victims. They are not, however, in all instances exempt from parasitic species, which find access to the cells during the course of construction and deposit eggs, from which larvæ hatch and proceed to consume the food so industriously stored, and either devour or starve, the rightful occupants.

The superfamily is divided into twelve families of which all but the Stizidæ (which includes the great cicada-hunters) and the Ampulicidæ (rare cockroach-catchers) have representatives in our district. The family Oxybelidæ furnishes two small species, of which the commoner one was found by the Peckhams to store with flies its burrows in the sand. The family Crabronidæ contains one-third of all our species, usually in livery of black and yellow. They may often be seen about old stumps and trees, disappearing in burrows made either by themselves or by some departed beetle. The food collected varies with the species. The Pemphredonidæ are rather small and generally black and their habits are much the same as those of the crabronids. Of the Bembicidæ we have only three species, of which two are common and are easily known by the long beak-like labrum. They are strong active insects frequenting sandy fields in which their burrows are stored probably with diptera. The Larridæ are more numerous and are more bee-like in form and in color black, with sometimes a red band on abdomen. In their burrows they store small grasshoppers, etc. The family Philanthidæ contains a half dozen handsome species, of which the two species of Cerceris are common. Some members of this genus have been found to provision their cells with beetles. The Trypoxylidæ utilize the deserted burrows of other insects, and store up spiders for their progeny. The only representative of the Mellinidæ is very rare and probably supplies flies for its young as an European species is said to prey upon diptera. The Nyssonidæ is the second of our families in number of species,

and some of its members are very prettily marked. They offer a fine field for study of life habits as hardly anything is known in regard to them. The family Sphegidæ contains those species which are at the height of fashion as regards slimness of waist. The small abdomen is attached to the thorax by a threadlike petiole consisting of one or two segments exceedingly attenuated, and frequently much longer than the abdomen itself. The black, or red and black, Ammophilas may be seen hawking up and down paths in fields, and collecting caterpillars for their burrows, which are constructed in dry light soil. The mud daubers which build clay cells, often in groups, under stones or about buildings, provision them with spiders.

The foregoing scant remarks will give only a brief and imperfect idea of the diversity of habits to be looked for among the Sphegoidæ, and of the correspondently great interest to be derived from a careful observation of our species, regarding so many of which nothing definite or authentic is recorded. Those of our members who, more fortunate than the writer, are able to spend the summer in the country, could derive a great deal of pleasure in considering the ways of these wasps, and would by carefully recorded observations much amplify our knowledge of their life-histories. As a guide for such work, so suitable for ladies summering afield, there is a delightful book on the "Instincts and Habits of the Solitary Wasps," by Mr. and Mrs. G. W. Peckham, of Milwaukee. Acquaintances could readily be made among these lively and industrious insects, which would make the sweet summer hours still more enjoyable and the fields to yield new interests. The plates in the volume just mentioned give excellent figures of several of our common species, and many of our forms are portrayed in the beautiful plates of "The Insect Book," by Dr. Howard, the eminent United States Entomologist. This splendid book should be in every household, especially in every farm house or country cottage, a mine of information and delightful interest for every youth, who desires to know somewhat of the teeming life of the fields, the woods and the waters.

Family XV.—Oxybelidæ.

1. Oxybelus quadrinotatus, Say. Our common species from June to Sept.; 6 females and 7 males.

2. Notoglossa emarginatus, Say. Four females; the male not yet captured.

Family XVI.—Crabronidæ.

Subfamily I.—*Anacrabroninæ.*

3. Anacrabro ocellatus, Pack. This interesting form is sometimes very abundant on spiræa, and is seen chiefly in July, in which month my 9 females and 12 males were taken.

Subfamily III.—*Crabroninæ.*

4. Solenius interruptus, Lepel. One of our commonest crabronids, occurring abundantly at the end of summer on goldenrods, etc.; 18 females, 12 males.

5. Solenius producticollis, Pack. Occurring with former species but much less common. In appearance and markings it closely resembles the former, but is less coarsely sculptured. Four females and five males collected in July and August.

6. Ectemnius montanus, Cress. Five females and three males.

7. Ectemnius corrugatus, Pack. A slightly smaller species; 1 female, 3 males.

8. Crabro maculatus, Fabr. This large and handsome insect is our only representative of the typical genus upon which the family is based. As C. singularis, Sm., it will be familiar to our collectors. It occurs not unfrequently upon goldenrod, the males being most abundant, as I have 10 males and only 3 females. Fox in his monograph of the Crabronids states that the scutellum of the male is never marked with yellow, but in one of my specimens it bears two yellow dots, as it also does in two of the females.

9. Pseudocrabro chrysarginus, Lepel. Another fine large species which is quite common; represented by 4 females and 19 males.

10. Xestocrabro sexmaculatus, Say. One of our commonest and largest species of the subfamily, occurring abundantly throughout the summer; 12 females, 18 males.

11. Xestocrabro trifasciatus, Say. Very similar in appearance but hardly as large, and much less common; 3 females, 5 males.

12. Xestocrabro paucimaculatus, Say. One female, captured June 20th,

13. Clytochrysus nigrifrons, Cress. One male at Aylmer, Aug., determined by Fox.

14. Clytochrysus obscurus, Smith. One male, on Kettle Island, Aug. 25, 1894.

Subfamily IV.—*Thyreopinæ.*

15. Synothyreopus advenus, Smith. The males of this and of the four following species are remarkable for a curious shield-like expansion of the anterior tibiæ, making the forelegs look as if they might be used as auxiliary wings. The species have all been determined for me by Fox. None of them are at all common apparently, and the females are very rare. Of this species 1 female, 3 males.

16. Synothyreopus tenuiglossus, Pack. One female. Collected also by Mr. Guignard.

17. Thyreopus cribellifer, Pack. Two males. The tibial shield is very large, about one-third of it spotted and the remainder fuliginous.

18. Thyreopus argus, Pack. Two males. The shield is smaller but is beautifully mottled with light spots upon a dark ground over its whole surface, from whence the name.

19. Thyreopus latipes, Smith. Two males. The pale yellowish shield bears several radiating dark stripes.

20. Blepharipus Harringtonii, Fox. The type female is in Coll. Fox. I, however, captured another female near Hull on June 9, 1895, and I have received from Mr. Guignard a male (labelled B. ater). This species is distinguished from the following by the more rugose metathorax, and the female is smaller.

21. Blepharipus nigricornis, Prov. One male in my collection and a female (labelled B. ater, and apparently determined by Prov.) received from Mr. Guignard.

22. Blepharipus ater, Cress. Two females. Easily separated from the foregoing by the enclosed triangular space on metanotum.

23. Blepharipus (Crabro) niger, Prov. This species, described from an Ottawa female from Mr. Guignard, is probably identical with B. Harringtonii, Fox, but I have not seen the specimen. If the same, this name would have priority.

24. Blepharipus cinctipes, Prov. Two females and one male. Very similar to nigricornis, but has the hind tibiæ distinctly annulate with white.

25. Blepharipus impressifrons, Smith. Two females and two males. A pretty little species easily distinguished by the yellow markings on pronotum, scutellum and legs.

26. Crossocerus minimus, Pack. Our smallest species of the subfamily. One female and four males, taken in June. Fox in his monograph of the crabronids says that he had not seen the male. It differs little from the female except in being slightly smaller and in having a little more yellow on the legs.

27. Cuphopterus maculipennis, Smith. This is a not uncommon species, prettily marked with yellow, and easily recognized when living, by the maculate wings, the spots upon which fade out very much in cabinet specimens; 4 females, 5 males.

Subfamily IV.—*Rhopalinæ.*

28. Rhopalum pedicellatum, Pack. The insects in this subfamily are rather small, and are easily recognized by the petiolate abdomen. This species is common and forms its nests in the stems of elder and raspberry; 15 females, 10 males.

29. Rhopalum rufigaster, Pack. Only one female of this small species, with abdomen partly red.

Family XVII.—Pemphredonidæ.

Subfamily I.—*Pempredoninæ.*

30. Stigmus fraternus, Say. A small species, abundant; 8 female 5 males.

31. Cemonus inornatus, Say. A common form; 12 females, males.

32. Pemphredon concolor, Say. Very similar in appearance b larger and not so common; 2 females, 2 males.

33. Passalœcus mandibularis, Cress. The triangularly produce labrum and short petiole distinguishes this genus from Cemonu and Pemphredon. Three females.

34. Passalœcus annulatus, Say. Smaller, with paler legs; 2 females, 2 males.

35. Diodontus americanus, Pack. One female from Dr. Fletcher.

Subfamily II.—*Pseninæ.*

36. Mimesa borealis, Smith. Second segment of abdomen red; females.

37. Mimesa niger, Pack. All black; 2 females, 1 male. The species much resembles in general appearance the smaller individuals of Pemphredon concolor, but is more slender and has the thorax more polished.

38. Psen trisulcus, Fox. Taken near Hull in July; 1 female, 1 mal

Family XVIII.—Bembicidæ.

39. Bembidula ventralis, Say. A common species upon goldenrod in August; 4 females, 3 males.

40. Bembex spinolæ, Lepel. Much resembles in shape and markings some of the large paper-making wasps, but is easily distinguished by the long beak-like labrum. Common in sandy spots in fields, where its burrows are made, and very active; 2 females, 2 males.

41. Microbembex monodontà, Say. A smaller and more prettily marked insect, of which I have received a female from Mr. Guignard who captured several. It has also been taken by Dr. Fletcher, but I have not yet met with it.

Family XIX.—Larridæ.

Subfamily I. —*Larrinæ.*

42. Ancistromma distincta, Smith. One female captured on 26th July. This species is larger and has the tibiæ more spinous than the following species. Three basal segments of abdomen red.

43. Tachysphex quebecensis, Prov. Although I have at present only 1 female and 1 male in my collection this species is not uncommon as several individuals have been taken by Mr. Guignard. The metathorax is more coarsely sculptured than in our other members of the genus. In the index published with his Add. Hym. Que., Provancher gives this species as = abdominalis, but the Larra abdominalis of Say is a Tachytes.

44. Tachysphex compactus, Fox. One female seems to belong to this species; the abdomen is coloured as in quebecensis, but the metathorax is different.

45. Tachysphex terminatus, Smith. A species easily recognized by the red tip of the abdomen; 2 females, one male. I have also a small (headless) male from Mr. Guignard under the name Larra minor, a species described by Provancher from individuals sent to him by that gentleman. In the description the legs are said to be unarmed, but the spines, though feeble, can be easily seen. The species is undoubtedly a synonym of terminatus.

46. Tachysphex laevifrons, Smith (?) Provancher records a male which he received from Mr. Guignard as this species, and I have a female which I doubtfully refer to it as I have not the description for comparison. Fox speaks of the species as perhaps identical with T. tarsatus, Say, the description of which applies pretty well to my specimen.

47. Tachysphex arcuatus, Smith (?) Provancher refers to this species a female received from Mr. Guignard. (Add. Hym., p. 26.)

48. Tachysphex sp. A male received from Mr. Guignard cannot be referred to any of the descriptions accessible. It is black with the exception of the reddish posterior margins of segments 2 and 3 of abdomen. The metanotum is finely striated and the eyes are unusually close together on the vertex.

Subfamily II.—*Lyrodinæ.*

49. Lyroda subita, Say. Of this elegant black species 2 females, 3 males.

Subfamily IV.—*Pisoninæ.*

50. Pison lævis, Smith. Provancher (Add. Hym., p. 269) credits Mr. Guignard with having taken a female at Hull. I have not seen the insect, as it, with others previously mentioned, are in the Provancher collection in Quebec.

Family XX.—Philanthidæ.

Subfamily I.—*Cercerinæ.*

51. Cerceris clypeata, Dahlb. This and the next are our only representatives of about one hundred described North American species. It is a common insect ; 7 females, 11 males.

52. Cerceris nigrescens, Smith. The markings of this species are white, instead of yellow, and it is also abundant . 4 females, 6 males.

Subfamily II.—*Philanthinæ.*

53. Aphilanthops frigidus, Smith. A pretty insect and not common ; 2 females. 2 males.

54. Epiphilanthus solivagus, Say. Our largest and most abundant species of this family. Very numerous upon goldenrod ; 18 females, 13 males.

55. Anthophilus politus, Say. One female. Taken also by Dr. Fletcher.

55*a*. Anthophilus dubius, Cress. Two males : the species is evidently a synonym of politus.

56. Philanthus bilunatus, Cress. A highly polished insect prettily marked with bright yellow ; 8 males. The female appears to be unknown.

Family XXI.—Trypoxylidæ.

57. Trypoxylon striatum, Prov. (T. albipilosum, Fox.) A fine large species which appears to be rare in this district as I have taken only one female. I have, however, received a male from Mr. Guignard who also furnished the type to Provancher.

58. Trypoxylon frigidum, Smith. A small species and rather abundant ; 6 females, 1 male.

Family XXII.—Mellinidæ.

59. Mellinus bimaculatus, Pack. A neat little insect which seems to be rare here as elsewhere. One male taken many years ago on Aug. 6 and one female Aug. 5, 1894; the latter was dead in a spider's web, but quite fresh and perfect.

Family XXIII.—Nyssonidæ.

Subfamily I.—*Gorytinæ.*

60. Pseudoplisus phaleratus, Say. A handsome species with clouded wings and conspicuous yellow markings on body and legs; 11 females, 9 males.

61. Hoplisus canaliculatus, Pack. Wings and markings paler; 3 females, 4 males.

62. Hoplisus simillimus, Smith. Very similar in appearance; 1 female, 3 males.

63. Hoplisoides nebulosus, Pack. Rare; 1 female, 2 males. Gorytes armatus, Prov., and Philanthus Harringtonii, Prov., described from Ottawa specimens, appear from the descriptions to be males of the same species.

64. Gorytes nigrifrons, Smith (?) One female taken near Hull on Aug. 5, 1894, is referred to this species with a little uncertainty.

Subfamlly II.—*Alysoninæ.*

65. Didineis texana, Cr. One female taken at Aylmer Sept. 10, 1893. Its capture was quite accidental, for it settled on the ground near me as I sat by the roadside watching a couple of Sphaeropthalma candensis, Blake, wandering around.

66. Alyson Guignardii, Prov. One female, two males.

67. Alyson conicus, Prov. The types of this and of the preceding species were collected by Mr. Guignard. Three females, one male.

68. Alyson melleus, Say. A pretty pale species; 1 female.

69. Alyson triangulifer, Prov. One female, one male.

70. Alyson oppositus, Say. This appears to be the commonest species; 6 females, 2 males.

Subfamily III.—*Nyssoninæ.*

71. Nysson lateralis, Pack. A stout black insect with white spots on abdomen; 1 female, 3 males.

72. Brachystegus nigripes, Prov. I have received from Mr. Guignard, who collected the type, a male, and also under the name Nysson rusticus, Cress, a female, which, although it has the

base of the abdomen red, is evidently the same species. It does not answer to the description of rusticus and belongs like nigripes to Brachystegus.

Subfamily IV.—*Astatinæ.*

73.—Astatus unicolor, Say. One female, one male; the latter is conspicuous by the large eyes meeting at vertex. Taken also by Dr. Fletcher and Mr. Guignard,

Family XXV.—Sphegidæ.

Subfamily I.—*Sphegineæ.*

74. Isodontia philadelphica, Lepel. One male received from Mr. Guignard. It has also been taken by Dr. Fletcher.

75. Prionony x bifoveolatus, Tischb. Mr. Guignard sent to Provancher the types of P. canadensis, which is a synonym. I have not met with either of the species. Provancher also records Sphex ichneumonea, Linn., as taken at Ottawa, but this is an evident error, as Mr. Guignard, to whom it is credited, has no recollection of capturing this fine species which is common westward.

Subfamily II.—*Ammophilinæ.*

76. Psammophila communis, Cress. Abdomen partly red; 1 female, 5 males.

77. Psammophila luctuosa, Smith. All black; 3 females.

78. Ammophila gryphus, Smith. This large species appears to be rare. I have only one male, and Dr. Fletcher has captured only one individual.

79. Ammophila conditor, Smith. This appears to be our commonest species, and the males appear to much more numerous than the females; 1 female, 12 males.

Subfamily III.—*Sceliphroninæ.*

80. Sceliphron cementarius, Drury. This large wasp is at once separated from the slender-waisted species of the previous subfamily by its yellow-banded legs. It may frequently be seen making its mud-cells under windowsills, etc., and is a common form; 3 females, 3 males.

81. Chalybion cœruleum, Linn. This is a fine insect, differing from all our fossorial wasps in its bright blue body and dark wings. Like the preceding form it is common and a builder of mud-cells; 4 females, 4 males.

NESTING OF SOME CANADIAN WARBLERS.

By WM. L. KELLS, Listowell.

THE CHESTNUT-SIDED WARBLER.

On the northern end of Wildwood Farm, which lies on the northwest of the town site of Listowell, there exists a tract of hardwood timbered forest of about seven acres in extent; but which, with that on the adjoining farm to the north, covers an area of over twenty acres. Most of this tract has a good natural drainage; but some parts towards the centre are low, and contain pools of stagnant water until after mid-summmer. The greater part of this wooded tract is still in its primitive wildness; for though the larger timber of the forest of thirty years ago has been mostly removed, yet the subsequent growth is yearly increasing in size, though none of the trees are ever likely to attain the proportions of their ancestors of the "backwoods." In most parts of this woodland there is a thick growth of low, young underwood; which, when in full leaf, as it is at the end of May, is very dense, being also intermingled in most places with wild raspberry vines. Amid such scenery the chestnut-sided warbler evidently loves to make its summer haunts and home; for here, from the early days of May till summer time is over, its rather plaintive song-notes are daily heard, and here, for several years past, I have noted the nests of several of the species. On May 22nd of the past year (1900), not far distant from each other, I noted two newly formed nests of this bird. The first seen was deep in the underwood, and placed in the fork of a small bushy maple about twenty inches off the ground. This was so bulky and compactly built that at first I took it to be a nest of an Indigo Bird. It was formed of a kind of woody fiber gleaned from decayed timber, vines and grasses, and lined with long, black, horse-hair, which it must have taken the builder a good deal of time, with much trouble, to collect and place in position. On the above date this nest contained an egg of the cow-bird, which I removed and—five days after—it contained three eggs of the chestnut-sided warbler, and

on these the female was incubating, and as the usual set of eggs of this species numbers four, it was evident that the cow-bird had removed one of the warbler's when she deposited her own ; this tramp among birds, is one of the worst enemies with which the whole family of the warblers has to contend : as many of their nests are found to contain one or more, of the cow-bird's eggs ; and there is danger that the progeny may destroy the whole brood in the nest of the species in which it is cradled. On one occasion I found a nest of the chestnut-sided warbler which contained four cow-bird's eggs, and but one of the warbler's own. The eggs of this species are of a whitish hue, with a very irregular wreath, or belt, of a brownish color, around the larger end, and some dottings, sometimes of a blackish hue on the middle surface ; the smaller end is unmarked. The other nest of this species, noted on the same date, was near the edge of the wood, and placed between several stalks of raspberry vines, about two feet off the ground, and composed of materials much similar to the other, with the exception of the horse-hair lining, and was not so bulky in size—this on the 30th of May, contained four eggs. A week after, two other nests of this species were noted, both deeper in the wood, and both placed in the forks of little maples : but at varying elevations from the ground, one being about four feet, this contained four four eggs, the other which contained three eggs, was about two feet off the ground, and by the side of a pathway. In both cases these were evidently advanced in incubation, and were not molested. I concluded that in this tract of forest about a dozen pairs of this spieces were breeding, but they have many enemies among other birds and small animals.

The chestnut sided warbler is among the first of the warblers to make its appearance in this part of Ontario, usually when the young underwood is beginning to put forth its leaves and the earliest of our wild flowers are in bloom. This season I first noticed the species on the 4th of May, and two weeks after its advent it begins to nest. It is probable that as more small fruit shrubs and vines are cultivated in the rural districts, that this species, as well as others of our wild woodland birds, will yet be found to make their summer haunts and homes in the vicinity of

human habitations, and contest with the chipping sparrow for the possession of a nesting site among the raspberry vines of the garden.

THE AMERICAN REDSTART.

In the same woodland, which, with the uncleared parts of the adjoining farm, covers an area of over twenty acres, the active and beautiful redstart is heard intermingling its notes, and found to have its summer home in close community with those of the chestnut-sided warbler, and its nesting site is always found to occupy a higher elevation, and usually the more open parts of the underwood, the nest being placed in rather exposed positions, the bird apparently depending for the concealment of the nest more on the fact that the material of which it is composed closely resembles the bark of the sapling in the fork of which it is placed, rather than on the denseness of the foliage that overhangs and surrounds it. Many nests of this species, in past years, have come under my observation; but it is only of those noted the present season that I purpose here to speak. On May 22nd I noticed a female redstart flying from a partly composed nest, the site of which was in the fork of a small maple sapling, and at an elevation of about eight feet off the ground. This nest could be easily seen, when the searcher's gaze was directed to it, at a distance of four rods; the woods around it were rather open, and the leaves of the sapling were a yard or more above it. Eight days after I found that this nest contained four of the warbler's own eggs and one of a cowbird, all of which were fresh. Of all the warblers, the nest of this species is about the neatest and most firmly put together, the bird evidently emitting a good deal of saliva upon the material of which the nest is composed when she is placing the fragments in position. All this work, as well as that of incubation, appears to be done by the female, though it is probable that her more beautifully plumaged consort occasionally supplies her with food as she incubates her eggs; and he certainly largely assists in feeding the young and in trying to defend them if exposed to danger. If the first efforts of this bird to propagate its species are successful, it does not nest more than once in the season, otherwise it will nest a second time. The materials of which the greater part of the

nest of the redstart are composed is a kind of fibre gathered from decaying timber and the seed pods of various kinds of vines, and it is usually lined with animal hair. I have never known the set of eggs to exceed four in number, and generally the second set contains only three, with the addition mostly of a cow-bird's. The eggs are of a whitish ground hue, marked towards the larger end with a wealth of spotting of a flesh-colored hue and smaller dots of the same hue scattered over the surface. Another bird of this species was noticed building her nest at a much higher elevation deeper in the wood, and even in a more exposed position; but a few days after the nest was completed it wholly diappeared, and I suspected that an olive-sided fly-catcher that had made her nest on an overhanging branch, a few rods off, was the author of that. Other nests were observed, but there was nothing specially noteworthy about them.

THE WATER THRUSH.

Near the centre of the woodland, adjoining Wildwood on the north, is a natural water "runway" where most of the large timber was up-rooted in the terrible wind and ice storm of April some seven or eight years ago. In one of those up-turned roots, below which there is in the early season, a deep pool of water, I have on several occasions, in past years, noticed a nest of a water thrush, and expected this year to take a set of its eggs from a cavity in the same old root, but a delay of several days having occurred after the time when I intended to have visited it for that purpose, I found when I did so on the 28th of May, that I was *too late*, the nest was there, but a glance at the four eggs which it contained showed by their galvanized appearance that they were far advanced in incubation, and I did not remove or revisit them. The cavity in which this nest was placed was small, the bird had either found it ready for her purpose, or had partly enlarged it, and the nest itself was made of weed-stems, dry grass, animal hair, and "hair-moss." Usually when the cavity is large, this species uses a quantity of dead leaves in the construction of her nest. This bird is not abundant anywhere in this country, though a pair or two of them may be found each season in suitable localities, which is always low, swampy woods, or along a natural water course

where there is much fallen timber, and where fires have burnt hollows in the mucky soil, that in after years are filled with stagnant water during the greater part of the year. In my boyhood days I discovered that this bird, as well as several other species of the warblers, would nest in cavities prepared for them in the early spring time, and as I have often acted on this suggestion, I seldom fail—each year—to find nests in these places if, situated in the localities that they frequent.

THE BLACK AND WHITE WARBLER.

On the southeast corner of the farm lot that adjoins Wildwood on the north, and but a few rods from the boundary line, in a stretch of low ground there stands the large turned up root of an old fallen tree, the top of which is over a dozen feet from the level ground. In what was once the "upper" side of this "turn-up," and about half-way in its height, I discovered on the 28th of May, a nest containing three eggs, which at the time, I took to be those of a Canadian warbler. Three days after I revisited the site, found the mother bird "at home" and seated on the nest. At my near approach she flushed off and down upon the ground—where with outspread and quivering wings, and the venting of a few notes, she attempted to draw my attention from her treasures. Gazing down on the interesting little creature, within a few feet of where I stood, I was not much surprised, though somewhat disappointed, to note that the specimen was of the *M. varia* species, and that it was her nest that was placed before me, and which now contained five beautifully spotted, fresh eggs. The cavity in which the nest was placed had been partly excavated, probably by the bird itself; but in order to support the foundation quite a large quantity of dead leaves and strips of bark had been used, and inside of this there was a lining of fine vegetable materials and some animal hair. So closely in composition and materials, as well as the situation of the nest, as also the size and marking of the eggs, do those of this species resemble that of the Canadian warbler, that it would be difficult to decide which belonged to each species, unless the owners were identified on or close by the nest. A few points of variation may be noted, and this subject will again be referred to in the article on the nest of

the Canadian warbler ; *M. varia* usually selects a nesting site in the "upper side" of the up-turned root and generally higher off the ground, and the eggs are usually less oblong in form than those of *Canadensis*. This species is not an abundant summer resident in this district, and scarcely a dozen nests of this bird have come under my observation in all my Wildwood rambles ; yet in all the low-land woods of this country some of the species may be found, and in such tracts it makes its haunts and home during the period that it remains in this province ; and here, from the early days of May, till towards the end of June, its song notes may be heard, and this period may be regarded as its nesting time ; but whether it nests more than once in the season I do not know. In all probability when the first set of eggs is taken before incubation begins, it nests again, but it may be taken as certain that in does not raise more than one brood in the season ; and considering the many enemies to whose depredations its nests are exposed, it is very probable that many of the species come and go without having increased their numbers ; the cow-bird is one of its worst enemies.

THE CANADIAN WARBLER.

On the 28th of May, when passing the "old root" of a fallen tree I discovered the newly made nest of a small bird, which at first I thought might be that of a mourning warbler, whose scolding notes I heard near by. On the 5th of June, when I thought the set of eggs would be deposited I revisited the place. On the nest sat the mother bird, and there she remained till I almost touched her with my hand, then she flushed out, making some attempts to draw off my attention ; and uttered a few sharp "chips," and I saw at once that she was a Canadian warbler. The nest then contained five eggs, and incubation had begun. The nest was placed in a cavity among the rocks, only a few inches above the more level earth, and was composed of dry leaves, strips of bark, and other fine vegetable fibers, and lined with some long horse-hair. When placed side by side with that of *M. varia* previously described, I make this comparison of the nests and their sets of eggs, after the latter are blown. The nests —in composition and size—are very much alike ; both are rather

loosely put together, but there is quite a distinguishing difference in the eggs. Those of *M. varia* are actually the largest, and more globular in form, and the ground color more of a chalky whiteness, and the spotting more of a brownish hue; with a general tendency to form a wreath about the larger end, and be distributed over the surface, even to the smaller point. The eggs of the Canadian warbler have a clear white hue, with a beautiful rosy blush, and the coloring which clouds the whole of the larger end of each egg, has more of an orange tinge than either reddish or brown, the dotting on the surface is more separated, and the approach to the smaller point more devoid of dotting than are those of *M. varia*; but in all the specimens the variations are so numerous that it is difficult to describe them. This species is very local in its distribution, being generally found to frequent the borders of swampy woodlands, having much the same habitat as the water thrush and *M. varia*; but here it is more abundant than either of the other species, and seems more disposed to explore the underwood of the higher hardwood lands and to nest on more level ground. Altogether, about a score of the nests of this species have come under my observation in my woodland rambles in this vicinity in the past twenty years; and, as in the case of the water thrush, black and white warbler, and several other species, several of these nests were in cavities previously prepared for them. The song of the male of this species is generally emitted at a height of twenty feet from the ground, and is rather a plaintive warble than an expression of joyfulness, and is rapidly repeated in an emphatic tone of voice; and the attentive student of bird music will soon learn to distinguish it from those of the other warblers. Like most other of our minor birds, this species is frequently imposed upon by the vagabond cow-bird. It is uncertain if the male assists the female in the duty of incubation, but he certainly helps to feed and protect the young. When the first set of eggs is taken, they nest again; but, if not molested, only one brood is raised in the season. The nesting period extends from the middle of May to the first week in July. The ground-nesting warblers have many enemies; and it is evident that many pairs of them come to this country, and

return again to their winter homes, without being being able to raise a single offspring.

On the 15th of June I saw another nest of the Canadian warbler, which then contained young a few days old. This was placed in the upper side of a hemlock "up turn," on the lower side of which I had noted a nest of the species the two previous years. As I had occasion to pass that way during the following days, I several times saw the mother bird seated on the nest, brooding over her young; and I thought as I gazed on the lovely creature that a more perfect picture of motherly care, affection and peacefulness could not be imagined, and I was pleased to think that she would succeed in raising her little family in peace and safety.

THE OVEN BIRD.

On the 14th of June, as I was passing with a team of horses attached to a wagon, along a road-way through the above mentioned wood, my companion directed my attention to the action of a small bird that was seen to flush almost from under the horses' feet, and by her manner of running along the ground, indicated that she had been disturbed off her nest. A little search discovered her home which contained three young just hatched out. This was a nest of an oven bird, otherwise known as the acceator, or golden-crowned thrush. It was partly sunk in the virgin mould, amid dry leaves and some wild flower stalks, and under a small branch, and composed of dry leaves and decayed vegetable stalks, and being covered over like a small hut, or oven, was so well concealed that the passer by even in searching for it, could fail in most cases to notice it ; and this site was only a few inches from where the horses and cattle had walked with heavy steps, and where the wheels of the wagon had sunk deep in the soft earth. It contained three young just hatched ; and the mother bird in leaving it acted more like a mouse, than a creature with wings. This interesting member of the warbler family is still a tolerably common summer resident of the remnant of our forest; and owing to the peculiar manner in which it constructs its nest, manages to secrete its eggs, and thus continues its existence in its ancestoral home, from which so many others of the avifaunian race have heen driven to seek new homes in more secluded retreats. The mother

bird also sits very close on her nest, and will allow herself to be almost trodden upon or caught within her hut-like nest before she leaves her charge. The set of eggs usually numbers four, occasionally five; these are of a whitish hue, wreathed and dotted, mostly on the larger end, with spots of brownish or flesh color. Like most other small birds, this species is often imposed upon by the cow-bird. If her first set of eggs is removed she nests again, but only one brood is raised in the season. The oven-bird arrives in this vicinity about the first week of May, and its song continues about eight weeks. When, on a June day, as I wander in the wooded lands and hear the song, or see the nest of this bird, my memory recalls my boyhood days and early pioneer rambles in what was then a portion of the backwoods of Western Canada; and now, as then, I note that this species seems disposed to locate its nesting place by the side of the cow-path, and among low underwood.

NOTE ON BROOD-CARE IN REPTILES.

To the Editor of THE OTTAWA NATURALIST.

DEAR SIR,—In an interesting note appearing in the December number of the OTTAWA NATURALIST on the oviposition of the Mud Turtle, the writer quotes an observant friend as saying that "though he never saw a young turtle come out of a nest, his belief is that the mother watches the nest, and, when the young are hatched, either pulls the top off the nest or puts down her claws and lifts the little ones out." Natural History consists not of beliefs but of carefully ascertained facts. As nobody has ever observed any turtle trouble itself about its eggs once they have been laid and covered up, one must be excused for hesitating to share this "belief." The brood-care so well developed in birds, the mammals, and some of the highest fishes (teleosts), is a much simpler thing in the reptile. There is very little evidence of any reptilian interest in the young, and what evidence there is relates so far as I know, to the snake and crocodile only. Any observations of such an instinct in the turtle would be very interesting.

C. GUILLET.

SCUDDER'S BLUE.

By J. B. WILLIAMS, F. Z. S.

Dr. Scudder's interesting article in the August number of the OTTAWA NATURALIST on "My First Namesake," brought to my mind the fact of there being a second brood of *Lycœna scudderi*; and I went to High Park, near Toronto, on the evening of August 16th, to try and find some of these butterflies. I had secured quite a number of the first brood on the lupine patches there during the month of June. It was almost six o'clock before I was able to reach the Park, and I quite feared that it would be too late; however, the place was exposed to the setting sun, and a number were still flying about; so that, in half an hour, two males and eight females of the desired species were captured. Several of them flew up from tall grass growing where the lupines flourished in the early summer. The flowering stems of the lupines were all dead, and the few leaves that remained near the ground were half withered, and did not look as if they would form very nourishing food for the young caterpillars, if the eggs of the second brood hatch in August. I therefore went again to High Park on December 7th, to see if any trace of eggs or chrysalids could be found. It was a mild, dry, afternoon, and I grubbed about on hands and knees among the dead lupine plants for a good hour; and as a result, found two tiny white objects, one on a piece of stalk, and one a seed-pod, which when looked at under a pocket-lens, appeared to be the "turban-shaped elegantly chased eggs," described by Dr. Scudder.

A mounted policeman who was patrolling the Park seemed rather suspicious of my movements, perhaps thinking he had come across an escaped lunatic, for the asylum is on that side of the city; and to the uninitiated, my actions may have appeared rather curious. When I got back to the road, he was standing a short distance from the Park conferring with a brother officer, and as I passed, one of them saluted me with "good afternoon." My answer was, I suppose satisfactory, for they made no attempt at an arrest, and I got safely back to the city with the two butterfly eggs. The price has fallen since Dr. Scudder collected at Albany, for my trip was a cheap one, and they only cost about seven cents apiece; nevertheless, that is a good price for such small objects, and I shall be sorry if they turn out, after all, to be something else, and do not hatch out in the summer as Scudder's Blue.

THE BOBOLINK'S LOVE FOR ITS HOME.

By W. H. MOORE, Scotch Lake, N.B.

(Read before the Ornithological Section of the Entomological Society of Ontario.)

In the little experience the writer has had in ornithological study, there is no incident more deeply impressed upon his mind than the love of a pair of bobolinks for their home.

June 16th, 1900, the writer and his brother C. were clearing drift material from a piece of island meadow, which overflows during the spring freshet in the St. John River. A bobolink nest containing three eggs was discovered, but not until the nest had been overturned and the eggs scattered about. The nest and eggs were gathered together and put in our lunch basket and taken home. Next day (June 17th) we were again employed in clearing up the drift. As we were about leaving for home, C. inquired what kind of nest that was, with one egg in it? On answering that I did not know of any nest there, but that that was where I had obtained the bobolink's nest the day before, he said there was a nest with one egg. Sure enough, in the depression where the nest had been, the birds had collected a few of the scattered straws of the nest and on them deposited an egg.

What impressed the writer most strongly was that the birds should repair the nest at all, for on just such occasions song and Savannah sparrows' nests had been partly destroyed, but the old birds were discouraged, and never returned to finish incubating. It was for this reason that the bobolink eggs were taken the first day. The egg laid on the 17th was taken and makes one of a set of four eggs, which afford an interesting bit of bobolink history.

When cutting the grass on our island lot, young birds are often found which cannot fly, and when it happens to be a bobolink's nest, the old female will fly about over the spot searching for its young. The flight at such times is undulating in small circles, but often when no person is near, the mother bird alights and searches in the grass to find the young and feed them. If the young are large enough to leave the nest, they are led to a place f safety. The male seems to be much less concerned in respect

to the safety of the young ; he seems to think more of saving his own colours, which he changes here by the first week in August. After that date the plumage of male and female, old and young, is very nearly the same, and they congregate in flocks of hundreds which resort to some favorite place to roost at night. During the latter half of August they begin the southward journey, and their "pink," "pink," is often heard high overhead, so high indeed that the birds are indiscernable to the naked eye.

SOIRÉES.

The first Soirée of the season was held in the Assembly Hall of the Normal School on the evening of Dec 12th. In the absence of Dr. MacCabe, an address of welcome was delivered by Dr. Sinclair.

Dr. Robert Bell in his Presidential address "On the Extinction of Useful Animals in Modern Times," referred to the general tendency to extinction of all species of animals which had obtained throughout zoological time, and showed that while in a state of nature a balance was generally maintained any interference by man accelerated the tendency towards extinction. Prof. Macoun, Mr. Shutt and Mr. Halkett also spoke briefly.

As is usual at the opening Soirée of the Club's lecture season, a portion of the evening was devoted to the exhibition of natural history objects and microscopic slides. Several members of the Club had loaned microscopes, and these added not a little to the interest and success of the meeting.

A mounted collection of perennial plants suitable for Ottawa, grown at the Experimental Farm, was exhibited by Mr. W. T. Macoun, and a very beautiful collection of fifty water colour paintings of Manitoba plants were shown by Dr. Fletcher with the artist's permission. These were painted by Mr. Norman Criddle of Ameme, Man., and attracted much attention not only on account of their artistic merit but also for their scientific accuracy.

Mr. Odell's living specimens of reptiles, and Mr. Halkett's living fish were among the most interesting objects shown.

The next Soirée will be held in the Y. M. C. A. Assembly Hall, when Dr. R. A. Daly will read a paper "On the Relation of Geology to Geography," illustrated by lantern slides.

TO OUR OTTAWA MEMBERS.

Half the Club's year has passed—half is before us. Each season should have for our members its own particular work and interests. Apart from the publication of THE OTTAWA NATURALIST, the two chief features of our organized life are the summer excursions and the winter lecture course. We all regret extremely that owing to untoward circumstances—principally unfavourable weather—our general excursions were not perhaps as successful as in past years. The sub-excursions, at the opening of the season, were well attended and the leaders report good collections being made.

The Soirée Committee appeal to the members to make the remainder of our year as successful as possible. Everyone can help towards this end by attendance at the lectures and by an intelligent interest in the subjects discussed.

The Council has made a departure this year—a most important one, one which should commend itself to all. As will be seen by the programme, we have secured for three nights of the course several new lecturers, some from outside the city—two from Montreal and one from London, Ontario. These lecturers are well known men—specialists upon the subjects they will discuss, and we feel there is a great treat in store for us.

As Chairman of the Lecture Committee, may I invite, or if necessary, urge, regular attendance throughout the course, which will be found one of particular interest. But if regular attendance is impossible, every member should strive to be present on the evenings when our visiting lecturers are with us. Come and bring your friends. Let us have the hall full, and thus show our appreciation of their kindness.

One word further. We should very much like to see fifty new names added to the membership roll this winter. To meet the increased expenditure in connection with the lecture course the money is needed, but altogether apart from that aspect, we want the members. If we all make some little effort, this increase is quite feasible. Every year, if the Club is vigorous and doing its work, should see an accession of members, but for several years past the proposals of new names for membership have not been as numerous as they might have been.

Finally, keep your programme where you can at all times refer to it, and let our Tuesday evenings have the first claim among your engagements.

F. T. SHUTT.

REVIEWS.

SYLVAN ONTARIO. A GUIDE TO OUR NATIVE TREES AND SHRUBS. By W. H. Muldrew. William Briggs. Toronto. 1901. Illustrated with 131 Leaf-drawings.

When Prof. Muldrew established in the grounds of the Gravenhurst High School an Arboretum in which he has now growing practically all the trees and shrubs of the Muskoka district he not only hit upon the best method of interesting his pupils in botany and especially the care and culture of trees, but he did a service to the town itself which might be imitated by other headmasters of public and high schools all over Canada. But when he went a step further and originated and elaborated his system of identifying trees and shrubs by their leaves alone he made it easy for any intelligent person, whether a botanist or not, to know them after a few minutes' study.

His plan is simplicity itself. After first describing the different kinds of leaves, their arrangement on the stem, their margins, shape, venation, etc., and figuring 131 forms of leaves, he separates the Ontario trees and shrubs into groups by their leaves and all the knowledge required to use the "Index based on the leaves" may be acquired by a careful reading of the six pages which precede it. But should there be any uncertainty in determining a difficult species the index is followed by a catalogue of all the species referred to in the index and where it has been thought necessary a few words of further description are added, together with the habitat and distribution of the species. Students of botany and everyone who wishes to know our shrubs and trees should possess a copy of SYLVAN ONTARIO.

MANUAL OF THE FLORA OF THE NORTHERN STATES AND CANADA. By Nathaniel Lord Britton. New York. Henry Holt & Co., 1901.

This long expected manual, based on Britton & Brown's Illustrated Flora of the Northern States and Canada has just been published, and will be reviewed in an early number of THE NATURALIST.

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MAMMALS OF THE CHILLIWACK DISTRICT, B.C.

By ALLAN BROOKS.

Chilliwack lies on the south bank of the Fraser River, the valley proper being a very level stretch of alluvial land some seventy feet above sea level. On the east, the Cascades rise sheer from the flat land to the height of from 5,000 to 8,000 feet, Mt. Baker to the southward being over 14,000 feet. The fauna of the lower levels is typical of the coast district, the higher peaks extending into the boreal and alpine zones, which give a great diversity of fauna and flora for so small an area.

Most of my mammal collecting was done between 1894 and 1900, prior to that time my attention being devoted mainly to birds.

I made many trips into the mountains, including the Mt. Baker range on 49th parallel, Tami Hy peak, Chilliwack Lake, and mountains to the southeast of this lake, mountains at head of Stave lake, Cheam peak, and many of the smaller mountains ; so the district was very fairly covered by me. Most of my collections were sent to, and identified by, Mr. Outram Bangs and Mr. Senit S. Miller, Jr. I have also supplied skins to the Biological Survey collection and a few to Mr. S. Rhoads, as well as skins of a pair of most of the species enumerated to the Provincial Museum, Victoria, B.C.

Many of the rodents may be intergrades with the forms occurring to the east of Cascade Range. One or two bats not enumerated may occur, for instance *Atalpha cinerea* and *Myostis longicrus;* I am pretty sure I have taken the last. The wolverine occurs in the mountains to the north and may be found in the district.

1. *Cervus Canadensis.* Wapiti, or Elk.

The elk, once numerous, is now extinct south of the Fraser, but I have many reliable reports that a bunch still holds out in the mountains at the head of Harrison Lake.

2. *Cariacus columbianus.* Black-tailed Deer.

Common in some localities and very scarce in others; the mule-deer overlaps the range of this species on the summit east of Hope.

3. *Mazama montana.* White Goat.

Irregular in its distribution on the highest peaks.

4. *Sciuropterus oregonensis.* Pacific Flying Squirrel.

Generally distributed both on the mountains and lowlands.

5. *Sciurus douglassi.* Douglas' Squirrel.

Abundant at all elevations.

6. *Eutamias townsendi.* Townsend's Chipmunk.

Common in the valley, and ascending the mountains to the park-like glades near timber line at about 5,000 feet.

7. *Eutamias quadrivittatus felix.* Cascade Chipmunk.

Abundant from about 5,000 feet to summits of the high rocky peaks above timber line.

The locality where I collected the type specimens was Lumsden Mountain on 49th parallel, due north of Mount Baker.

8. *Arctomys caligatus.* Hoary Marmot.

On all the alpine peaks, very rarely descending into the valleys.

9. *Aplodontia rufa.* Sewellel.

Very rarely seen in the valley, but more or less common on all the foothills and higher mountains; very abundant on the southern slopes of all the higher mountains, where the ground is in some places completely honeycombed with their underground runways. It is never found away from water or small springs, and does not ascend above timber line. Locally known as "Mountain Beaver."

10. *Castor canadensis.* Beaver.

I have taken specimens as late as 1900, and a few still hold out in the mountain streams, and occasionally in the Fraser itself.

11. *Mus decumanus.* Norway Rat.

Introduced.

12. *Mus musculus.* House Mouse.

Introduced and driving the indigenous white-footed mouse from most of the houses and barns.

13. *Peromyscus austrus.* White-footed Mouse.
Abundant at low elevations.

14. *Peromyscus oreas.* Bang's White-footed Mouse.
Abundant on mountains and in heavily timbered foothills. I took the type specimens on Lumsden Mountain at an elevation of about 5,500 feet.

15. *Neotoma cinerea columbiana.* Wood Rat.
Rare in the valley, common in the mountains ; for several years prior to 1897 wood rats were extremely scarce.

16. *Evotomys saturatus.* Western Red-backed Vole.
I have never taken this species in the valley, but from the foothills to timber line it is common. I took some very pale *Evotomys* at Stave Lake in '96, which Mr. Miller identified as differing but slightly from *saturatus ;* Stave Lake lies between Agassiz and Port Moody, at both of which points has been taken another species of *Evotomys*, described by Mr. Vernon Bailey in his monograph of the genus.

17. *Phenacomys orophilus.* Mountain Lemming Vole.
Taken only on Lumsden, Mt. Baker Range, at an altitude of about 5,500 feet, described by Mr. Rhoads as a new species ("*oramontis*") from these specimens.

18. *Microtus mordax.* Cantankerous Vole.
Mr. Vernon Bailey in his excellent "Revision of the North American Voles." states that no form of the *longicaudus* group occurs on the high Cascades. I took three specimens of either *mordax* or *macrourus* on Lumsden Mountain at an altitude of 5,500 feet in August '95. These I sent to Mr. Senit S. Miller, in size they resembled *marourus* but in coloration were nearer *mordax.*

19. *Microtus richardsoni arvicoloides.* Giant Vole.
Common on all the higher peaks, being especially abundant in the dense growth of pink flowered *Mimulus* which fringes the little snow-fed streams. Like other voles, it is subject to epidemics which thin them out when they become too numerous ; in '99 I noticed numbers of dead ones on the mountain tops.

20. *Microtus townsendi.* Townsend's Vole.
In the fields and meadows of the valleys only, some times abundant, at others scarce.

21. *Microtus oregoni serpens.* Creeping Vole.
Abundant in the valleys, where nearly every log in the woods has one of their underground runways beneath it. I have also taken it at timber line in the mountains (6,500 feet.)
Not often noticed on account of its subteranean habits,

22. *Fiber osoyosensis.* Pacific Muskrat.
Common.

23. *Zapus trionotus.* Western Jumping Mouse.
Found in suitable localities from sea level to 7,000 feet. Most abundant on the mountain tops.

24. *Erithizon epixanthus.* Western Porcupine.
Very scarce.

25. *Lagomys minimus.* Least Pika.
Mr. Bangs has re-instated Lord's species from specimens I sent him taken near the type locality. Found in nearly all rock-slides from 100 feet to summits of highest peaks.

26. *Lepus washingtoni.* Washington Hare.
Common in the bottom lands.

27. *Lepus columbiensis.* Columbian Varying Hare.
This is one of the only mammals that are found in this locality I have never succeeded in taking specimens of. The hares north of the Fraser and in the mountains all turn white.

28. *Felis oregonensis.* Pacific Cougar.
Not uncommon and very destructive to both game and stock. In some localities they have about exterminated the deer. I have then noticed the bones and teeth of *Aplodontia* in their dung. The young ones are handsomely spotted, differing in this respect from the form found east of the Cascades.

29. *Lynx canadensis.* Canada Lynx.
Now very scarce, used to be not uncommon.

30. *Lynx fasciatus.* Coast Wildcat.
Not uncommon, used to be abundant.

31. *Canis occidentalis.* Wolf.
Very scarce, both the black and gray forms occur.

32. *Canis latrans.* Coyote.
Coyotes of late years have made their appearance in the Chilliwack Valley.

33. *Vulpes vulpes.* Red Fox.
I have heard one or two reports of foxes, and saw the remains of a red one that was killed at Pitt meadows.

34. *Ursus horribilis.* Grizzly Bear.
Found in the mountains only. I saw one shot near Summit Lake, of an almost uniform drab gray, almost white.

35. *Ursus americanus.* Black Bear.
Once abundant but getting scarcer—still does great damage to raisers of hogs. Both black and "cinnamon" forms occur and intergrade.

36. *Procyon psora pacifica.* Pacific Racoon.
Common at low elevations.

37. *Rutra canadensis.* Otter.
Fairly common.

38. *Mephitis spissigrada.* Pacific Skunk.
Common. Described by Mr. Bangs from specimens sent to him by me from Sumas.

39. *Spilogale phenax latifrons.* Little Stupid Skunk.
"Civets" are found from the lowest levels at all events up to 4000 feet, and probably higher.

Scarce in the late winter and spring, but numbers can be taken in the fall and early winter months.

40. *Lutreola energumenos.* Pacific Mink.
Common. Mr. W. H. Osgood has lately described the Alaskan mink as a new species, larger and paler than *energumenos.* In this connection I may state that the type specimen of *energumenos* was very much smaller than those I took later. The color is generally very dark, but sometimes much paler—a warm reddish umber.

41. *Putorius longicaudus saturatus.* Long-tailed Weasel.
Very scare. I have only noticed it at low elevations and have only taken one. Unlike the next species, I think it always turns white in winter.

42. *Putorius cicognani.* Bonaparte's Weasel.
Common. In the valley this weasel rarely turns white in winter, at high elevations always does so.

43. *Putorius cicognani streatori.* Puget Sound Weasel.
One or two typical examples taken.

44. *Mustela caurina.* North Western Marten.
Scarce. *Mustela americana* also probably occurs.

45. *Mustela pennanti.* Fisher.
At one time frequently seen throughout the district, now very rare.

46-47. *Vespertilio fuscus.* Brown Bat.
Rather scarce.

48. *Vesperugo noctivagans.* Silvery Bat.
Common.

49. *Myotis evotis.* Large-eared Bat.
I have several times taken a medium sized dark brown bat which must be this species, though the ears seemed too short; what I took to be the young were uniformly blackish.

50. *Myotis californicus.* California Bat.
Common. Most specimens are dark enough for the form *caurinus.*

51. *Myotis saturatus.*
This little bat is the most numerous of the genus.

52. *Sorex personatus.* Masked Shrew.
I have only taken this at very high elevations.

53. *Sorex trowbridgi.* Trowbridge's Shew.
Common in the thick woods ; I have not taken it above 2,000 feet. Very hard to get good specimens, as the fur on abdomen slips within an hour after death. *S. vagrans* and *obscurus* taken in same localities will keep for eight hours or more.

54. *Sorex vagrans.* Wandering Shrew.
Abundant in the valley, and once taken at 6,000 feet elevation.

55. *Sorex obscurus.* Dusky Shrew.
Abundant, replaced on mountain tops by next species.

56. *Sorex longicaudus.* Long-tailed Shrew.
Common at high elevations.

57. *Sorex vancouverensis.* Vancouver Island Shrew.
I have several times taken very dark seal-brown shrews with the size and teeth formation of *vagrans* which must be this species. Specimens taken on the foothill between the Chilliwack river and Chilliwack valley were all of this race.

58. *Sorex* (*Atophyrax*) *bendirei.* Bendire's Shrew.
This fine shrew is fairly common in thick woods and swamps in the valley.

59. *Neurotrichus gibbsi.* Shrew Mole.
Abundant in the valley in thick woods, and I took one specimen at timber line near 49th parallel when trapping for *Phenacomes* among the short juniper and heather, with banks of eternal snow all around.

60. *Scapanus townsendi.* Townsend's Mole.
Common in the portions of the valley not affected by Fraser floods, and exceedingly hard to trap, more so than a Beaver or Otter.

SYNOPSIS OF THE BIRDS OF THE SASKATCHEWAN VALLEYS AND TRIBUTARIES.

By EUG. COUBEAUX, Prince Albert, Sask., N.W.T.

The present key is based on the recent catalogue of Canadian Birds by Professor John Macoun, M.A., F.R.S.C. (Ottawa, 1900, Part I), and on my own collection and observations.

It includes all the species commonly found or more or less frequently met with in the two valleys of the Saskatchewan and in those of their tributaries.

In order to find the name of a bird with this key, see whether the characters of the bird agree with those described in the key, beginning with No. 1 in the first column of figures and following the numbers of this column consecutively (1, 2, 3, etc.) as long as the characters agree until the name of the bird is reached.

If a character does not agree, see what the number in the second column of figures is; then find the same number in the first column lower down, and proceed as above.

This key is based on conspicuous characters only, without regard to the genus, the family and the orders. It is above all for field use and mainly made with fresh birds.

ANSERES.

LAMELLIROSTRAL SWIMMERS.

Three toes directed forwards, webbed. Bill flat, broad, laminated on sides.

1	17	Hind toe not lobed.
2	5	Neck rather long, bill with a soft cere extending to eye.
3	4	Bill entirely yellow or yellowish. Length 4-5 feet. *Olor Buccinator* (Rich.) Wagler. Trumpeter Swan.
4	3	Bill having the tip black. Length 4½ feet. *Olor Columbianus* (Ord.) Stephn. Whistling Swan.
5	2	Neck shorter, bill without cere.
6	12	Bill shorter than head.
7	13	Hind toe very short and elevated.
8	11	Neck entirely black.
9	10	Tail of 18 to 20 quills. Length 35 in. *Branta Canadensis* (Linn.) Bannister. Canada Goose.

10 11 Tail of 16 quills. Smaller, 30 in.
Branta Canadensis hutchinsii (Rich.) Coues. Hutchins's Goose.

11 9 Neck with a white patch on each side. Length 23 to 24 in.
Branta bernicla (Linn.) Scopoli. Brant.

12 6 Bill as long as head.

13 7 Hind toe reaching the ground.

14 15 Forehead white. 26-27 in.
Anser albifrons gambeli (Hartl.) Coues. American White-fronted Goose. Laughing Goose.

15 14 No white on the forehead. Entirely bluish.
Chen cærulescens (Linn.) Gundl. Blue Goose.

16 15 Adult white, bill reddish. Young more or less mottled with gray. About 30 in.
Chen hyperborea nivalis (Forst.) Ridgw. Greater Snow Goose.[1]

17 1 Hind toe long and lobed.

18 33 Lobe of the hind toe narrow and not more than $\frac{1}{6}$ of an inch. Nostril at base of bill.

19 20 Bill narrowed at base and much enlarged at tip.
Spatula clypeata (Linn.) Boie. Shoveller. Spoon-bill.

20 19 Bill equally broad throughout or nearly so.

21 24 Bill conspicuously shorter than head and the middle toe and claw.

22 23 First and second quills longest; bill blue black at tip. Length 20-22 inches.
Mareca Americana (Geml.) Stephens. American Widgeon. Baldpate.

23 22 Second quill longest, bill green, olive. Length 19 in.
Aix sponsa (Linn.) Bonap. Wood Duck.

24 21 Bill longer or as long as head, and longer or as long as the middle toe and claw.

25 30 First quill longest; of large size, 19 to 24 inches.

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[1] I do not mention the typical species, the *Chen hyperborea* (Pall.), as it seems to be only an accidental species in the west (*vide* Macoun, *l. c.*, p. 114).

27 27 Speculum white or whitish, or dusky speckled with white. Length 19-22 inches.
Chaulelasmus strepera (Linn.) Bonap. Grey Duck.

27 26 Speculum glossy green or greenish, purple and blue.

28 29 Male, head and neck dark, neck with a white ring.
Anas Boschas Linn. Mallard.

29 28 Head dusky, fore part of the neck white; middle rectrices longer than the other quills.
Dafila acuta (Linn.) Bonap. Pintail. Springtail.

Females.

With the wings as in the male ; head, neck and under parts pale ochrey, speckled and streaked with dusky. About 24 inches.
Anas boschas.

With only a trace of the speculum between the white or whitish tips of the greater coverts and secondaries. The whole head and neck speckled or finely streaked with dark brown, and grayish or yellowish-brown ; below, dusky freckled ; above, blackish ; all the feathers pale-edged.
Dafila acuta.[1]

30 25 Second quill longest. Of small size, 13-17 inches.

31 32 Wing coverts pale blue; bill slightly enlarged.
Querquedula discors (Linn.) Stephens. Blue-winged Teal.

32 31 Wing coverts dusky.
Nettion Carolinensis (Gm.) Baird. Green-winged Teal.[2]

33 18 Hind toe short, broadly lobed; lobe broader than $\frac{1}{5}$ of an inch.

34 51 Bill elevated at base, flat and broad towards tip which has a strong horny nail.

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[1] I put off the *Anas obscura* Gmel., the black duck, which is the common wild duck of the Maritime Provinces, though a few stragglers reach sometimes Manitoba (*vide* Macoun, *l. c.* p. 76.)

[2] I do not include the *Querquedula cyanoptera*, the Cinnamon teal, a southern species, which is only a very rare straggler in Manitoba (*vide* Macoun, *l. c.* p. 83).

35 49 Nail small, holding only the middle of the tip of bill.

36 37 Rectrices very narrow, pointed and stiff, 18 in number.
Erismatura Jamaicensis (Gmel.) Salv. Ruddy Duck.

37 36 Rectrices softer.

38 44 Of small size, less than 20 inches.

39 42 Bill keel hollow, slightly enlarged towards tip; nail $\frac{1}{5}$ to $\frac{1}{4}$ of an inch.

40 41 Speculum white, bill blue. About 16 inches.
Aythya affinis (Eyt.) Stepn. Lesser Scaup Duck. Blue-bill.

41 40 Speculum gray ash. About 18 inches.
Aythya collaris (Donov.) Ridgw. Ring-necked Duck.[1]

42 39 Bill keel round and smooth, equally broad throughout, blue, with a very small nail. Length 15 inches.
Charitonetta albeola (Linn.) Stepu. Buffle-head. Spirit Duck.

43 42 Bill black with above white at base. 18-19 inches.
Clangula clangula Americana Faxon. American Golden-eye. Whistler.

44 38 Of large size, 20 to 24 inches.

45 46 Head and neck black.
Aythyamarila (Linn.) Boie. American Scaup Duck. Big Black-head.

46 45 Head and neck rich chestnut or ruddy chestnut.

47 48 Bill shorter than head (two or less), dull blue with a black belt at end. Nostrils within its basal half.
Aythya Americana (Eyt.) Baird. Red-head. Pochard.

48 47 Bill not shorter than head (two and a half or more), blackish with nostrils at its middle.
Aythya Vallisneria (Wils.) Boie. Canvas-back Duck.

49 35 Nail very large, larger than $\frac{1}{5}$ of an inch, and holding the whole of the end of the bill.

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[1] I include that Manitoban species, as a few stragglers may reach the eastern part of the partly wooded prairie in Saskatchewan.

50 51 Bill gibbous at base, nostril nearly at its middle ; birds black or dusky.

Oidemia Deglandi Bonap. White-winged Scoter.

51 34 Bill straight, tip hooked. Rectrices stiff.

52 53 Of small size, less than 20 inches, from 17 to 20.

Lophodytes cucullatus (Linn.) Reich. Hooded Merganser.

53 52 Larger, from 20 to 27 inches.

54 55 Wing with one black bar. 26-26¾ inches.

Merganser Americanus (Cass.) Stepn. American Merganser. Goosander.

55 54 Wing with two black bars. 23-23½ inches.

Merganser Serrator (Linn.) Schaff. Red-breasted Merganser.

ORNITHOLOGICAL NOTES.

THE GOLDEN EAGLE (*Aquila chrysætos*) IN ONTARIO.

Through the kind exertions of Mr. Edwin Beaupré, of Kingston, two specimens of this fine species have recently been acquired for the Museum of the Geological Survey. One of these, which is said to be a female, was shot November 11th, 1901, flying over Mud Lake, Odessa, Lennox Co., by Mr. Smith. Odessa, it may be added, is ten miles from Kingston. The other, which is said to be a male, was shot November 15th, 1901, at Westbrooke, Frontenac Co., by Mr. Redden. Westbrooke is seven miles from Kingston and three from Odessa.

In the Museum of the Survey there were previously two specimens of the Golden Eagle, both of which are from Ontario. One, which is said to be a female, was shot near Woodbridge, York Co., in November, 1897, and the other, which is said to be a male, was shot near Brampton, some twenty-five years ago.

It has long been known that in this species the sexes are so similar, in colour, size, &c., that it is scarcely possible to distinguish them without dissection.

Although circumpolar in its range the Golden Eagle is nowhere very common, and it seems desirable to place upon record these four instances of its occurrence in the Province of Ontario.

J. F. WHITEAVES.

Ottawa, Jan. 20, 1902.

SOME NEW CANADIAN SENECIOS.

By EDW. L. GREENE.

The following members of the genus *Senecio*, all apparently hitherto undescribed, form a part of a most rich and valuable collection of plants made by Mr. James M. Macoun in the Chilliwack Valley, B.C., during the summer of 1901.

SENECIO CREPIDINEUS. Perennial, low but rather stout and very leafy, allied to *S. taraxacoides* and *S. Holmii*, commonly 4 to 7 inches high, lightly somewhat arachnoid or floccose-pubescent, or often almost glabrous: leaves mostly basal and supra-basal, the one or two properly cauline quite similar to, and scarcely smaller than the others, all obovate-lanceolate, 1½ to 4 inches long, tapering to a broad petiole, acutish, saliently and sharply dentate: corymbose panicle of large more or less nodding heads little or not at all surpassing the leaves: involucres nearly ½ inch high, subcylindric, the linear bracts about 10; rays about as many, light-yellow, about 5-nerved.

Collected at an altitude of 6,000 feet; closely allied to several alpine and subalpine species of the more southerly Rocky Mountains, the whole forming a group of which *S. Soldanella* may be considered typical. The heads in this new one are much more numerous and notably narrower than in any of the allied species. Its number in the Geol. Surv. collection is 26,678. Its habitat, as given by Mr. Macoun is "damp debris on a snow-slide."

SENECIO PRIONOPHYLLUS. Resembling *S. triangularis*, but leaves on shorter petioles and distinctly hastate, more gradually acuminate, much more deeply and sharply serrate-dentate, in texture much firmer and dark-green, with venation pale or whitish, underneath whitish tomentulose, above obscurely and sparsely short-hairy, but the stem densely villous-tomentulose from base almost to summit, this indument subfuscous: inflorescence denser and more fastigiate than in *S. triangularis*; the rays longer and very narrow: achenes short and slender-columnar, not narrowed under the pappus, this very fine and promptly deciduous.

The type of this is Mr. Macoun's No. 26,675, collected 8 Aug., on the southern slope of the Cheam Range, with *Bromus marginatus* and *Castilleia miniata*, at 4,000 feet. Number 26,676, collected Aug. 12th within a few yards of No. 26,675, I also refer to it though it is far less notably pubescent, while at the same time it exhibits quite as strongly all those peculiarities of inflorescence, ray-flowers, etc., by which the species stands in contrast with *S. triangularis*.

SENECIO DILEPTIIFOLIUS. Allied to *S. aureus*, the rather stoutish stems a foot high, from a firm short-jointed nearly horizontal rootstock; herbage deep-green and glabrous, small tufts of white wool occupying almost the axils of the leaves and pedicels: lowest leaves with broadly oblanceolate incisely serrate blade an inch long or more, and a slender petiole about as long; the lower and middle cauline considerably larger and more deeply incised but also petiolate, only the uppermost more nearly lanceolate or linear and sessile, these merely serrate-toothed: cyme of middle sized or smallish narrow heads distinctly subumbellate; bracts of the cylindric involucre few and broad, oblong-linear and merely acutish: rays about 5 or 6, long and light-yellow:

Mr. Macoun's label for this bears the number 26,679, and indicated that the plant was collected 29 August at an altitude of 6,000 feet, growing with *Epilobium spicatum*, *Eucephalus Engelmannii* and *Mimulus Lewisii* on a mountain slope, from the upper part of which water trickled through the roots of these plants. I name the species in allusion to the general likeness which its leaves bear to those of *Lepidium Virginicum*, the type of a genus *Dileptium* with some authors.

SOIRÉES.

The second soirée of the season was held in the Y. M. C. A. Assembly Hall, Jan. 14th. The lecture of the evening, by Dr. R. A. Daly on "The Relation of Geology to Geography," was mainly devoted to the illustration of the developmental idea in geographical study. A table showing the great scope of the geographical sciences was exhibited, and the conclusion stated that a

physical study of the earth furnishes a natural and necessary introduction to the study of distributions which is the largest division of the whole subject. But we must go to geology for information as to the real nature of the forms of the earth's surface. The application of geology is gradually placing physical geography among the true sciences. Living organic species have no more surely been evolved from earlier types than have the present forms of the land been developed from pre-existing forms. This recognition of streams of influence from past geological ages has a salutary effect on the method of the geographer; it makes clear to him that many apparently similar land-forms should be clearly differentiated and others of unlike outward appearance should be closely associated. The lacustrine plain of southwestern Ontario, the marine plain of the St. Lawrence and the old denuded plain of Russia can only be finally and rigorously described by referring to their difference of origin. Similarly, valleys of stream erosion, fault-troughs and glaciated valleys should not be classified together simply on account of their possessing the common attribute of being linear depressions. On the other hand, the Selkirk mountains, the Laurentian highlands and the rolling plateau of Nova Scotia, at first sight utterly dissimilar, are yet most fruitfully treated of under the one class of complex mountains at different stages in the process of earth-sculpture. Repetition of types form one of the most interesting characteristics of the new physical geography, greatly aiding the memory and the understanding of land-forms. Thus a thorough discussion of the fiords of Norway renders intelligible and easily retainable in the memory the physiography of the ragged coasts of Greenland, Labrador, Alaska, New Zealand and Patagonia; the fault-trough of the Rhine is paralleled by the fault-trough of Palestine; the delicate topography associated with the vanished glacial lobes of North America, once recognized in this country as having that origin, suggested explanation for similar reliefs in Germany which have been moulded in sympathy with similar lobes.

A few indications of the influence of his physical surroundings on the life of man were given during the exhibition of lantern slides. The geological history of the earth, the physical environ-

ment of life and the actual distribution of the activities of life, form a continuous series of considerations, no term of which can be omitted without impairing the interest and value of the whole series.

The third soirée of the Ottawa Field-Naturalists' Club was held in the Y. M. C. A. building on the evening of Jan. 28th, when Mr. Percy H. Selwyn gave an address on the "Natural History of the Honey Bee." Attention was first called to the difference between the regular and uniform frames composed almost entirely of worker comb, which are to be found in the modern hive, as compared with those constructed by the bees when living in a state of nature. The latter are of all shapes and sizes with usually an abnormal proportion of drone comb. The queen bee was then spoken of at some length, and it was shown that while being hatched from an egg which under ordinary conditions would have produced a worker bee, stimulative feeding during the larval period combined with increased accommodation to allow for growth, made wonderful changes in the perfect insect. Notice was also taken of the fact that while the worker bees are most solicitous for the welfare of the drones during the time of natural increase, viz., swarming, no sooner has this time passed and their services are no longer required than the bees turn them all out of the hives to perish. It was also shown that while it is now possible with the aid of comb foundation to reduce the amount of drone comb in each hive to a minimum, in no case can it be entirely dispensed with. The natural instinct for the reproduction of the race is so strong within the bees that before swarming takes place a certain number of drones must be present in the hive, and consequently if only worker combs are provided, the bees will either cut out portions of this comb and replace with drone comb of their own building, or, as is generally the case, will build cells suitable for rearing drones along the bottoms of the frames.

The report of the Entomological Branch was read by Dr. Fletcher and will be printed in an early number of THE NATURALIST.

ANNUAL REPORT OF THE GEOLOGICAL SECTION OF THE OTTAWA FIELD-NATURALISTS' CLUB, FOR THE YEAR 1901-1902.

Addressed to the Council of the Ottawa Field-Naturalists' Club.

In presenting to the Council the Report of the work done by the members of the Geological Branch of the Club during the past year, the latter desire to state that considerable progress has been made, much additional material has been obtained, and reports as well as papers published during the past year bearing on the geology of the Ottawa district, and that though there were not many excursions held, the number of small working parties and sub-excursions did not fall very short of any previous year in the history of the Club.

The numerous excavations and openings for drainage and sewage purposes have continued to give to the student of geology in our midst a fine opportunity to obtain excellent material, especially of fossils.

A pleasurable feature of the sub-excursions has been the good attendance of members as well as of student of different educational institutions in our city. Several new members were elected from amongst occasional attendants at our geological sub-excursions in former years. Some of the ladies and gentlemen present at the outings have been able to secure quite a series of interesting specimens, most of which have been named by one or other of the leaders of the Geological Branch of our Club, and they now form part of private or public cabinets where geological collections are kept.

Amongst those who took a prominent part in the work of this section last year may be mentioned: Mr. W. J. Wilson, Ph.B., of the Geological Survey Department, who never fails to be present and usually brings with him quite a following; Mr. I. Kendall, of the Macdonald School of Manual Training, and also Dr. F. Slater Jackson, late assistant in Biology at McGill University, who, on several occasions last summer, accompanied our branch and obtained interesting suites of fossils which were all determined for him before he left the city. A number of younger members of the

Club and their friends have also done excellent work. George Lewis Burland, Herbert Maingy, Douglas McLean, Percy Wilson, Willie Herridge and Otis Whelen all deserve special mention for the industry and care they exhibited in the collections made and the anxiety they evinced to have them named and labelled. An enthusiastic class of youthful geologists was composed of the boy pupils of our fellow member Dr. Cephas Guillet. The work done by this class is most creditable indeed.

Besides collections of the fossils which were obtained on several of these sub-excursions, at some of which the president and other officers of the Club and leaders in Geology were present, notes bearing upon the stratigraphy and character of the rock formation were taken and a number of interesting photographs prepared which serve to show the nature of the strata at many points where they had never previously been observed. Some of the photographs taken during the sub-excursions of the Club are used in illustrating points of interest in the geology of Ottawa and its surroundings in Dr. Ells's forthcoming Report of the Geology of the Ottawa District.

Among the more salient and important features noted may be mentioned the occurrence along the eastern extension of Somerset street, in the centre of that valley of erosion which formerly was used as a rifle range—the Rideau rifle range—a well-defined fault or dislocation in the earth's crust. This is only one of many faults which must exist hidden by pleistocene or drift deposits, and except for the artificial cuttings made and the notes taken during the excavations it would have been practically impossible to say that there existed one there.

This fault occurs in the Utica formation and presents the two limbs of a normal dislocation, in juxtaposition, the strata being scarcely disturbed at all, yet, both from the studies that have been previously made of the characters of the Utica of the Ottawa district and from the characters of the fauna obtained by the writer on each side of the fault it is evident that the lower as well as the upper beds of the Utica occur in the exposure.

There was no topographic feature or indication on the surface of the ground or trace whatever evident to even suspect the exist-

ence of a fault in that locality, but in the trench cut along Somerset street east between Chapel street and Goulborne avenue the dislocation was clearly visible. Mineralization along the line of fault, as is customarily the case, had taken place resulting in the segregation of a considerable quantity of calcite associated with iron pyrites.

This fault was seen to trend in an almost due east and west direction heading for the western end of Sparks's rapids on the Rideau river. On each side of the fault and in the neighbourhood of the same the strata were strikingly dissimilar; on the east side thin bedded limestones with interstratified black bituminous shales were exposed, whilst an almost compact and homogeneous mass of fissile and black bituminous shales holding but few fossils, compared with the lower beds of the series occurred on the east side of the fault.

Lists of the fossils noted during these sub-excursions were prepared and will accompany this report. They will serve to emphasize the facts already noted of the existence at that point of an upper and a lower outcrop of the beds of the Utica formation.

New Edinburgh.—At the C. P. R. crossing along the Dufferin road in New Edinburgh, the main drain excavations revealed fine sections in the Utica formation also. On the occasion of the first excursion of the Club to Beechwood (see p. 94 of the Trans. of the O. F. N. C.) the geological section examined the exposures as well as the dumps, and a large quantity of fossils were obtained. Your leaders were kept busy identifying and determining specimens from the time the excursionists reached the spot until time was called to meet at the rendezvous near the Cemetery gate, where the addresses were given on the finds of the day. Seventeen species of fossils typical of the Utica were listed on that occasion from specimens obtained by one or other of the following persons present for whom they were named. Leaders: Dr. R. Bell, Mr. W. J. Wilson, Dr. H. M. Ami; Members, &c.: Mr. Clark, Mr. Kendall, Miss McQuestion, Miss Ross, Mr. Baldwin, besides the following younger but enthusiastic collectors: Alexander Anderson, Herbert Maingy, Lloyd Blackadar, Otis Whelen and Gordon Gullock.

List of the fossils of the Utica formation found in the excavations made for the Main Drain of Ottawa, April 27th, 1901, on the occasion of the first excursion of the Ottawa Field-Naturalists' Club.

1. Leptograptus flaccidus, Hall.
2. Orthograptus quadrimocronatus, Hall.
3. Climacograptus bicornis, Hall.
4. Leptobolus insignis, Hall.
5. Lingula Progne, Billings.
6. ,, Cobourgensis, Billings.
7. ,, cuta, Hall.
8. ,, obtusa, Conrad.
9. Orthis testudinaris, Dalman.
10. Zygospira modesta, Say.
11. Trorholites ammonius, Emmons. (Large, fine specimen.)
12. Orthoceras tenuistriatum, Hall.
13. Orthoceras lamellosum, Hall.
14. Modiolopsis, sp. indt.
15. Asaphus latimarginatus, Hall. (=A. Canadensis, Chapman.)
16. Triarthurus spinosus, Billings.
17. ,, Becki, Green, (both in the nepionic and adult stages).

Amongst the most interesting finds made on that occasion was one of the embryonic forms of *Triarthrus Becki*, a characteristic trilobite of the Utica formation. Primordial features present in the specimen indicate clearly the remote origin of this generic form whose nearest relatives so far known belong to the Cambrian period, and whilst its pygidium or tail appendage is quite diminutive, its head or cephalic shield is comparatively large. Such larval forms of this trilobite are rather scarce, but deserve special attention. The writer has found a number of them during his researches in the Utica of the Ottawa district, and hopes to be able to put the material together some day. It may be added here that considerable progress was made during the past year in the study of the fauna of the Utica, and as soon as drawings can be prepared which will serve to illustrate the fine Utica fossils of this region a much needed contribution to the palæontology of a portion of the Ordovician succession about Ottawa will soon follow.

Britannia. The second excursion of the season was held at Britannia. The geological section visited the extensive excavations made by the Metropolitan Light, Heat and Power Company,

and obtained there on the huge blocks of sandstone and shale a series of interesting tracks and trails of marine organisms, together with one or two rare fossils preserved as casts of the interior of the animal.

Hull, Que. About the end of May, whilst there were a few members of the Royal Society of Canada still in our city, some of the members of the geological section, acting as guides, visited the "Heap" in Hull, as well as the excavations for the main drain, in Ottawa, where the Utica formation was well exposed. The species collected were subsequently determined and will serve to illustrate the geology of our district in remote portions of the Dominion.

Besserers, Ont. The exceedingly low state of the water in the rivers and streams about Ottawa afforded an unusually fine opportunity to collect nodules from the fossiliferous clays of the Green's Creek period or formation (as Prof. Penhallow styles it) and though considerably incapacitated from doing much work during the autumn owing to an accident which had befallen the writer, a number of collections were made.

Rideau Sand Quarry. About two miles up the Rideau River above Hog's Back, along with Mr. W. J. Wilson, also a leader of the Club and a foremost student in Pleistocene geology in our midst, we visited this interesting locality and obtained four species of drift fossils preserved in a matrix of coarse sand. These comprise the well known *Saxicava rugosa*, Linnæus, *Macoma Balthica*, Linnæus, *Mytilus edulis*, Linnæus, and a species of *Belanus* which is difficult to identify with any of the forms now living in the waters of the Lower St. Lawrence or shores of the Western Atlantic. Its characters ally the form more closely to *Balanus porcatus* de Costa than to any other. I am indebted to Dr. Whiteaves, who was shown the specimens in question, and he thinks that this as well as most of the species of *Balanus* from Canada need revision and careful study.

Below the residence of Mr. T. C. Keefer, Rockcliff, along the shore of the Ottawa river, an excellent section of the Chazy formation may be seen especially in its most arenaceous development.

Some of the lower strata consist of coarse sandstones with occasional films of shaly or argillaceous materials interstratified. Amongst the forms observed and not hitherto recorded from this locality was the *Lingula Lyelli*, Billings, described originally from the Chazy of Allumette Island. A number of new tracks and trails of marine organisms were also noted and a large suite of specimens secured which will add considerable information to the fauna of those seas whenever figured and described.

Publications. As stated at the outset, a number of contributions on the geology of the Ottawa district have been prepared and published during the past year which will enable the student of Geology in our midst to prosecute his researches with greater facility.

A Geological Map. I scarcely think that I am giving out a state secret when I say that there is hope that before this season is over the Geological Survey Department will have issued from its press the long-looked-for map of the "Ottawa District."

Thanks to the energy of Dr. A. R. C. Selwyn and of his successor Dr. Dawson, as directors of the Geological Survey of Canada, the plan of issuing geological maps for the leading cities or centres of activity and thought in Canada will find its expression in the issue of the first of the series in "A Geological Map of Ottawa and its environs;" but whilst the initial steps were taken, as remarked above, by Drs. Selwyn and Dawson during their terms of office, it was reserved to Dr. Bell, acting Director of the same Survey and also the President of the O. F. N. Club, to see the practical completion of the work.

The Club hails with special pleasure the publication of the map in question, especially the Geological branch, for, within the area covered by the map many of the geological phenomena recorded and described in the Transactions of the Club for the past twenty-two years are therein embodied. There is nothing like a map on which one can lay down statements and facts in geology and geography which is, according to the latest definition, only a branch of geology, after all. Not only in the department of Geology will the said map be of use, but also for the Botanical, the Zoological and other sections of the Club. Faunal and floral

maps can now be prepared and maps showing the distribution of any species, whether of plant or animal. For this purpose it is hoped that the Council of the Club will endeavour to secure from the Department of the Geological Survey at least 200 black and white prints or copies of the map of this district to be kept on sale by our Club Librarian for the use of the members of the Club. They may, however, be purchased from the Geological Survey at a nominal price.

The report by Dr. Ells which is to accompany the map will no doubt be hailed with great pleasure by all who will read it. I should advise the members of the Club to secure copies of this report early if they do not wish to find the edition exhausted from the demands that may be made upon it when issued.

Catalogue of the Marine Invertebrata of Eastern Canada, by Dr. Whiteaves, also of the Geological Survey, is a report which is of special interest to the members of our Club, as it deals with the marine invertebrates of the Lower St. Lawrence, a goodly proportion of which are to be found in the sands, clays and gravels of our Pleistocene deposits in the Ottawa valley. Every year sees new forms added to the lists of the Pleistocene fossils, and these find their living representatives in the salt waters of the St. Lawrence and adjoining basins of to-day. An excellent review of this most important work of Dr. Whiteaves has already appeared in THE OTTAWA NATURALIST, p. 165, by Prof. E. E. Prince, and I shall not trouble you with a notice of it from a geological standpoint further than to state that the volume is most welcome and timely and represents the work of a life-time, the accumulation of vast amount of useful information all condensed for the use of naturalists, fishermen and others interested both in the economic as well as the scientific side of the subject.

"*Ancient Channels of the Ottawa River*" is the title of another paper by Dr. R. W. Ells, F.R.S.C. It appeared in the April number of THE OTTAWA NATURALIST, pp. 17-30 with map accompanying the same, and forms a contribution which ought to stimulate the members of the Club to carry on the work there delineated, with special reference to the immediate vicinity of the Capital. The ancient or now abandoned river valleys are quite

common about this city, and the numerous accompanying phenomena which these valleys invariably present, afford fertile subjects for future study and research. There is a proposal to prepare at no distant date a contour map of Ottawa and vicinity, so that when this is an accomplished fact the interpretation of many phenomena, especially in Pleistocene geology, will be greatly facilitated and their correlation made easy. Such a map would fill another long-felt want.

Pleistocene plants. The fossil plants collected by different members of the Club and others at different times, were some time ago forwarded to Prof. D. P. Penhallow of the Botanical Laboratories at McGill University, and he has kindly determined them, and these are now all labelled by that eminent authority, so that as soon as there is room to exhibit them in the National Museum on Sussex street or in the new Museum to which we are all looking with earnest hope, the extinct flora of the Green's Creek period will be seen to advantage. From the last collections sent to Prof. Penhallow by the writer he has determined no less than nineteen species of plants from the marine fossiliferous clays of Besserers Springs and adjacent shores of the Ottawa River.

"*Geology of the Principal Cities of Eastern Canada,*" by the writer. In this paper, published by the Royal Society of Canada last year, I have endeavoured to put together in condensed form the results of twenty-four years' work in the neighbourhood of Ottawa. A table containing lists of the formations and of the systems under which these fall, of the characteristic fossils they contain, as well as of the thicknesses of the strata, constituting each as known to date, are given, together with lists of the localities where these formations may be studied to advantage. This will, it is hoped, save much time and labour on the part of those who will come after us in studying the geology of this part of Canada. Similar lists and tables are also prepared for the cities of Montreal, Toronto and Quebec by the writer, and by Dr. G. F. Matthew for St. John City, N.B. Attention is called to this paper on account of the reference to the Ottawa formations therein contained.

The late Dr. G. M. Dawson. This report cannot conclude without a slight reference to the great loss which the geological section of the Club has sustained in the death of one who for three years was the President of the Club and the foremost Canadian geologist. In Dr. Dawson the Club and the members of the geological section had one who was ever ready to give them the benefit of his judgment, criticism and experience in the discussion of points of interest in the geological structure of our district. He never failed to encourage and stimulate our members to unravel and describe the geology of this interesting section.

The following list of fossil sponges from the geological formations about Ottawa has been taken from among my notes on the palæontology of this district taken during the past twenty years, and may not be uninteresting to local geologists.

QUATERNARY.

Pleistocene System.

Green's Creek formation (Marine fossiliferous clays, "Leda clay").

1. Craniella Logani, Dawson. Odell's brickyard, Ottawa East, Ont.

PALÆOZOIC.

Ordovician System.

Utica formation.

2. Stephanella sancta, Hinde. Porter's Island, Montreal Road, Albert Street, near Bank Street, Ottawa City, Ont.
3. Cyathophycus reticulatus, Walcott. Gloucester, Ont.
4. ,, nidiformis, nobis. MS. Somerset Street East, City.
5. ,, subsphericus, Walcott. ,, ,, ,,

Trenton formation.

6. Astylospongia parvula, Billings. Concession and Division Streets.
7. Brachiospongia digitata, Marsh. Foot of Parliament Hill.
8. Steliella crassa, Hinde. Division Street, Ottawa.
9. ,, Billingsii, Hinde. ,, ,,
10. Palæospongia Trentonensis, var. Ottawaensis, n. var. Division Street, Ottawa.

Birdseye and Black River formation.

11. Stromatocerium rugosum, Hall. Hull and Ottawa quarries ; also found at base of the Trenton formation.

Beekmantown or Calciferous formation.

12. Cryptozoon calciferum, Dawson. March, Ont. ; on Ottawa, Arnprior & Parry Sound Railway.

H. M. AMI, *Leader.*

Ottawa, Jan. 14th, 1902.

C. F. King del.

To illustrate paper by Dr. Whiteaves on a species of Panenka.

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ON THE GENUS *PANENKA*, BARRANDE, WITH A DESCRIPTION OF A SECOND SPECIES OF THAT GENUS FROM THE DEVONIAN ROCKS OF ONTARIO.

By J. F. WHITEAVES.*

(With one Plate.)

In the sixth volume of the "Système Silurien de la Bohême," which was published in two parts in 1881, Barrande proposed the name *Panenka* for a genus of lamellibranchiate bivalves from the Silurian rocks of Bohemia, and described and figured no less than 231 species of that genus. These species are all ornamented with radiating ribs, which give them a certain general but superficial resemblance to recent shells of the genus *Cardium*. But, upon closer examination it will be seen that in many of the Panenkas the ribs are unequal in size and irregular in their distribution, and that their valves are usually longer than high. Their test, also, is said to be thin, and their hinge line to be entirely devoid of teeth properly so called. On the other hand, in the typical species of *Cardium* the ribs are exquisitely regular in their size and arrangement; their valves are higher than long; their test comparatively thick, and their hinge line provided with both cardinal and lateral teeth. Dr. Paul Fischer, in his "Manuel de Conchyliologie," places the genus *Panenka* in Rudolph Hoernes' family *Præcardiidæ*, which consists exclusively of palæozoic genera and species.

Four years later, in 1885, Professor James Hall described and figured, or enumerated, seventeen species of *Panenka* from the Devonian rocks at several localities in the United States, in volume V, part I, Lamellibranchiata II, of the "Palæontology of the State of New York." And, in 1891, the present writer described and figured an unusually large and coarsely ribbed species of the genus, from the Corniferous limestone at St.

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

Mary's, Ontario, under the name *Panenka grandis*, in the fourth volume of the "Canadian Record of Science."

The generic name *Panenka*, as stated by Barrande, is a Czech or Bohemian word, with the same significance as *puella* in Latin. But, although the seventeen species of *Panenka* enumerated by Hall are included by S. A. Miller in the list of "North American Palæozoic Fossils" in the first edition of his "North American Geology and Palæontology," published in 1889, yet in the First Appendix to that list, published in 1892, he says that the name *Panenka* is "not formed according to the rules of nomenclature and should be discarded." It had, however, as already explained, come into use by palæontologists on both sides of the Atlantic, so that its rejection would probably be attended with more inconvenience than its retention.

Quite recently, in November and December, 1901, the Rev. Thomas Nattress, of Amherstburg, Ontario, kindly sent to the writer, for identification, a few specimens of a fossil lamellibranchiate bivalve from the immediate vicinity of Amherstburg. These, he writes, were collected by Mr. Harry Hodgman from pieces of solid rock blasted and dredged out of the bed of the Detroit River, at the Old Lime Kiln Crossing, Anderdon township, Essex county, a "few hundred yards only within the Canadian boundary, in thecourse of deepening the channel." They clearly belong to the genus *Panenka* and are obviously quite distinct from *P. grandis*. So far as the writer can see, they cannot be satisfactorily identified with any of the known species of *Panenka* from the American Devonian. Two of them as much more perfect than the rest, and both of these are represented on Plate XV. The original of figure 1 on that Plate represents a specimen with a subcircular marginal outline, which is somewhat similar in form to *P. multiradiata*, Hall, but which has broader and more oblique umbones, and a much longer hinge line posteriorly. Figure 2 represents a specimen with an elongate subovate marginal outline, which comes nearer to *P. robusta* and *P. dichotoma* of Hall, but which is more regularly and longitudinally subovate than either. In *P. robusta*, also, the ribs are much fewer and coarser, and in *P. dichotoma* the anterior end is represented as produced and subangular above. Under these circumstances it seems desirable to distinguish the

specimens from the Detroit River by a new specific name, and they may therefore be provisionally named and described as follows.

PANENKA CANADENSIS (sp. nov.).

Shell, or rather cast of the interior of the shell, of about the average size, valves regularly and rather strongly convex, varying in outline in different specimens from subcircular to longitudinally subovate, but always at least a little longer than high. Posterior side rather broader and much longer than the anterior, umbones broad, tumid, prominent, very oblique and placed considerably in advance of the midlength, beaks curved inward and forward; hinge line straight, horizontal, considerably prolonged behind in some specimens but apparently not so much so in others.

Test unknown; surface of the cast marked by numerous (about sixty) narrow but prominent ribs, with concave grooves between them. In the original of figure 1 on Plate XV, the ribs are slightly unequal in size. Most of them are simple but they occasionally bifurcate, and here and there a few shorter ribs are intercalated between the longer ones, that radiate from the umbones. In the original of figure 2 on the same Plate, the ribs are more regularly disposed, and they are all a little larger posteriorly than anteriorly.

Muscular impressions and hinge dentition unknown.

Dimensions of a comparatively high and short specimen (fig. 1); maximum length 74 mm., greatest height (inclusive of the umbo) 67 mm.: do. of a more elongate specimen (fig. 2) that is narrower in the direction of its height, length 77 mm.; greatest height, which happens to be behind the umbo, 60 mm.

Corniferous formation, Anderdon township, Essex county, Ontario: a few specimens collected by Mr. Harry Hodgman, U. S. Inspector, in October and December, 1901. According to Mr. Nattress they are from a brown dolomite which underlies the true Corniferous limestone in that neighbourhood.

Explanation of Plate XV.

PANENKA CANADENSIS.

Fig. 1.—Side view, natural size, of a right valve of a specimen with subcircular marginal outline, and comparatively long hinge line behind.

Fig. 2.—Similar view of the right valve of a longitudinally subovate specimen, with a comparatively short hinge line.

Both of these specimens are in Mr. Hodgman's collections.

Ottawa, Feb. 15th, 1902.

BIRD NOTES.

By W. T. MACOUN.

Winter birds were not numerous at Ottawa this year with the exception of the house sparrow, which is always here in large numbers. Some interesting notes, however, have been taken and these should be recorded.

The snowy owl has been much commoner than usual. Three live specimens in a store on Sparks street attracted much attention during the month of January.

The first pine grosbeaks of which I have a record were seen by me on Jan. 26th at the Normal School, when two males were observed, and on the following day a flock of from eight to ten birds were noted none of which, however, was highly coloured. The birds may have been here earlier than these dates but no notes were sent in. They have been quite common ever since and were seen to-day, Feb. 18th.

On Feb. 6th I noticed two white-breasted nuthatches on a shed near Concession street.

The following notes were supplied by Mr. W. A. D. Lees and are of special interest:

"On 18th December, 1901, I saw, near my house in Ottawa East, a bird which I took to be a meadowlark (*Sturnella magna*). I was not quite certain of my identification as the bird rose suddenly from near the open end of a street drain and flew some distance off and took refuge under some old lumber where I had not the time to follow it. Again, yesterday, 9th January, 1902, I saw the same bird flitting from place to place along the railway embankment near the round-house in Ottawa East, and this time I satisfied myself beyond a doubt that my first guess as to the species had been correct. So far as I know this is the first winter record of this bird here, and it may interest the readers of THE OTTAWA NATURALIST to know of it."

On Feb. 6th Mr. Lees, in company with another person, saw a robin at the Normal School grounds feeding with a flock of pine grosbeaks. It seemed plump and in good health.

On Dec. 15th I saw a specimen of the bohemian chatterer feeding on the berries of the mountain ash on Somerset street, and I carefully noted the markings of the bird,

CONTRIBUTIONS TO CANADIAN BOTANY.[1]

By JAMES M. MACOUN, Assistant Naturalist, Geological Survey of Canada.

XV.

ANEMONE HUDSONIANA, Rich.

Frenchman's Bay, near Southampton, Ont. Aug. 28th, 1901. (*John Macoun.*) Southern limit in Ontario.

AQUILEGIA COCCINEA, Small.

Niagara, Ont.; Câche Lake, Algonquin Park, Ont.; Otterburne, Man.; Brandon, Man. (*John Macoun.*) Wingham, Ont. (*J. A. Morton.*) Grindstone Point, Lake Winnipeg. (*J. M. Macoun.*) Our only specimens of *A. Canadensis* are from Ottawa, Belleville and Red Rock, Ont. *A. coccinea* is easily separable from *A. Canadensis* either in flower or fruit. In flower by its stout spur which is more than twice the length of that of *A. Canadensis* and abruptly narrowed near the apex. The follicles of *A. coccinea* are straight and much longer than the spreading follicles of *A. Canadensis.*

AQUILEGIA VULGARIS, L.

Roadside, Wyoming near Petrolia, Ont. (*John Macoun.*)

LESQUERELLA NODOSA, Green, Pittonia, VOL. IV, p. 309.

On sand, Castellated Rocks, Milk River, Assa., July 13th, 1895. Herb. No. 10,313.[2] (*John Macoun.*)

LESQUERELLA VERSICOLOR, Greene, Pittonia, VOL. IV, p. 310.

On rocky slopes, Stony Mt., Man., June 4th, 1896. Herb. No. 12,401. (*John Macoun.*)

LESQUERELLA MACOUNII, Greene, Pittonia, VOL. IV, p. 310.

On prairies at the police barracks, Medicine Hat, Assa., Aug. 9th, 1895. Herb. No. 10,308. (*John Macoun.*)

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[1] Published by permission of the Director of the Geological Survey of Canada.

[2] These numbers are those under which specimens have been distributed from the Herbarium of the Geological Survey of Canada.

LESQUERELLA ROSEA, Greene, Pittonia, VOL. IV, p. 310.

On prairies at Old Wives' Creek, Assa., June 2nd, 1895. Herb. No. 10,309. (*John Macoun.*)

BRASSICA JUNCEA, Cass.

Montrose, near Niagara, Ont. (*R. Cameron.*) Burnside Road, near Victoria, Vancouver Island. (*A. J. Pineo.*)

VIOLA FLETCHERI, Greene, Pittonia, vol. IV, p. 296.

Acaulescent, small, the simple ascending rootstock rather small for the plant, closely jointed : leaves few, small, from ovate-reniform to subcordate-ovate, ¾ to 1 inch long at time of petaliferous flowering, the undeveloped ones cucullate, all very regularly crenate, glabrous and shining above, mostly sparse-hirsutulous beneath and on the petioles, these in the earliest not longer than the blade, in the later more than twice as long : flowers very few, often 1 only ; peduncles hirsute, minutely bracted below the middle : sepals small, lanceolate, veinless, serrate-ciliolate : corolla large, more than ¾ inch broad, rich purple ; the upper pair of petals much the largest, obovate, the middle pair narrower in proportion and strongly bearded with long cylindric hairs, the odd one as long as these and a trifle broader.

Growing with *V. blanda* under trees north of the road running from Rockcliffe to Beechwood. The plants grow singly and are generally one-flowered. Collected in the spring of 1901 and in fruit in September by Dr. J. Fletcher and J. M. Macoun.

VIOLA SUBVISCOSA, Greene, Pittonia, VOL. IV, p. 293.

Rootstocks not much branched, slender, short-jointed and knotted ; plant 4 to 6 inches high at time of petaliferous flowering : leaves thin, deep-green, shining and slightly clammy, very sparsely appressed-hairy above, somewhat hirsute beneath along the veins and sparsely ciliate, in outline from cordate-reniform to broadly cordate with deep and often almost closed sinus, subserrately crenate, the more strictly cordate ones about 2 inches in diameter and little longer than broad : peduncles about equalling the leaves, bibracteolate

below the middle, more or less strongly hirsutulous, as are also some of the petioles: sepals oblong, obtuse, strongly and closely ciliate with spreading or somewhat retrorse hairs: corolla violet, large, about 1¼ inches wide, the petals not very dissimiliar, rather broadly obovate, the keel as broad as the others and very obtuse.

Described from specimens collected by Dr. Jas. Fletcher, in open spaces among woods at Aylmer, Que. This species has also been collected on Prince Edward Island, by Mr. L. W. Watson and in Vermont. In general appearance *V. subviscosa* resembles *V. septentrionalis* but this latter species "has a heavier foliage, of a light green shade, wholly devoid of clamminess, each leaf with a broad open sinus and each branch of its stout rootstock produces a considerable cluster of leaves and flowers."

VIOLA CARDAMINEFOLIA, Greene, Pittonia, vol. IV, p. 289.

Caulescent, the numerous slender decumbent or more depressed stems 3 to 5 inches long: leaves small, the subcordate-ovate obtuse minutely crenate blade often merely ½ inch, seldom ¾ inch long, of firm texture, obscurely pulverulent-puberulent, the slender petioles about 1 inch long; stipules lanceolate, the lowest serrate-ciliate, the upper nearly entire except toward the base: slender peduncles little more than an inch long, bibracteolate much above the middle: sepals subulate-lanceolate, glabrous: corolla small, deep blue; spur elongated, oblique.

In rocky woodland near Aylmer, Quebec, Canada, 6 June, 1901, Dr. J. Fletcher. Allied to the common *V. Muhlenbergiana* of the U. S. (now rightly or wrongly called *V. Labradorica*), but easily distinct by its small, thick and somewhat fleshy foliage always of ovate outline and obtuse; the flowers not half as large, much more deeply coloured, with a different spur.

VIOLA FULCRATA, Greene, Pittonia, vol. IV, p. 285.

Cowichan River, Vancouver Island, 2 June, 1898. Herb. No. 19,912. (*J. R Anderson.*)

VIOLA PETROPHILA, Greene, Pittonia, vol. IV, p. 286.

Crevices of rocks, Shawnigan Lake, Vancouver Island, 9 May, 1897. (*J. R. Anderson.*)

VIOLA COMPACTA, Greene, Pittonia, vol. IV, p. 286.

Crevices of rocks, Shawnigan Lake, Vancouver Island. Herb. No. 19,910. (*J. R. Anderson.*)

VIOLA ANDERSONII, Greene, Pittonia, VOL. IV, p. 287.

Thetis Lake, B. C., 29th April, 1900. (*J. R. Anderson.*)

VIOLA ORECALLIS, Greene, Pittonia, VOL. IV, p. 288.

Mill Hill, B. C., 28th April, 1900. (*J. R. Anderson.*)

VIOLA ALBERTINA, Greene, Pittonia, VOL. IV, p. 289.

Described from specimens collected by W. Spreadborough east of McLeod River, northern Alberta, but a common species everywhere in the foot-hills of the Rocky Mountains.

CERASTIUM ANGUSTATUM, Greene, Pittonia, vol. IV, p. 300.

Open prairies in the sandhills north of Prince Albert, Saskatchewan, July, 1896. Herb. No. 12,459. (*John Macoun.*) Only known station.

CERASTIUM CAMPESTRE, Greene, Pittonia, vol. IV, p. 301.

The common species on the Canadian prairies. Our specimens are from Stonewall, Man. (*John Macoun.*) Indian Head, Assa. (*W. Spreadborough*) Cypress Hills, Assa. (*J. M. Macoun.*)

CERASTIUM VESTITUM, Greene, Pittonia, vol. IV, p. 302.

Dry banks at Ste. Anne, west of Edmonton, Alberta, June 9th, 1898. Herb. No. 19,285. (*W. Spreadborough.*) A well-marked species known only from Mr. Spreadborough's specimens.

CERASTIUM CONFERTUM, Greene, Pittonia, vol. IV, p. 302.

Described from specimens collected by Prof. John Macoun along the old telegraph trail in Lat. 54°, British Columbia, June 24th, 1875, and at Stewart Lake, B.C., June 20th. Not since collected.

CERASTIUM TOMENTOSUM, L.

There are specimens of this species in the herbarium of the Geological Survey, labelled "Brant Co., Ont." but without the collectors' name. It is here recorded in the hope that some further information relating to it may be secured as this is the first American record known to us.

MENTZELIA TENERRIMA, Rydberg.

Waneter, B.C. 1901. (*R. H. Jamieson.*) New to Canada.

STENOTUS LYALLII, (Gray.)

On nearly all the higher mountains on both sides of the Chilliwack Valley, Coast Range, B.C., at about 6,000 ft. alt. Always found with *Solidago multiradiata*, var. *scopulorum*. (*J. M. Macoun.*)

SOLIDAGO VIRGAUREA, L., var. GILLMANI, (A. Gr.) Porter.

On rocks at the extreme end of the Bruce Peninsula, Tobermory, Ont., Aug. 23rd, 1901. Herb. No. 26,719. (*John Macoun.*) Known previously only from the south shore of Lake Superior. Probably a good species.

SOLIDAGO JUNCEA, Ait., var. SCABRELLA, A. Gray.

Thickets at Leamington, Ont. 1901. (*John Macoun.*) New to Canada.

ASTER ANGUSTUS, T. & G.

At the "round house" in the M. C. Ry. yard at Montrose near Niagara, Ont. (*R. Cameron.*) Introduced from the prairies.

ASTER LONGIFOLIUS, Lam., var. VILLICAULIS, Gray.

On earth along the St. John River at Woodstock, N.B. Herb. No. 22,505. (*John Macoun.*) Our only Canadian specimens.

ASTER KENTUCKYENSIS, Britt.

Toronto Island, Ont., Sept. 6th, 1901. Herb. No. 26,358. (*John Macoun.*) New to Canada. Determined by Dr. Britton.

ASTER VIMINEUS, Lam., var. SAXATILIS, Fernald, Rhodora, vol. 1, p. 188.

Paugan Falls, Que.; banks of the Nation River at Casselman, Ont. (*John Macoun.*)

ERIGERON BRANDEGEI, Greene.

Aplopappus Brandegii, Gray.

On mountains north of Chilliwack Lake, Coast Range, B. C., alt. 6,500 to 7,500 ft., 1901. (*J. M. Macoun.*) Not recorded west of Selkirk Mts.[1]

GNAPHALIUM ULIGINOSUM, L.

Abundant along ditches, Chilliwack, B. C., 1901. (*J. M. Macoun.*) Our only specimens from British Columbia.

XANTHIUM PENNSYLVANICUM, Wallr.

Common at Humber Bay in front of High Park, Toronto, Ont., 1901. Herb. No. 26,807. (*John Macoun.*)

XANTHIUM COMMUNE, Britt.

From Quebec to Manitoba. Our specimens are from Casselman, Ottawa and Napanee, Ont., and Brandon and Killarney, Man.

XANTHIUM MACOUNII, Britt.

Goose Island, Lake Winnipeg, Man., 1884. The type. (*J. M. Macoun.*) Only known station.

XANTHIUM GLANDULIFERUM, Greene.

Police Point, Medecine Hat, Assa. Herb. No. 10,911; Walsh, Assa. Herb. No. 10,910, the type; east of Hand Hills, Alta. (*John Macoun.*)

X. echinatum and *X. Canadense* are not known to occur in Canada, but as they grow in the Northern States they will probably be found in Southern Ontario.

SILPHIUM PERFOLIATUM, L.

Not rare at Chatham, Ont. (*John Macoun.*)

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[1] The geographical limits given in these papers refer to Canada only.

SILPHIUM TEREBINTHINACEUM, L.

Walpole Island, St. Clair River, Ont. (*C. K. Dodge.*) In thickets at Sandwich and Windsor, Ont. (*John Macoun.*)

HELIANTHUS PETIOLARIS, Nutt.

Along the C. P. Ry. at Câche Lake, Ont. 1900. (*John Macoun.*) Introduced from the west.

HELIANTHUS ANNUUS, L.

Head of Queen street, near High Park, Toronto, Ont. 1901. (*John Macoun.*)

CHRYSANTHEMUM SEGETUM, L.

Near the tannery at Tilsonburg, Ont. 1901. (*Macoun.*) A garden escape. Not recorded from Ontario.

CHRYSANTHEMUM CORONARIUM, L.

A garden escape at Tilsonburg, Norfolk Co., Ont. (*John Macoun.*)

ARTEMISIA CAUDATA, Michx.

Abundant in sandy fields at Sarnia, Lambton Co., Ont. Collected in recent years by C. K. Dodge and by Prof. Macoun in 1901. Herb. No. 26,339. The plants from Manitoba referred here in Macoun's Catalogue of Canadian Plants, vol. 1, p. 256, are *A. Canadensis.*

ARTEMISIA ABROTANUM, L.

Roadsides at Allenford between Southampton and Owen Sound, Ont. 1901. (*Macoun.*) Not before recorded in these papers.

SENECIO PLATTENSIS, Nutt.

Woods at Sandwich, Ont. Herb. No. 26,673, and at Camlachie, seven miles from Sarnia, Ont. Herb. No. 26,674, 1901. (*John Macoun.*) New to Canada.

CARDUUS HILLII, (Canby.) Porter.

On shingle, Little Eagle Harbour, Lake Huron. Aug. 23rd, 1901. Herb. No. 26,454. (*John Macoun.*) Specimens referred to *Cnicus pumilus*, Macoun, Cat. Can. Plants, VOL. 1, p. 555 are this species.

SAUSSUREA MONTICOLA, Rich., App. Frank. Journ., ed. 2, 29.

Lumped with *S. alpina* by Gray and others, but it presents so little resemblance to that species that the most casual observer would at once know it to be distinct. Easily separated from *S. alpina* by its "narrower, more rigid entire leaves and very hairy involucre." Collected by Dr. Richardson in grassy plains on the Copper Mountains, lat. 67°, and along the arctic coast between the Mackenzie and Coppermine rivers. The specimens in the herbarium of the Geological Survey are from Herschell Island, west of the mouth of the Mackenzie, 1893. (*Rev. J. I. Stringer.*) West shore of Great Bear Lake, lat. 65° 30′ to lat. 66° 30′. 1900. (*J. M. Bell.*) Lat. 62° 17′, long. 103° 07′, 1893; on Stony Island, Great Slave Lake, 1900. (*J. W. Tyrrell.*)

HIERACIUM PILOSELLA, L.

St. John and Charlos, Restigouche River, N.B. (*Philip Cox.*) New to New Brunswick.

HIERACIUM LONGIPILUM, Torr.

A single specimen collected in woods 5 miles from Sarnia, Ont. 1901. (*John Macoun.*) A very rare species in western Ontario. Seldom collected.

MENTHA ROTUNDIFOLIA, (L.) Huds.

In a gravelly ravine running into the Thames near London, Ont., 1901. (*J. Dearness.*) New to Canada.

CLINOPODIUM ACINOS, (L.) Kuntze.

Our herbarium specimens of this plant are from sandy and grassy roadsides north of London, Ont. (*J. Dearness*) and near Galt, Ont. (*W. Herriot.*)

RUMEX FENESTRATUS, Greene, Pittonia, VOL. IV, p. 306.

Described from specimens collected by Prof. John Macoun in salt marshes at Comox, Vancouver Island, June 23rd, 1893. Herb. No. 1,570. Also collected in 1887 by Prof. Macoun at Chase River, near Nanaimo, Vancouver Island. Herb. No. 23,723. The common large *Rumex* on the east coast of Vancouver Island.

CALAMOVILFA LONGIFOLIA, (Hook.) Hack.

Ammophila longifolia, Macoun, Cat. Can. Plants, VOL. II, p. 208.

Sand-dunes at Point Edward, Lake Huron, Ont. 1901. Herb. No. 26,047. (*John Macoun.*)

DANTHONIA AMERICANA, Scrib. U.S. Dept. Agric. Div. Agros., Circular 30, p. 5.

Wellington Mines, Nanaimo, Vancouver Island. June 13th, 1887. (*John Macoun.*) Among a score or more of sheets of *Danthonia* from the west coast of British Columbia, our herbarium contains but this one of *D. Americana*.

NOTES ON THE WILLOWS OF THE CHILLIWACK VALLEY, B.C.

By J. M. MACOUN.

The number of species of *Salix* in the Chilliwack Valley is remarkably small for that region, only four species having been seen in 1901 in the valley itself and five on the mountains on either side of it. In the valley *S. Sitchensis* is common everwhere, and was the only willow growing along the river between Chilliwack Lake and the point at which the river enters the Fraser Valley with the exception of one clump of *S. pseudomyrsinites* Anders., which grew on a gravel bar in the river This species was also found by a rivulet at an altitude of 6,000 feet. The other valley species were *S. caudata* (Nutt.,, collected at Chilliwack village, and *S. Lyallii*, Heller. at Sumas Lake and by a stream flowing into Chilliwack Lake.

The only common species on the mountains was *S. commutata*, Bebb., always by rivulets at about 5,000 feet altitude, where snow has lain late in the spring. *S. conjuncta*, Bebb., was found on one mountain in a similiar habitat. *S. nivalis*, Hook., which might be expected to be common, was seen only on Tami Hy Mountain at an altitude of 5,500 feet. *S. subcordata* covered a large boulder at 5,600 feet and *S. crassijulis*, Trautv , was abundant on a rocky slope on Tami Hy Mt. but seen nowhere else.

Specimens of all the above were examined by Dr. P. A. Rydberg who has verified my determinations and named the species about which I was uncertain.

TARAXACUM IN CANADA.

About a year ago Dr. Edw. L. Greene described several new species of Taraxacum from Canada.* Several sheets of specimens have been added to the Geological Survey collection since our material was examined by Dr. Greene, but these are all referrable to one or other of the species enumerated below. In his introductory note Dr. Greene says: "Indigenous species will probably be found sufficiently numerous though perhaps only upon western mountain territory." It is probably true that the number of indigenous species in eastern and northeastern Canada is small, perhaps, indeed, there is only one species which ranges from the mountains of eastern Quebec through Labrador and Ungava to Hudson Bay, but that there is at least one indigenous species in eastern Canada no one who has travelled through the unsettled

*Pittonia, Vol. IV, pp. 227-233.

parts of the country can doubt. Not only is *Taraxacum* not rare on the banks of lakes and streams, but the writer has often found it in bogs and swamps several hundred miles from settlement of any kind.

TARAXACUM CHAMISSONIS, Greene, Pittonia, vol. IV, p. 228.

Very common on the shores and islands of Behring Sea and south along the Alaskan coast. Will probably be found in British Columbia.

TARAXACUM RUPESTRE, Greene, Pittonia, vol. IV, p. 229.

Crevices of rocks, alt. 6,000 ft., Mt. Queest, Shuswap Lake, B C. Herb. No. 15,111; Avalanche Mt., Selkirk Mountains, B.C., alt. 8,000 ft. (*J. M. Macoun.*) Kicking Horse Lake, Rocky Mountains. (*John Macoun.*)

TARAXACUM OVINUM, Greene, Pittonia, vol. IV., p. 229.

On Sheep Mountain, Waterton Lake, lat. 49° 05′, Rocky Mountains. Herb. No. 11,711. (*John Macoun.*)

TARAXACUM LACERUM, Greene, Pittonia, vol IV, p. 230.

Canyon of the Upper Liard River, Yukon, lat. 60° 26′. June, 1887. Herb. No. 15,119. (*John Macoun.*)

TARAXACUM DUMETORUM, Greene, Pittonia, vol IV, p. 230.

A common species from Assiniboia westward to British Columbia.

TARAXACUM ERYTHROSPERMUM, Andrz.

The red-seeded dandelion is probably common throughout eastern Canada, but has been seldom separated from *Taraxacum Taraxacum*. Our specimens are from Ottawa, Niagara Falls and Hamilton, Ont.

J. M. M.

SOME NEW NORTHWESTERN COMPOSITÆ.

By EDWD. L. GREENE.

ASTER MICROLONCHUS. Stems about two feet high, very erect, divested of all lower leaves at flowering time, parted from below the middle into numerous leafy and flowering branches forming a somewhat contracted and subpyramidal panicle ; the reddened bark of stem and branches glabrous or obscurely pubescent : leaves of the panicle narrowly lance-linear, two inches long more or less, entire, sessile by a broad more or less perceptibly auricled base, thin, delicately scaberulous above, scabrous on the margin, glabrous beneath, marked by a delicate midnerve only, spreading or slightly deflexed : heads few and subracemose on the branches, or solitary at the ends of them, nearly an inch broad measuring the rays, the involucre short-campanulate, its bracts in about three series, narrowly spatulate-lanceolate, scaberulous, at least marginally, and spreading or recurved at tip : rays many and showy, apparently pale violet.

The types of this strikingly handsome new Aster are Mr. Macoun's numbers 26,3'4 and 26,385 from the Chilliwack Valley, B.C., collected 18 Aug., 1901. Its immediate allies are *A. longifolius*, Lam., *A. hesperius*, Gray, and *A. ensatus*, Greene. From all of these it differs not only in aspect, but in its foliage which, though sensibly roughened above, is yet of a texture so delicate that all the lower and properly cauline ones fade and fall before the time of flowering. It is perhaps more elegant and beautiful than any of its near relations, and rather smaller in stature, though growing in generous soil, and a climate abundantly moist and not severe.

GNAPHALIUM MACOUNII. Apparently biennial, the stems rigidly erect, about two feet high, rather loosely leafy and clothed with a somewhat hirsute and viscid glandular-pubescence : leaves narrowly oblanceolate, acute, 3 inches long, the upper decurrent, all white-woolly beneath, light green and merely glandular-pubescent above : branches of the subpyramidal close panicle and the main stem for some distance below it densely white-woolly : involucres of middle size, their pearly scarious bracts all ovate, very acute : flower and fruit not seen.

Collected in the Chilliwack Valley, B.C., 29 July, by Mr. Jas. M. Macoun, No. 26,847; also earlier at Revelstoke, No. 11,334, and again from the Warm Springs, Kootenay Lake, both in British Columbia, in the year 1890. No. 34,053 from Salmon Arm, J. R. Anderson, 1899, is also the same. The species is related to *G. decurrens*, yet very distinct in habit and inflorescence, the dense white-woolly pubescence of the upper part of stems and branches of the panicle being very peculiar.

GNAPHALIUM PROXIMUM. Annual, erect, rather slender, a foot high, rather amply leafy, even up to the subsessile leafy-bracted clusters of heads: leaves thin, equally hoary on both faces, about 1½ inches long, from ovate-lanceolate to oblong-lanceolate, broadest at the sessile and subcordate clasping base, somewhat cuspidately acute: small plants simple and with but a terminal cyme; larger ones with many short but strict branches, each with its cyme: bracts of the rather smallish involucres greenish-white, the outer broadly triangular lanceolate and acute, the inner very obtuse: pappus rather scanty, dull-white.

In moist ground in the vicinity of the Mammoth Hot Springs, Yellowstone Park, Messrs. A. and E. Nelson, 1899, distributed under No. 6,036 for *G. Sprengelii*, from which the species differs widely in habit, form of foliage, etc.

ARNICA LÆVIGATA. Near *A. latifolia* and as large, the herbage of a deeper green and of much more thin and delicate texture: radical leaves from round-ovate and cordate to lance-ovate and subcordate, 2 to 3 inches long, on slender petioles as long, the 2 or 3 cauline pairs broad and sessile, glabrous on both faces and coarsely, incisely, often doubly serrate-toothed, the larger 3 inches long and more than 2 in breadth: peduncles about 3, slender, puberulent under their narrowly turbinate involucres, the bracts of these uniserial, lanceolate, acuminate, scarcely pubescent except as to the villous ciliolate margins; rays light-yellow, long and narrow; disk-corollas narrow-funnelform, the very short and hirtellous tube passing gradually into the limb, which much exceeds it in length: pappus white; achenes glabrous.

By springs in woods of the Chilliwack Valley, B.C., 5 Aug., 1901, J. M. Macoun, No. 26,926. However much like *A. latifolia* in general habit and leaf-outline this may be, it must needs be distinguished specifically by its total lack of pubescence, thin texture, narrow involucres, funnelform corollas, etc. In true *A. latifolia* the bracts are glandular-hairy throughout, and not at all ciliate; and its disk-corollas are much larger and not funnelform, the throat and limb swelling out abruptly from the short tube. Mr. Macoun writes that this species was collected in 1901 on Mt. Cheam by Mr. J. R. Anderson and Dr. Jas. Fletcher.

ARNICA APRICA. Also akin to *A. latifolia* and like it commonly more or less pubescent, but the hairs less rigid, and obviously jointed; the whole plant much smaller in all its parts, and the heads more numerous: radical leaves long-petioled and broadly or narrowly cordate-ovate, the cauline oval, sessile, all serrate or dentate, the teeth callous-tipped: bracts of turbinate involucre few, thin, oblanceolate, acute or acuminate, often purple-tipped, nearly glabrous: rays few, rather deep-yellow, not deeply toothed, the teeth short and broad: disk-corollas with slender tube about as long as the subcylindric but abrupt limb: pappus firm, white; achenes long and slender, glabrous except a few obscure bristly very short hairs and as few minute glands about the summit.

This is represented by Mr. James Macoun's numbers 26,284 and 26,285 from the Chilliwack Valley. It is said to be a plant not of the woods, but of open ground along streamlets. It is readily distinguishable from *A. latifolia* not only by its smaller size and more numerous flowers, but by the character of its pubescence, and especially by its short merely tridentate rays; these last, in the real *A. latifolia*, being elongated, and very deeply cut at summit into narrow almost ligulate teeth or segments.

ARNICA MACOUNII, Greene, Pitt. iv., 160. This species, hitherto known to me only from Vancouver Island, was copiously collected by Mr. James Macoun in the Chilliwack Valley, last season, the specimens bearing the numbers 26,927, 26,928 and 26,929 of the Geol. Surv. Herb.

ARNICA AURANTIACA, Greene, Torreya i, 42, founded on a plant of Oregon collected only by Mr. Cusick until now, must be credited to British Columbia, Mr. Macoun's No. 26,934 from the Chilliwack region matching perfectly the originals of the species.

ARNICA CONFINIS. Less than a foot high, monocephalous, or else with also a pair of monocephalous peduncles from the axils of the uppermost pair of leaves, these surpassing the terminal one; herbage of a light green, viscid-puberulent as to the foliage, the stem with a sparse hairiness: lowest leaves obovate to oblanceolate, an inch long or more and petiolate, the cauline in about three pairs, ovate to lanceolate, 1 to 2 inches long, callous-denticulate, or serrate-dentate, or even subentire, acutish; heads of middle size, the involucral bracts biserial, acuminate, sparsely hirsute: rays deep-yellow, not large; disk-corollas with hirsute tube and naked limb about equal; achenes with a few hirsute hairs; pappus tawny, subplumose.

Chilliwack Valley, B.C., Mr. Macoun, No. 26,933. In characters of pubescence, flower and fruit this approaches *A. ovata*, Greene, but in foliage and habit it differs widely.

ARNICA ASPERA. Stems clustered, often 2 feet high, equably leafy to the corymbose summit, loosely hirsute, more strongly and quite retrorsely so toward the base: leaves about 2 inches long, ovate-lanceolate, sessile by a broad base, the upper longer, the lower shorter than the internodes, rough-hairy on both faces, saliently callous dentate: peduncles several, slender; involucres small for the plant, campanulate, their bracts uniserial, hispidulous with pustulate hairs; rays very obtuse and only minutely tridentate; disk-corollas with very short tube and rather longer limb about equally and very sparsely setose-hairy: achenes setose-hairy; pappus tawny, subplumose.

The type of this species is a plant found by myself on Mt. Rainier, 19 Aug., 1889, and then supposed to be *A. amplexicaulis*, which I have now for some time known to be a very different plant. *A. aspera* has also been collected by Mr. Piper at Snoqualmie Falls, Washington, and again in the Olympic Mountains. Mr. M. W. Gorman obtained it in 1897 among his plants of the Washington Forest Reserve.

ARNICA CANA is a name needed to replace that of *A. incana*, Greene, Pitt., iv, 169; there being an *Arnica incana* of Persoon of much earlier date.

ARNICA CROCINA, Greene, Torreya, i. 42, first published in Pittonia, iv, 159, by the untenable name of *A. crocea*, is now in hand from two additional stations. It is Mr. James Macoun's No. 26,931 from dry slopes north of Chilliwack Lake, 26th July, 1901; also No. 34,074 of the Canad. Geol. Surv., collected by J. R. Anderson, 1901, from Mt. Cheam, north of Chilliwack River, B.C.

THE SPOTS ON THE EGGS OF THE GREAT BLUE HERON.

By W. E. SAUNDERS.

Some ten years ago I was surprised to receive from Frank L. Farley, then at St. Thomas, but now ranching in Alberta, a set of eggs of the Great Blue Heron which bore a goodly number of jet black spots, and as these spots would not wash off, it was manifest that they were a part of the egg! Although this conclusion was easily arrived at, it was not a satisfying one, as I well knew that all (?) herons' eggs were normally unspotted. In 1900 Mr. Robertson, Aylmer West, Ont., sent me a fine set of five of this species, all of which show more or less of this peculiar spotting. At intervals this problem would recur to my mind, until at last, one day it dawned on me that these herons, at St. Thomas and Aylmer, were within ten or twelve miles of Lake Erie, and I knew that the pound-nets set by the fishermen for sturgeon, etc., were a favourite feeding ground for these birds; and, moreover, that the fishermen soak their nets with a compound of pitch. This solved the problem. Clearly the birds got pitch on their feet, off the nets, and carried it home for the sole purpose (?) of beautifying their eggs. But if this were the case, then a solvent of this pitch compound, such as ether or carbon bisulphide, would dissolve and remove these spots. This theory proved to be correct, and a diligent application of ether to one of the spots removed it. It is plain, therefore, that the spotted eggs would belong to birds who fished in the lake, and that those who fed entirely at smaller

waters would have eggs of clear blue. This conclusion puts one in a position to theorize about the inhabitants of an individual heronry, and lends much interest to the following extracts from Mr. Farley's letter of Feb. 1st, 1891, in which he says:

"On the 24th May, 1889, Ben and I went to the heronry nine miles northwest from here, but did not get there till late in the day, about six o'clock. I did not want to go up as I had walked the country since four o'clock that morning and was tired, but Ben went up one tree with six nests in it, and took two sets, one of 4 spotted, and one of 5 plain ones. Then when he came down I went up another with five nests in it. It was nearly too late, about seven o'clock, when I got up, and I did not want to be caught in the top of a black ash with dead branches after dark, so I did not get any eggs but saw into several nests and could see one set of 5 spotted ones and two plain sets. I went down and we tried Ben's to see if they were fresh, but found that one of the set of 5 was broken, and it was about 18 days set on out of the 21 days; and the bird was all formed. We got the eight eggs home all right and by persistent work for two weeks they were fit for the cabinet, and he now has them in his collection in British Columbia.

"The heronry is in a big forest of black ash and soft maple trees, and was nearly flooded beneath. There were about 100 nests in the place. Some of the trees had as many as eight nests in them, but the majority only had four or five, and some only one. We concluded that we were about ten days too late, and in 1890 we would visit it. Accordingly, on the 12th May, 1890, we left home at 3.30 a.m. and got there shortly after daybreak. We each chose our tree as we both had a pair of irons. I took one with five nests and Ben one with seven. As soon as I got up I yelled out to him that I had a set of five spotted ones, but they were pipped so I left them and went on up to the other nests. From that tree I took two sets of spotted eggs and one of plain ones. No. 1 spotted contained four eggs and No. 2 contained three eggs. No. 2 is the set I send you. During the day I took three sets of spotted, one of five, one of four and one of three. I could only make the set of three fit for my cabinet, although I have the rest laid aside. During the day Ben took three nests of

spotted ones and seven of the others. All told, the two of us took about fifty eggs during the day. This date we also found too late, and this year we will visit it on the 1st or 2nd May, and I hope you will prepare for it and have a good day up the ashes about 70 to 90 feet above *terra firma*."

From this extract it is clearly a lawful conclusion that some of the herons in that colony confined their feeding to smaller waters, while others, nesting in the same tree, visited Lake Erie as well, or possibly did the whole of their hunting on its waters.

On a careful examination of the set taken by Mr. Anderson in May, 1899, I find that although the eggs were fresh, yet every one is spotted, varying from two to three small spots on what was probably the most recent egg, up to several dozen spots of various sizes on the earlier specimens. Therefore it is manifest that the eggs become spotted very soon indeed after they are laid, and point strongly to the conclusion that the unspotted ones belong to birds that confine their hunting exclusively to the smaller waters.

As a rule it is very difficult, if not impossible, to establish that there is any fixed difference in the habits of individual birds of a breeding colony, and a hint of individuality such as these spotted eggs gives, is a gratifying discovery to the student of bird life.

THE AMERICAN SCOTER IN MIDDLESEX.

(Read before the Ornithological Section of the Entomological Society of Ontario.)

By W. E. SAUNDERS.

At the last meeting I presented for inspection a specimen of the Surf Scoter, which was one of a flock of three, two of which had been shot on the Thames River, eight miles west, by Messrs. Murdock and Bridgeman. Only a single record had previously existed for the county, and no other Scoter had been recorded at all.

In the early morning of Nov. 13th, while walking up from the waterworks, I saw a duck on the river and after making the usual sneak along the bank, I got a good rifle-shot at it and missed. It flew, but only about a hundred yards, when it lit

again. A passing car caused it to go a little farther and soon after, by a careful sneak, I got another shot, this time with success. In a moment or two the duck revived and began to swim vigorously for the shore. When it lagged, I dropped a bullet from a smokeless cartridge just outside of the duck, which then made a fresh start for the shore, which after several such spurts was reached, and my prey hid among the irregular sods at edge of the water, out of my sight. To kill it was then the problem, but after carefully searching the shore from several points, I managed so badly as to appear right above it and it started for mid stream in hot haste. Before long it was dead, but the wind being almost directly up stream refused to bring it within reach, nor would the current, but the latter, on the contrary, neutralized the effect of bullet after bullet, which I dropped carefully from the rifle, just beyond the dead bird. Eventually the wind drifted it up stream past a point which was my last hope, and from which, standing barefooted in the icy water, I was unable to reach it with a long stick, and I realized that I must get it from the other shore. This meant walking three-quarters of a mile to the bridge, and then back again. By the time this was accomplished the duck had nearly reached the shore and in a few minutes I had the pleasure of handling an unknown specimen which I guessed was a Scoter. Without staying to plug its mouth, I started in hot haste for business, the time being about 9.30, and in a few minutes was disgusted to notice that the old adage, "more haste and less speed" was being proved once more by the numerous splashes of blood on my trousers. This necessitated a stop to wash them in the river, and once more I started for town, this time without further mishap.

On examining the bird with the aid of Ridgway's Manual it was easily seen to be the American Scoter (*Oidemia Americana*), a bird not hitherto recorded for the county although it is a regular visitant, probably in restricted numbers, to the great lakes.

SOIRÉES.

The fourth soirée of the Ottawa Field-Naturalists' Club was held in the Y. M. C. A. lecture room on the evening of July 11th, when the Rev. Robert Campbell, D.D., lectured on "The Ferns of Canada." The lecture was illustrated by lantern slides showing the various kinds of fern structure and fructification and with the exception of a few western species, the large series of slides shown included nearly every form found in Canada. In his introductory remarks the lecturer defined the terms used in describing the various parts of a fern and as each picture was thrown on the screen the differences between genera and species of the same genus were pointed out. The slides were all good, but those made from photographs of mounted specimens were much truer to nature than the reproductions of drawings. In addition to the slides Dr. Campbell exhibited a very complete and finely mounted collection of the ferns of Canada. The lecture was of great interest not only to the botanist but to the many lovers of ferns who, though not botanists, are lovers of Nature.

REVIEW.

MATTHEW, G. F.—ARE THE SAINT JOHN BEDS CARBONIFEROUS? Amer. Geol. Vol. XXVII, No. 6, pp. 383-386, Minneapolis, Minn., U.S.A., June, 1901.

This brief paper is an attempt to give the evidence upon which the plant-bearing beds of the St. John district rest regarding their reference to the Devonian and Silurian systems as held by Dr. Matthew. Correlations with the "Millstone Grit" of England and the "Mauch Chunk" of Pennsylvania are given for different portions of New Brunswick. Two distant series exist, says Dr. Matthew, one in which the sandstones occur as "free stones," the other in which the "sandstones are strongly cemented with silica and some calcite, the shales converted into slates, the limestones are more crystalline and the beds usually tilted at high angles." An unconformity exists at the point of division. Dr. Matthew holds with discordance of dip &c. The *Mispec* and the *Little River* terranes, the latter constituting the fern beds in question, according to Dr. Matthew, lie beneath the unconformity. Dr. Bailey, Dr. Ells, Sir Wm. Dawson, Dr. T. Sterry Hunt, and Dr. Selwyn are given as authorities for the view that the stratigraphical sequence is as given by Dr. Matthew. The latter claims that recent discoveries serve to prove that types which are usually referred to this "flora have been gathered from the lower horizons of the Carboniferous. Dr. Matthew also adds that many genera of plants have a wide vertical range citing a recent genus supposed to be found in the Dretaceous. Dr. Matthew makes the so-called "Millstone Grit" the equivalent of the "Pottsville Conglomerate.

H. M. A.

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