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THE

OTTAWA NATURALIST,

Being Vol. XVIII. of the

TRANSACTIONS

OF THE

OTTAWA FIELD-NATURALISTS' CLUB.

Organized March, 1879. Incorporated March, 1884.

OTTAWA, CANADA:
OTTAWA PRINTING COMPANY (LIMITED.)
1902.

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THE OTTAWA NATURALIST.

VOL. XVI. OTTAWA, APRIL, 1902. No. 1.

THE REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING MARCH 18TH, 1902.

The Council of the Ottawa Field-Naturalists' Club beg leave to submit the following Report of the work of the Club for the year just closing :

MEMBERSHIP.

The total membership of the Club at the present time is about 250 ordinary members and seven corresponding members.

Mr. W. J. Wilson, the Secretary, represented the Club at the meeting of the Royal Society of Canada held in this city in May last, and read a brief statement of the Club's work during the year.

SPECIAL LECTURES.

Dr. James Fletcher delivered a lecture on "Nature Study" before the Normal School students.

SOIRÉES.

The Soirée Committee deemed it advisable to depart somewhat from the usual custom in preparing the winter course of lectures, and secured prominent lecturers outside of Ottawa for three out of the seven evenings. These gentlemen were : Rev. Robert Campbell, of Montreal, who spoke on "The Ferns of Canada" ; Prof. E. W. MacBride, of McGill University, Montreal, who spoke on "The Present Position of the Evolution Theory" ; and Mr. W. E. Saunders, of London, Ont, who lectured on "Native Birds." The success of the whole course both in interest and attendance amply justified the Committee in making the change.

The programme was published on page 214 of THE OTTAWA NATURALIST. The course was carried out as published except that Prof. Prince was called away to British Columbia and was not able to give us his address on "Whales and Whale Hunting."

In addition to the above, Dr. Conway MacMillan, of Minnesota University, delivered a most interesting lecture under the auspices of the Club on "Marine Biological Stations on the Strait of Fuca, B.C.," on Saturday evening, February 22nd.

The attendance at all these lectures was good, in some cases reaching 300 or 400. Five of these lectures were illustrated by lantern slides, and the Council desire to express their appreciation of the very efficient manner in which Mr. J. P. Dunne managed the lantern.

EXCURSIONS.

The Excursion Committee made early arrangements for a number of sub-excursions for Saturday afternoons and also for a general excursion to Chelsea, but unfortunately circumstances over which the Committee had no control seriously interfered with successfully carrying out all of them.

The first sub-excursion was to the vicinity of Beechwood, 27th April, and was attended by about 80 members. Fifteen species of Utica fossils were collected, and twenty-three species of plants were found in bloom.

The second sub-excursion was held on May 4th, at Britannia, where over 100 attended. Many interesting specimens both of plants and rocks were collected. The sweet coltsfoot, a plant rare in this district, was found on that day. Heavy rain on the two following Saturdays made it unfit to go out, but on the 24th of May, about twenty members, a large number of whom were ladies, met at the Exhibition Grounds, Bank street, and walked out to Hog's Back and round by Billings' Bridge. The interesting rock formations at Hog's Back were studied and several facts in Pleistocene geology observed.

The general excursion to Chelsea was arranged for the 1st of June, but that day proved most unfavourable. About seventy members and friends met at the Central Station and decided to go notwithstanding the downpour of rain. Considering the inclement weather considerable work was done. Large numbers of plants

were secured and two or three species of Pleistocene shells. A smaller number went to the same place the following Saturday, June 8th.

A most gratifying feature of these excursions is the large number of young boys who attend, and who are becoming enthusiastic collectors and close observers.

THE OTTAWA NATURALIST.

THE OTTAWA NATURALIST, the official organ of the Club, was issued regularly during the year under the able editorship of Mr. James M. Macoun. Vol. XV. is made up of twelve numbers containing 286 pages, also three maps, six botanical plates and five palæontological plates. There are over fifty titles of papers, of which the most important are :

Bird Notes from Point Pelee, Ont., by Harry Gould.

Ancient Channels of the Ottawa River, by R. W. Ells, LL.D.

Notes on a Supposed New Species of Lytoceras, by J. F. Whiteaves, LL.D.

The Sources and Distribution of the Gold-bearing Alluvions of Quebec, by R. Chalmers.

Allies of Stellaria Media (L.) Cyrillo, by Theo. Holm.

New Plants from Alberta, by Edw. L. Greene.

The Late George Mercer Dawson, and Bibliography, by H. M. Ami, D.Sc.

Ross's Gull, by Prof. E. E. Prince.

The Golden Eagle, an Addition to the Fauna of Middlesex County, by J. E. Keys, London, Ont.

Notes on a Turtle from the Cretaceous Rocks of Alberta, by Lawrence M. Lambe.

Contributions to Canadian Botany, by James M. Macoun.

The Algonquin National Park of Ontario, by Archibald M. Campbell.

The Extinction of the Elk in Ontario, by L. H. Smith.

The Canadian Species of the Genus Whittleseya and their Systematic Relations by David White.

Some New Canadian Gentians, by Theo. Holm.

The Physical Geography of the Red River Valley, by D. B. Dowling.

My First Namesake, by Samuel H. Scudder.

On the Autumn-Flowering of Various Wild Plants in 1900, by Cephas Guillet.

Tringites Rufescens, Buff-breasted Sandpiper, by G. A. McCallum.

Fat in the Animal Body; its Function and Origin, by A. T. Charron.

Prehistoric Camping Grounds along the Ottawa River, by T. W. Edwin Sowter.

Notes on the Winter Birds of the Cariboo District, B.C., by Allan Brooks.

Some of the Birds of Algoma, by. C. T. Scott.

Rattlesnakes and Scorpions, by J. R. Anderson.

On Some Canadian Species of Gentiana; Sectio Crossopetolæ, Frœl, by Theo. Holm.

An African Dipnoid Fish, by Andrew Halkett.

Certain Canadian Violets, by Edw. L. Greene.

Alligator and Turtles as Pets, by W. S. Odell.

Fauna Ottawaensis, by W. Hague Harrington.

Nesting of Some Canadian Warblers, by Wm. L. Kells.

On the Genus Panenka, by J. F. Whiteaves.

Some New Northwestern Compositæ, by Edw. L. Greene.

The Spots on the Eggs of the Great Blue Heron, by W. E. Saunders.

Mammals of the Chilliwack District, B.C., by Allan Brooks.

Synopsis of the Birds of the Saskatchewan, by Eugene Coubeaux.

Some New Canadian Senecios, by Edw. L Greene.

Besides these and other papers, THE OTTAWA NATURALIST contains ornithological notes by W. T. Macoun and Dr. Whiteaves, book reviews, and reports of excursions and soirées, etc.

The Treasurer reports that the finances of the Club are in a satisfactory condition, and that there is a balance on hand of $129.28.

The Geological Branch reports that considerable progress has been made, much additional material obtained and reports and papers published bearing on the Geology of the Ottawa District. Besides the collections of fossils which were obtained on several

sub-excursions, notes bearing on the stratigraphy and character of the rock formations were made and a number of interesting photographs prepared which show the nature of the strata at many points where they had not previously been observed. Some of these photographs are used in illustrating points of interest in the geology of Ottawa and vicinity in Dr. R. W. Ells' Report on the Geology of the Ottawa District. The report mentions many interesting features in connection with the geology of this district, and gives a list of fossils from the Utica formation, also a list of fossil sponges from geological formations about Ottawa, and a list of Pleistocene shells from the sand-pit about two miles above Hog's Back on the Rideau River. Reference is made to the Geological Map of Ottawa and Vicinity just issued by the Geological Survey Department, and the report points out how useful such a map will be to working naturalists.

The Botanical Section reports that as usual the Club's excursions were well attended by those interested in Botany. At all of these excursions one or more of the botanical leaders was present and assisted in the determination of the different species collected.

Several new species have been added to the local list during the year. These include four violets new to science, of which descriptions have appeared in THE OTTAWA NATURALIST. It is proposed to complete the publication of Dr. Fletcher's Flora Ottawaensis this spring.

In the report of the Zoological Branch it is pointed out that "it is difficult to present new matter annually in the field of local zoology, and that it is hardly to be expected that many additions to the vertebrate fauna excepting in the lower orders, such as fishes, reptiles, etc., can be made. However, some interesting facts have been placed on record." Among these may be mentioned Mr. Halkett's study of a Dipnoid fish (*Protopterus annectens*), a full account of which will be found on page 184 of THE OTTAWA NATURALIST. Reference is also made to specimens of the bow-fin and gar-pike from the Bay of Quinte, which were preserved in formaline, thus preventing the disappearance of the natural colours of the fish. A quantity of Pacific herring was obtained for the purpose of investigating a remarkable case of mortality in these fish near Nanaimo in January last. It is stated

that the waters of the straits off Nanaimo were covered for an extent of hundreds of acres with dead herring lying two or three feet thick. Reference is also made to the Biological Report from the Marine Scientific Station founded by the Dominion Government on the Atlantic Coast, and to the Marine Invertebrates of Eastern Canada by Dr. J. F. Whiteaves.

The Entomological Report draws attention to the continued investigation of the life-histories of many of our insects, especially at the Central Experimental Farm, where Dr. Fletcher and his assistants have bred various interesting species and where a fine series of inflated skins of larvæ has been prepared by Mr. Gibson. Mr. Young has also continued his excellent work in the same line. The report also mentioned some of the more interesting insects observed during the year, and the entomological papers which have been published in THE OTTAWA NATURALIST and elsewhere.

The Ornithological Branch reports that the usual notes and records have appeared in THE OTTAWA NATURALIST, and that the active work has been about the same as in former years, though much of this has been done by ornithologists residing outside of the Ottawa district. In this connection mention is made of the excellent work done by Mr. W. E. Saunders. The dates of the arrival of 107 species of birds have been published and about 20 more dates of other species have come to hand but not yet published.

From reports received from various places in Canada and one place in Michigan, the ornithological editor of THE OTTAWA NATURALIST has been able to publish a comparative table of the first arrival of birds in different parts of the country.

The Club again desires to publicly express its thankfulness to Dr. J. A. MacCabe, Principal of the Normal School, for the free use of rooms in that building for our library and for Council meetings, and for the Assembly Hall for four evenings. Our thanks are also due the Young Men's Christian Association for the use of their Assembly Hall for four evenings; and to the daily newspapers for inserting free notices of our meetings.

ROBERT BELL,
President.

W. J. WILSON,
Secretary.

THE OTTAWA FIELD-NATURALISTS' CLUB.

The Treasurer's Statement for the year ending March 18, 1902.

RECEIPTS.			EXPENDITURE.		
1901			1902		
March 20—To balance		$256 46	March 18.—By printing Ottawa Naturalist, Vol. XV. 12 numbers pp. 286	$267 70	
1902			Illustrations	98 70	
March 18—Subscriptions			Authors' extras	64 50	
1901-02	144 00		Wrapping and mailing	6 00	
Arrears	54 10		Postage	23 15	
		198 10	Editor	50 00	
Advertisements		42 60		510 05	
Authors' extras sold		34 09	Less 5% on printers' bill, for cash	21 04	
Ottawa Naturalists sold		1 15			489 01
Government Grant		200 00	Miscellaneous printing—		
			Circulars	9 15	
			Advertising	3 60	
					12 75
			Soiree expenses		92 70
			Excursion expenses		63
			Stationery		1 20
			Postage		6 83
			Balance		129 28
		$732 40			$732 40

March 18, 1902.

Audited and found correct.

JAMES FLETCHER, *Treasurer.*

J. Ballantyne, R. B. Whyte, } *Auditors.*

A REMARKABLE SPRING.

Not even the proverbial "oldest inhabitant" can remember a spring which opened at Ottawa as early as the one we are now enjoying. From the beginning of February till the end of March the weather has been almost uniformly fair and mild. March 3rd was cold and blustery, but from that on the days were bright, and the snow melted away gradually without floods or an undue amount of slush or mud. The return of the spring birds and the blossoming of native plants are good indications of the progress of the season. Certainly no spring within the recollection of the

writer has been so early as the present one, and the following dates seem worth putting on record for future reference.

The Horned Lark, which generally may be looked for in the middle of February, was this year three weeks behind time. Every other record, however, is far in advance of the usual date at Ottawa. Leaving my house on the morning of March 15, a lovely warm day, I first noticed a pair of English Sparrows carrying straws to their nest. On a mountain ash tree Pine Grosbeaks and Cedar Waxwings were seen eating the berries. Bohemian Waxwings were looked for but none were observed. On the road to the Experimental Farm, flocks of Pine Siskins and Chickadees were busy in the cedars as though to add their testimony to that of the last named and to remind us that winter was not yet gone. In contradiction to this idea, Song Sparrows were on this day heard for the first time—not a single bird, but several—singing their joyous song from the topmost branches of the alders in a piece of swamp land. Robins appeared in numbers also on this day, although single birds had been seen several days earlier. As the Experimental Farm was reached, numerous Crows, some of which had wintered in Dow's swamp, were noisily proclaiming that spring was actually here, and the modest little song of the Horned Larks echoed the good news. Later in the day Red-winged Blackbirds were seen among the rushes on the banks of the Rideau canal. The next record was of the Cowbird on March 22, Bronzed Grackles came in flocks on the 23rd, the Bluebird on the 24th, and the Slate-colored Junco on March 27. As a rule the Song Sparrow is the first arrival and may be expected about March 28.

"Frogs" were heard whistling vociferously at the very early date of March 25.

The first flowers of the year were Snowdrops on March 26, in sheltered spots, Crocusses on March 29 in similiar places, and Siberian Squills on 31st. The Silver Maple, usually our first wild plant to blossom, had fully expanded flowers on March 30, but Mr. W. J. Wilson observed some blossoms on his record James street tree on the 26th; my earliest previous record was April 2 in 1898 On March 30 also Hepaticas in bloom were collected at Hull, and on March 31 the swamp Alders had some catkins fully expanded.

J. F.

BIRDS OF SABLE ISLAND, N.S.

By W. E. SAUNDERS.

Sable Island lies about sixty miles south of the nearest coast of Nova Scotia, and 150 miles a little southeast, from Halifax. Most people who have any idea at all about Sable Island think of it as a desert sandbar, over which shaggy ponies glean a scanty subsistance from the tough native grasses and on whose shore many lives have been sacrificed by shipwreck during the past three hundred years ; but I viewed the island from an ornithological standpoint, and as usual the point of view made all the difference in the world. Instead of being a desert island on which there was scarcely anything to interest one, it had for several years been known to me as the only home in the world of the Ipswich sparrow, and so far as I knew only one ornithologist had enjoyed the privilege of seeing this bird during the season of housekeeping It is called the Ipswich sparrow from the fact of the first specimen having been killed by C. J. Maynard near Ipswich, Mass. Had its life history been fully known when it was named it would of course have been called the Sable Island sparrow, and such should be its name now, for not only is Sable Island the only breeding ground in the world, but an island upon which no other land bird breeds. When an ornithologist has an opportunity of visiting a bird whose summer home is so little known, there is small wonder that he should forget all about the reputation of the island as a desert and think only of the rare treasure, ornithologically-speaking, which is to be obtained there.

So it may be imagined that I very gladly accepted the invitation to be one of the party that was to reach Sable Island on May 16, and remain till the 23rd to make some experiments in planting the island with forest trees ; and looking back on our trip it must be said that not only were my own expectations of enjoyment more than realized, but even other members of the party who had no great expectations were very loath indeed to leave when the last day came.

More than forty persons have their constant residence there, and the men of these families are employed in the work of the life saving stations and the two lighthouses. Every morning and

every evening the entire shore of the island north and south, from end to end, is inspected. In bright weather this inspection is made from the lookout by means of field glasses, but when, as was almost always the case during our visit, a fog lies over the land, the inspection must be made on horseback so that no person could get wrecked upon the island and remain undiscovered for more than about 12 hours. Immediately after the completion of each inspection, a telephone message is sent to the main station, reporting the result. A definite hour is set for these reports, so that they are all sent in together. At the time of our visit this hour was half-past six in the morning, and the same time in the evening ; but, of course, as the seasons alter, these hours would need to be changed.

The temperature, while not high is extremely stable. Our visit lasted seven days, during which time the thermometer varied only 21 degrees, namely, from 38° to 59°, the variation for each day being only about 12° ; and the greatest daily variation we experienced was only 17°, from 42° to 59°. This was on May 22 which was a very warm, bright day. Fogs are of almost daily occurrence, and while we had the good fortune to have sunshine on three days of our seven, there was only one on which we did not have fog, and on some we had nothing else. There is a record of nine consecutive weeks of fog at about this time of the year, but we were told that later on in the summer during August and September, the weather was all that one could wish, and the bright, warm days were exceedingly enjoyable.

As the inhabitants are all government employes, there is no commerce on the island. All supplies have to be brought from the mainland, and most of these are provided by the government. which sends a vessel twice a year to supply the needs of the inhabitants. Sometimes these visits are postponed as was the case in October, 1900, when it was found impossible to send supplies at all ; and the boats which should have reached the island at that time landed its cargo, after two attempts, in the month of March. This delay caused a waste of 100 barrels of cranberries, which had been picked for the market and which are about the only agricultural export the island yields.

The superintendent, Mr. Robert J. Boutilier, has now been in office for about seventeen years, during which time he has brought the life-saving work up to a high standard of excellence, and he is certainly entitled to the highest credit for the present efficient state, which is in marked contrast to the condition of affairs before his incumbency. His kindness and that of his family was very much appreciated, and cannot be too highly spoken of. We were made to feel at home from the moment we landed, and when we left, our farewell was a pressing invitation to come back at the first opportunity and make a further visit. When Mr. Boutilier went there he had the landsman's dislike of drinking surface water, and instead of settling down to use the rain water from the roof he sank a well in order to get pure water, at some depth. What was his surprise to find that the fresh surface water was merely floating upon the salt water beneath, and no matter how deep the well was sunk only salt water was obtained.

The island is in the form of an elongated crescent, with its concave side to the north. It is nearly 25 miles long and only about a mile wide in most places. At each end it tapers down to a point of bare sand without any sign of vegetation whatever, and over which the sea sweeps at every high tide, and with every stormy wind. Approaching the island as we did from the north, the first view we received of it rather confirmed our ideas of a desert. All along the north side there is a line of sandy cliffs, varying from 40 to nearly 100 feet high. These are occasionally broken by gulleys which the wind has made, but the general effect is of one continuous cliff. The face of it is, of course, of bare sand, with very little vegetation, so that one receives the impression of white sand with only a scanty covering of grass upon the top of the hills. As the steamer approached closer we could see but little more of the island, as the cliffs barred our vision. But soon we could make out the men bringing the surf boat from its shelter to the water's edge, and it was not long before the first of the Sable Islanders stood on the deck of the *Minto*. We were, of course, eager to land, and took the first opportunity of doing so. While we were waiting for the boat to come out we were much interested in watching the large school of codfish which

swam around the vessel so thickly that scores were in sight at once. The crew tried to catch some, but stale bait did not seem to appeal very strongly to the taste of the fish. One or two only were hooked and none captured. As we approached the shore in the surfboat, we saw quite a number of seals, which permitted a very close approach, but they did not seem so inquisitive about a boat as they did subsequently about a person or a dog on shore. We had no difficulty in landing, as the sea was quite calm. The boat was simply rowed towards shore till it stopped. Then, as the waves retreated, some of the party jumped out, while those less agile were lifted by the crew and carried to dry land. Starting up for the centre of the island we were all interested to find many specimens of the eggs of the skate, which Capt. Knowlton, of the *Minto*, told us he had always known as a boy, under the name of "the devil's wheelbarrow." The body of the egg is about $1\frac{1}{2}$ by $2\frac{1}{2}$ inches square and $\frac{1}{2}$ to $\frac{3}{4}$ inch thick. From each corner projects a curved horn about from 4 to 6 inches long, and from the sides are string-like substances by which the mother fish attaches the egg to the sea weed in the bottom of the ocean, where it remains until torn from its moorings by current or storms, when it is cast upon the shore. These we found in large numbers, not only at the landing-place but in most other localities on the island.

The boat house was in the mouth of one of the gullies, which had been torn through the sand cliff by the wind. Near the west side of the gully stood a conical pyramid of sand, which had originally been a part of the continuous hill running from east to west. Apparently the gully had been made in two parts, and when the second one had been excavated this pyramid was left standing between the two. It is a perfect cone of about 30 or 40 feet in height, and gives one a good idea of the power of Sable Island winds.

The records show that winds of 40 to 60 miles an hour are common, and even 80 miles has been reached. Unfortunately we were not favored with any extremes of weather ; most of us would have enjoyed the experience of meeting a wind travelling at the rate of 60 miles an hour at least ; but although on one or two occasions we had one of 30 miles, it never went any higher. To

one accustomed to a land breeze, however, a 30-mile wind feels quite strong. and one has to bend forward considerably in walking against it.

Passing up through the gully we got our first sight of the interior of the island, and at once our idea of a desert was dissip ated. From the hill tops on the north the land sloped away southward in an undulating manner until it almost reached the level of the ocean, and while the higher hills were but thinly covered by the long, creeping grass, *Ammophila repens*, there was a variety of plant growth on the lower ground which was as green as it would have been in any other part of the world before the new spring shoots become conspicuous. Before us lay the superintendent's house, painted white, and its front yard consisted of an acre or two of timothy and clover, which was as green as an Ontario field. Beyond the house lay a couple of small ponds, and south of them again the large inland lake of salt water, which extends fifteen miles through the interior of the island. Across this lake is a long, low sandbar separating it from the ocean. At times this bar attains the height of ten or twenty feet, and is then covered with creeping grasses and other beach plants.

At one time an opening in the bar permitted the entry of fishing schooners into the lake ; but once two of these that took refuge from a storm through this passage, were caught, as the storm from which they fled closed the passage, and thus prevented their exit, unless it could be made overland, which was eventually accomplished.

From east to west the island is of the same general character, except that towards the east, there are many large patches of cranberry and crowberry, the former of which is gathered in quantities for the market.

The vegetation on Sable Island is strongly modified by the fierce winds which hurl particles of sand at one's face with such a force that their sting is felt severely ; and so thickly that there seems to be a stratum of mist just above the beach. The effect of this assault on soft-leaved plants can readily be guessed, and Mr. Boutilier told us that on his willow tree, which is planted in a fence corner and grows three feet above the fence each year, the leaves turn black and die after some of the strong winds in

summer. It seems hardly worth while for this tree to bother growing above the fence at all, as it is killed back each winter to the level of the protection. At the time of our visit the dead wood of last year's growth was still on it, but all the living buds were below the fence-level. As a result of these strong winds, all the plants of the island seem to grow dwarf ; the common juniper, which is a variety of *Juniperus communis*, curls and twists its trunk around on the ground, while the little branchlets grow more or less upright to the height of a foot or two. Even the blackberry, *Rubus* (sp ?) creeps along the surface, which method is greatly appreciated by the visitor from the mainland, who has been accustomed to work his way through their tangle with much caution and considerable laceration of cuticle. The blueberries, which are numerous and large, are quite frequently lifted completely free of the sand in which their mother-plant is growing, but very often the sand has to be blown or washed off before eating. The meadow rue, *Thalictrum* (sp ?), which had its first leaves unfolded at the time of our visit, showed no sign of any intention of leaving the earth any further beneath it than was absolutely necessary.

Yet it would be unfair to condemn the vegetation of the island by its appearance at that period of the year, when the maximum day temperature had barely reached 60 ; for the residents told us that the grasses, goldenrods, etc., are "waist-high," in the late summer, and Prof. John Macoun, is reported to have found over 190 species of flowering plants there Of ferns, we found three species—Polypody, *Polypodium vulgare* — the Lady Fern, *Dryopteris spinulosum* (var ?), and the Cinnamon Fern,. *Osmunda cinnamomea.* The two latter were scarcely above ground, but roots were taken which proved to be of these species. With all this variety present, it will be readily understood that in the lower and more fertile parts of the interior, the upper layer of soil has become turfy and black, and could doubtless be used to grow fine crops were it not for the reason that, if it were turned under and cultivated, the wind would probably blow a lot of it into the Atlantic during the succeeding winter.

Gulches 50 yards wide and more, torn through the sand cliffs on the north coast, were frequently seen. Around the telephone

poles and fence posts, wind is said often to scoop a round hole, often of considerable depth ; at other times, when Boreas is in a building mood, it is piled up around the telephone poles, until once it occurred that the line had to be moved to prevent the wires from burial. Some of the poles we saw had only about six feet left projecting out of an original height or 25 or 30 feet.

My first thoughts on Sable Island were not for the success of the forestry experiment, but for the little birds who made this strange island their only home, and my ears were on the *qui vive* for the first notes ; and although it was foggy and rainy, as we approached the superintendent's house I could hear some sparrow-like chirps, and in a moment or two I heard the first song of the Ipswich sparrow, and was delighted to think that I would have them at such close range as the front yard of the house in which I was to stay. They proved to be very common, and one could hardly go to the door without seeing on the board walk which stretched away through the hay field, a pair or more, while their song could be heard at almost every moment of the day from the same point of observation.

As the rain continued, and it was therefore deemed unnecessary to proceed with the work of the trip at once, I took advantage of the opportunity in spite of the weather, to start off on a tramp up the island. By far the most numerous of all birds there were two terns—the common tern and the arctic. These are the small gull-like birds with the forked tail, whose skins have been used so much in the past few years for the decoration of hats. On Sable Island they are in thousands ; one can never go out of the house without having them in sight and in hearing ; nor is there any place on the island where it is possible to escape their presence. The common tern probably outnumbers the arctic by about two or three to one, but the habits of the two are so familiar that they may be considered together. The roseate tern, a more southern form, breeds in small numbers, and had just arrived at the time of our visit. The nesting places of the other terns were scattered all over the island. They breed as a rule in communities, although we saw a few places where it seemed as though perhaps less than half a dozen pairs would nest together. We were too early for the height of the breeding season, but the birds had begun to lay, and

perhaps every third or fourth nest would have from one to three eggs in it. These are used by the inhabitants very largely for food, and a hungry man can dispose of a good many such small eggs, but the birds are in such numbers, and are such persistent layers, that it is not very long before the inhabitants tire of eggs as a diet, and the birds are thus allowed to raise their young in peace. Even before this period arrives it is impossible for the inhabitants to eat all the eggs that are laid by so many tens of thousands of birds ; therefore many nesting places are left untouched, and the egg collecting is largely confined to those localities more accessible and convenient to the houses. Although too early for the main crop of eggs, yet three of our party one evening gathered over a hundred eggs in about twenty minutes. They reported the nests as being so close together that one could step from nest to nest, and this was also the case on a small island in one of the fresh-water ponds, which I visited, where there were probably a hundred nests in a space not more than twenty yards long. The majority of the nests were merely a hole scooped in the sand, but a fair number had more or less straw and dry grass as a lining ; and a very few had quite a compact and thick lining of the same material. The eggs vary much in color, the normal type being clay color with blackish spots, probably $\frac{9}{10}$ of the eggs being thus colored. A few are of a rich dark brown, similarly spotted while at the other extreme about one of the hundred is of a clean pale blue, almost or quite unspotted. At least two common species of gulls show a similar variation. The birds are exceedingly graceful flyers, living almost entirely upon the wing, and catching their prey, which consists of small fish, by darting down and taking it from the water, sometimes without wetting more than the bill, while at other times the force of the plunge is not sufficient to carry the bird deep enough to catch the fish. They feed largely upon a long, slender fish, called the lance, and also upon sticklebacks, which grow to a length of about $3\frac{1}{2}$ inches. Over every favorable piece of inland water the birds may be seen hunting at all times of the day, and thousands more are out upon the ocean, following the schools of cod, which chase the small fish, driving them to the surface, where they become the prey of the terns. Their call is heard everywhere, and at all times. Even in

the night, when the wind permits, one can hear an occasional call, and in the day time I do not suppose that one could locate himself in so remote a spot that he would hear their calls as seldom as every half minute, and when one visits a nesting ground the other extreme is reached and it is often impossible to converse with one's companion except by great exertion.

The Ispwich sparrow, which was the chief attraction to me on Sable Island, is an insular race of the Savanna sparrow of eastern North America. In the struggle for existence for thousands of years on this bleak little islet, the bird has become considerably larger and much paler than the continental form. The increase in length is about 13mm., or 8 per cent. The breeding ground of this bird was for many years unknown, and not until 1894 was the bird fully studied and written upon. Previous to that time it was known as a migrant from Georgia to Maine and Nova Scotia, and as a straggler to Newfoundland, but it then disappeared from sight, though it was vainly hunted in the breeding season on Prince Edward and Cape Breton islands and in Newfoundland. At last a few shrewd guessers surmised that it must breed on Sable Island, and finally a skin sent from there in summer settled the matter, but its summer history was not known until Dr. Jonathan Dwight, jun., of New York, braved the inconveniences of the passage to the island, and spent three happy weeks there in May and June, studying the summer habits, song, etc., of this interesting species. Shortly afterwards he published a complete and very interesting monograph of this sparrow, including also an account of the history, climate and other features of the island, thus giving to the world the details that had so long been wanting.

I was far more favored in my visit than he, as the season was more advanced, and the weather brighter and more favorable and I found that the intervening period of time had been auspicious for the sparrows, as they were much more abundant than he represented them to be in 1894. I found many nests, most of them being incomplete, but in seven instances I was able to take sets of eggs, four containing 5 eggs, and the remaining three 4, showing a marked difference from the Savanna sparrow, which almost invariably lays 4 eggs in this locality.

The variation in the colors and markings of eggs is very great, some resembling those of the Savanna sparrow, others with a lighter ground and larger blotches resemble those of the vesper sparrow, while one set has very small spots and is of a general slaty hue, resembling the eggs of the horned lark, and yet another closely resembles some sets of the bobolink. The nest is built in a similar manner to that of the Savanna sparrow, an excavation of nearly an inch being made among long, fallen grass of last year's growth, and the nest is seated in this excavation and built up about two inches above the ground level. It is well concealed, and would be difficult to find were it not that the bird is very particular as to the proper condition of grass, and as this condition is rather unusual, one's search is reduced to a trifle. Towards the eastern end of the island where the crowberry, *Empetrum nigrum* grows abundantly, a patch of it is often selected as a nesting site, and the task of discovery becomes more difficult.

The song resembles very closely that of our species, but the ending, instead of being a grasshopper-like buzz, as with us, is aptly described by Dr. Dwight as "pre-e-e-a." Reading these letters in a book conveyed no very definite idea of the sound to my mind, but when I heard it I realized that not only was the description very accurate, but that the sound was almost exactly the same as the call of the tern, which, doubtless, the bird has acquired by dint of hearing this cry thousands of times each day, all summer long. That such changes do take place was proved to me some years ago by hearing a junco that lived in a region of white-throated sparrows, render his song, not a plain series of "chips," as usual, but "chip-chip-chip....chip-chip-chip," etc., in triplets, exactly as the white-throat does.

While the Ipswich sparrows are found during the migration as far south as the Carolinas, it is a remarkable fact that a fair proportion of them reside on Sable Island all winter, the number remaining being usually estimated at about one-fifth of the total. During severe weather many of these are sometimes picked up exhausted and chilled, and are then sheltered and fed till a better season arrives. And not only are the birds themselves thus cared for, but the foxes, which are the chief enemies of this and other birds on Sable Island, are unmercifully pursued at every oppor-

tunity, and in the winter a systematic attempt is made to kill them by traps, poison and the gun. Their numbers are now very much reduced, and the good work still proceeds, so that there is quite a possibility of their utter extermination within a few years.

After the terns and sparrows, the most abundant bird is the semi-palmated plover, well known through most parts of the country in the migration, but which is absent in the breeding season, except in the more remote regions of the north. Sable Island is perhaps its most southerly breeding ground, and this probability made the study of this bird very interesting. Along the edges of the large inland lake there is cast up in the spring a fringe of eel grass, varying from one to four feet in width. In this eel grass the plover chooses to place its nest, and it seemed to be of no use whatever to look anywhere else. Each pair excavates three or more nests as a rule, and sometimes lines them as well, using the same material among which it is built. When a person following the shore comes to a pair of these plovers, all he has to do is to follow along this fringe of eel grass and search carefully for a depression, where the nest may be; and my experience was that where one hollow was found, close by would be several others. But I was too early for the main nesting season, and saw but two nests with eggs. The male bird has a curious two-syllabled call, which it gives in rapid succession while on the wing. Its flight at this time, as well noted by Dr. Dwight, closely resembles that of the night hawk, and may extend over two or three minutes at a time with constant calling.

THE BELTED PIPING PLOVER.

The only other plover breeding upon the island is the belted piping plover. This is the western variety of the piping plover, and Dr. Dwight noted as one of the surprises of Sable Island that this bird, whose main breeding ground is on the western plains, should be found so far to the east, while the eastern part of the continent is almost entirely inhabited by the other variety. These birds excavate their nest-hollow in the bare, open sand, which makes them exceedingly difficult to find, as the bird leaves the nest at sight of an intruder. One such that I found was on a bare patch of sand in the mouth of a gully, which the wind had cut

through to the North Atlantic, and there was not so much as a single blade of grass within twenty feet of the nest. It is rather a misnomer to call the place where their eggs were laid a "nest," as it was merely a hollow, which contained a single small piece of shell. Later on, the boys told me, the Piping Plover lines its nest very extensively with pieces of shell ; but in this case there was only the one fragment, though the set was complete, and the other nest that I found contained only one small bone of a bird about an inch long. The substances must surely be more in the line of decoration than for any assistance in the task of incubation. One of these nests I stumbled upon while skirting the lake one afternoon having just shot the female under the impression that she belonged to the species rather than to the variety ; but on picking her up I found that my surmise was incorrect, as the band across the chest by which the distinction is made, really did extend right across, although very faint in the centre, and her mate, who was seen but not killed, had a wide black bar completely across. The other nest, however, cost me much thought and trouble, and were it not that one welcomes difficulties for the sake of overcoming them, it is not likely I should ever have found it.

The male bird seemed to pass most of his time on the shores of the lake about two hundred yards south of the nest and here, on some little sandy knolls, I searched on several occasions without success. Each time the male would run along before me apparently quite concerned, and after a while his call would bring the female. At last I caught a glimpse of her coming through the gully before mentioned leading to the North Atlantic and that gave me the hint I needed. I went back to the gully and the birds followed, but search as I would I could not find that the numerous tracks, which could be readily followed on the loose sand, led to any nest at all. Leaving them for that time, I returned the next day, crept carefully to the top of the hill overlooking the gully, and fired off my gun, in the hope of starting the bird from the nest. But there was no response. After waiting perhaps five minutes the male began calling at me from below, and with the aid of my glass I located him, standing still ; soon I saw the female standing near him, and I descended and made another fruitless search. A second time I went back and crept again to the

top of the hill, this time making no noise, but just sitting down to wait and see what might happen. After some minutes I heard the call of the plover, and soon located the male, standing still as before. In a short time the female came down the shore and lit near by; but so long as I remained in sight the birds would do nothing but stand still for a long time, run a short distance, and then stand again. However, I marked carefully the place where I first saw the male and went down to it, took up his back track, and trailed him to the nest, which contained four eggs, laid in the bare sand. I found that on my search of the previous day I had passed within six feet of the nest without seeing it, and during the night preceding my success, a fox passed within ten or fifteen feet of the sitting bird, but, fortunately for me, had not winded her.

These eggs have a beautiful creamy buff ground, dotted with small spots of black, and harmonize very well with the color of the sand in which they are laid, as, indeed, does the color of the bird itself, which is almost light enough to persuade one that a running bird is a fleck of foam being blown along the beach.

THE LEAST AND SPOTTED SANDPIPERS.

These complete the list of the four waders that breed upon the island At the time of Dr. Dwight's visit, the spotted sandpiper was a very rare bird, only two pairs being reported from the whole island. At present it is quite common, and its numbers approach quite closely to those of the least sandpiper. Its habits are, of course, too well known to need any special mention, as they do not differ on Sable Island from those of the bird so familiar throughout Ontario.

THE LEAST SANDPIPER.

The least sandpiper, however, is a bird belonging to the far north, and found in only two or three isolated localities south of Labrador. I found them invariably in pairs, evidently mated, often sitting so close together that two could be obtained at a single shot if desired. But the very fact that two were always seen together proved that they had not yet begun nesting, nor did I see any sign of nest-building going on, although their presence was confined almost exclusively to the damp spots and edges of small inland ponds, where they are said to breed. Their

courtship flight was very interesting. The note they used resembled somewhat, to my ear, that of the spotted sandpiper, but was repeated far oftener than is the case with that bird. Sometimes both birds would be in the air at once, but whether the female gave the note as well as the male, I could not definitely ascertain without shooting the birds, which I was very loath to do. The note would be given continuously for perhaps three or four minutes, during which time the bird flies slowly, with steady flapping of the wings, mounting in the air gradually until, when watching them in the evening, one loses sight of them in the gloom.

THE DUCKS.

Two ducks, the red-breasted merganser and the black duck, complete the enumeration of the ten breeding birds of Sable Island. Both these species were usually seen in pairs, but on one or two occasions five or six of the black ducks were seen together. The pairs that were seen of this species were doubtless birds to whose nest an accident had happened, as it was too late for the regular laying period, and Mrs. Boutilier had at the house a little duckling, which had been hatched from a nest found two or three weeks before ; and from a setting of last year she has two handsome wild black ducks that will come at call and feed from her hand.

The merganser was less common than the black ducks, and while I saw two birds on three different occasions, I judged them to be but one pair which had not yet begun to nest. Both these species are now much rarer than formerly, Mr. James Boutilier putting an estimate of their numbers at about three dozen pairs of the two species combined, on the whole island. This decrease is, of course, due entirely to the ravages of the foxes, and not, as frequently happens, through the persecution of man, as it is certain that few other ducks are favored with such complete protection as those receive that live on Sable Island. Not only is spring shooting prohibited, and the birds left to breed unmolested, but even in the fall, when the young are fully fledged and fit to be eaten, none of them are shot. The inhabitants control their appetite for duck until the northern birds are travelling south, and the ducks that really belong to Sable Island are left to

migrate unharmed. In addition to this, as I have said before, the foxes are mercilessly persecuted, and no doubt should the present efforts to exterminate them result successfully. the number of ducks breeding on the island would be largely increased, and might even be added to by other species.

As may be supposed, there are no tree birds resident on the island, and it is a curious and noteworthy fact that not only is Sable Island the only breeding ground in the world of the Ipswich sparrow, but also that this is the only land bird that breeds on the island. Nearly all the commoner Nova Scotia birds are found there during the spring and fall migrations as stragglers. All that I saw were the barn swallow, king bird, black-poll warbler, white-throated sparrow, water thrush, and one specimen of the orchard oriole, the latter being exceedingly rare. All these birds are, of course, under unfamiliar circumstances, having to rest largely upon the ground or on fence posts and buildings. But they seemed happy enough, and apparently a few of them remained for several days, possibly waiting for a favourable wind to carry them north.

Of sea birds, three gulls were seen, the herring gull, the great black-backed gull and the kittiwake, the latter being the only one seen in large numbers; of it one flock of several hundred was noted at the west end on May 22nd, while numerous small flocks and individuals were seen all over the island, but they have not yet been found to breed. The greater yellow legs and the red phalarope complete the total list of 21 species of birds which I noted upon the island. The phalaropes live mostly out at sea, and I was told by one of the men on the Government steamer *Arcadia* that he usually sees them far from land, swimming among the beds of floating seaweed, where, no doubt, they feed upon the minute life which finds its home in such places. The sailors call them sea geese. A flock of these birds were flying around the island a few days before my arrival, when they encountered one of the telephone wires, with the result that three of them were injured, one fatally; another lost a wing, and a third recovered itself fully in a few days. I made a specimen of the one whose wing was cut off. A few days later on I was surprised to have the other injured bird fly past me and alight on the edge of the

large lake, where it proceeded to feed quite unconcernedly. After watching it for some time I shot it. I had been hoping that if I ran across any phalaropes I would have the pleasure of seeing them swim, but this one persistently dabbled in the mud and refused to go out into the water. Its breast feathers were quite soaked with water and mud when I took it up showing that it had ventured into the muddy water over the depth of its legs.

MAMMALS.

There are no native land mammals on Sable Island. The walrus was formerly abundant on its coasts, but was hunted to extermination long before the memory of the present inhabitants. Two species of seal are common, the larger one of which, the harp seal, was frequently seen off shore, at the time of our visit, among the dozens of the harbour seal, which was very common, several herds of over a hundred each being seen in driving a few miles along the North Atlantic shore. Some pups of the latter were found, evidently recently born, upon the beach, after the herd had wobbled into the sea. The inquisitiveness of the small seals is very great. Unless the sea is very rough, one cannot walk any distance along the beach without assembling an admiring audience of from five to twenty-five of these creatures, which swim along twenty, thirty or forty yards from the shore, with many heads constantly above water, staring at the intruder; and the general effect of their countenances is so human that it gives one the uncomfortable feeling of being stared at, and makes him inclined to let out a yell that will disperse his audience. But he very soon discovers that this does not accomplish the desired result, and is forced to endure their staring with philosophical fortitude. When one catches a pup of the harbour seal the mother swims in the water close to shore, with evident anxiety; but the inhabitants told us that when the pup belonged to the other species the anxiety very soon changed places and fell on the captor, who must run fairly fast to escape the mother of the youngster. The young of the harp seal are pure white, and are born in midwinter. When a band of the harbour seals is drawn out on shore, covering a surface of say 30 yards square, they are visible at a considerable distance, and when the team approaches they commence to pro-

gress towards the water, and as their limbs are so very short, they are forced to hunch themselves along much as does a many-legged caterpillar. Everyone has noticed how, in the progress of a caterpillar, a hump arises behind the head and travels back to the other end. With the seals the motion is very similar, and the effect of a whole section of a beach wobbling down into the water in this peculiar style is one of the most ludicrous sights I ever beheld, and the mainlanders broke into roars of laughter at the attempts of each successive band.

Almost at the opening of the history of the island, cattle were liberated on it, and gradually multiplied until there was quite a good herd there. These, however, were hunted by parties from the mainland, who came over in boats for the purpose, and finally all the wild cattle were exterminated. Horses were next introduced, and some of their progeny are there yet. Swine were at one time wild upon the island, but they were said to devour human bodies from the frequent wrecks, and they were killed off for this reason. Rats have once or twice been a plague to the inhabitants, on one occasion making such inroads into the food supply as almost to threaten their very lives. At another time rabbits were liberated in small numbers and multiplied very rapidly, having a serious effect upon the pasture for the horses; cats were therefore imported to kill them off, and when they had this last nearly accomplished a few foxes were liberated. It took the foxes but a single winter to kill all the rabbits and all the cats, and the inhabitants have been endeavoring ever since to get rid of this last and worst pest. Whether they will succeed or not is hard to say; but for the sake of the birds it is to be hoped that their efforts will not falter.

FIVE NEW RANUNCULI.

By Edw. L. Greene.

R. HIRTIPES. About a foot high, the ascending stems and long petioled leaves very hirsute with long white and shining spreading hairs, this indument extending copiously even to the petiolules of the rather ample ternate or quinate leaves, but not to the flowering branches and peduncles, these almost glabrous: leaves about 3 inches long, the leaflets 3-cleft and rather much incised; flowers very small for the plant, the round-obovate petals not more than 2½ lines long; sepals small, broadly ovate, obtuse, hirsute, but mostly with broad thin petaloid margins: achenes rather large, forming a large subglobose head, their beaks short, not much curved.

Obtained in woods near Sandwich, Ontario, 5 June, 1901, by Mr. John Macoun, the specimens being labelled by him as representing *R. hispidus*, Michx. and bearing the Canad. Geol. Survey number 33,582; but this is a plant very different from true *R. hispidus*, the foliage being much more dissected, the pubescence more copious and dense, the flowers altogether small and inconspicuous, in comparison.

R. CARDIOPETALUS. Low and slender, 4 to 8 inches high, with something of the habit and foliage of a small *R. hispidus* yet in no degree hispid, hirsute, or even villous, but finely appressed-pubescent throughout, thinly so on the older parts, but the half-developed later leaves appearing silky canescent: lowest leaves a half-inch long, truncate at base, 3-cleft to the middle and the segments crenately 3-lobed, the later ones twice or thrice as large, deeply cut into 3 crenate and trifid segments: peduncles 1 or 2, in flower little exceeding the leaves; sepals ovate-lanceolate, acute, strigose-hairy corolla nearly one inch broad, the 5 petals narrowly obcordate: fruit not seen.

At the Whirlpool Rapids, Niagara, Ont., 21 May, 1901, John Macoun (n. 33,581). As to habit, this plant lies between *R. hispidus* and *R. fascicularis*; being like the latter in size, and like the former as to its few and slender roots. Its pubescence is not that of either of those; while the remarkably narrow sepals, along

with broad distinctly obcordate petals must compel its recognition as a good species.

R. OCTOPETALUS. Perennial, of the size and the upright habit of *R. acris*, but lower part of stem and the long stout petioles densely and coarsely hirsute: leaves ample, pinnately ternate, the subsessile lateral leaflets cleft into 2, the long-stalked terminal one into 3 slightly cuneiform or sometimes almost quadrate segments, these incisely toothed above the middle; the rather loose panicle glabrous; flowers small, the expanded corolla about ½ inch broad; petals commonly 8, sometimes 7 or 6, almost linear-oblong, obtuse: achenes small for the group, moderately compressed, sharply margined, tipped with a slender almost straight but distinctly inflexed style, not numerous, forming a small globose head.

In marshes of Knox Co., Tennessee, 10 June, 1893, T. H. Kearney; the specimens labelled *R. hispidus*, but surely very erroneously.

R. RUDIS. Perennial, the several very thick stems (often ½ inch in diameter) hollow, therefore weak and reclining, often 2 feet long, rather coarsely and loosely hirsute: leaves ternate, the radical on long petioles, the 3 primary leaflets on nearly equal stout pétioles of an inch or less, each deeply cleft or parted into 3 broadly cuneate incisely lobed or toothed segments, glabrous above, villous-hirsute beneath along the veins; cauline leaves similar but short-petioled, the uppermost simple and sessile, incised like the segments of the lower: flowers small, numerous and somewhat panicled near the ends of the branches: sepals oblong-lanceolate, obtuse, hairy, persistent even under the head of full grown fruit: petals small, not even equalling the sepals, round-obovate: achenes little compressed, turgid, smooth, the ensiform beak about as long as the body, the whole forming a large subglobose or almost ovate head.

Discovered in a wet meadow in "Devil's Garden," northern California, (Plumas or Lassen County) June, 1895, by Mrs. R. M. Austin.

R. INTERTEXTUS. Stems many, slender, prostrate, interlaced, forming close mats either floating in very shallow water, or terres-

trial on muddy shores, all the stems rooting at the nodes ; herbage wholly glabrous : earliest leaves round-ovate, obscurely crenate, the later ones 3-lobed to the middle, the lateral lobes often 2-lobed all the lobes obtuse or retuse, the sinuses open; flowers 3 or 4 lines broad ; sepals and petals each 5 ; stamens 8 or 10 : heads of achenes round-ovate, the gynophore oval, perfectly glabrous ; achenes many, small, little compressed, often turgid, tipped with a short stout blunt style.

Common almost throughout the Rocky Mountains, as an aquatic of subalpine ponds and swamps, and hitherto referred to *R. natans* of Europe ; thoroughly distinct from it (1) by leaf-outline ; the Old World plant having leaves 5-lobed and with closed sinuses; (2) by its round-ovate rather than spherical heads ; (3) by an oval and glabrous, rather than spherical and villous receptacle. The species resembles closely the species of *Batrachium* in habit ; yet forms no real connecting link.

A special lecture was given under the auspices of the Club in the Assembly Hall of the Normal School, Feb. 22nd, when Prof. Conway MacMillan lectured on the work of the "Marine Biological Station on the Straits of Juan de Fuca." The lecture was illustrated by a fine series of lantern slides. Prof. MacMillan in his opening remarks described the trip across the C. P. Ry. and exhibited some very beautiful views illustrative of alpine scenery. At the south end of Vancouver Island, where the station is located, a permanent camp has been made with accommodation for a large number of students. Last season's party was composed of men and women from all parts of America. All branches of natural history are studied, and a properly equipped laboratory and photographic dark room simplify the work of the student. Prof. MacMillan himself devoted his attention chiefly to the study of certain groups of sea-weeds, and slides showing many of the most interesting species growing on the rocks and under water were exhibited. The lecturer in closing expressed the hope that what had been said might result in students and teachers from eastern Canada joining his party next year, the special rates secured from transportation companies and the small cost of living at the biological station for the six weeks season making it possible for almost anyone to make the trip across the continent and spend a a pleasant and profitable summer on the Pacific coast.

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NEW NORTHWESTERN PLANTS.

BY EDW. L. GREENE.

ACTÆA CAUDATA. Evidently tall, the stem probably solitary, the young petioles and rachis villous-puberulent, the leaflets when young minutely villous along the veins beneath, the upper face sprinkled with minute rigid shining hairs more or less appressed: leaflets from rhombic-ovate to lance-oblong, doubly and sharply incised, but with a long lance-linear perfectly entire acumination: raceme short, obtusely low-conical, its bracts ovate to ovate-lanceolate, acuminate, of one-fourth the length of the pedicels: petals 2 or more, of about two-thirds the length of the stamens, the elliptic blade passing gradually into a flattened claw of its own length: berries not seen.

Margin of a rivulet, Chilliwack Valley, B.C., July 11, 1902, J. M. Macoun, No. 33,550, at least in part, and as to the flowering specimens; for the branches taken by Mr. Macoun later by a few days, and at a lower altitude seem to represent a different species, probably *A. arguta*, Nutt., the leaves of which are not at all caudate-acuminate as in this new species and the next following.

ACTÆA ASPLENIFOLIA. Stems perhaps several from the root, 1½ feet high at early flowering, with leaf and inflorescence near the summit; a very sparse, somewhat villous hairiness along the veins of the leaves beneath, and an equally sparse succession of minute rigid hair-points along veins and veinlets above; leaflets of somewhat deltoid-lanceolate outline, incisely lobed and the lobes serrate, the leaflet ending caudately as in the last: raceme very short and few-flowered; bracts thin, distorted, almost scarious: petals usually 2, of less than half the length of the stamens, and

consisting of a round-obovate or almost orbicular blade and equally short claw : fruit not seen.

Of this species, so well marked in the cut of its foliage and in the character of its petals, the type specimens are Funston's No. 14, from Yakutat Bay, Alaska, 1892, and one from some unknown station also in Alaska, obtained by my friend Mr. A. W. Gorman. There are other Alaskan specimens of *Actæa* very different from these, and perhaps representing *A. arguta ;* these, however, from southerly stations.

ACTÆA CALIFORNICA. *A. arguta*, Greene, Fl. Fr. 310 ; Man. Bay. Reg. 6, not Nutt. This *Actæa* of the California Coast Range, and which in the north passes over to the Sierra Nevada, is very distinct from *A. arguta*, not only by its rhombic-ovate acute petals (commonly 3 or 4), but by its peculiarly broad and almost obtuse leaflets, which are also not much incised. They are, indeed, abruptly acute, but as to general outline, quite rounded at both ends. In this species the stems are often several from the same root.

DELPHINIUM CHILLIWACENSE. Stems solitary, slender, 1 to 2 feet high from a not deeply seated rounded tuberiform small root, or from a small condensed cluster of several such; the whole plant sparsely leafy and with one or more short and very lax few-flowered racemes ; lower part of stem somewhat retrorsely villous-hirsute with white hairs, this indument more sparse and not retrorse as continued up to the summit of the petioles, the leaf-blades more pubescent with somewhat appressed short hairs : sepals rather narrow, deep-blue ; petals white ; spur long and straight, acuminate : follicles short and stout, moderately divergent, appressed-pubescent even in maturity.

Dry rocky banks, Chilliwack Valley, B.C., 19 June, 1901, J. M. Macoun, No. 33,573. Not a showy species, but very well marked in habit, and in the character of the root. It is related to *D. bicolor*, though not very intimately.

CERASTIUM SUBULATUM Perennial, the sub-erect flowering stems 6 to 10 inches high, ending in a peduncled and few-flowered cyme, this in age almost equalled by the upright very leafy sterile

shoots; the leaves of the latter linear or subulate-linear, twice the length of the internodes, spreading or the lowest recurved, less than a line wide, puberulent, or marginally somewhat villous, the stem retrorsely villous: bracts of the cyme short, broadly subulate; calyx glandular-hirtellous and with some scattered villous hairs: capsule short, only the teeth exserted and bent upward.

Chilliwack Valley, B.C., J. M. Macoun, 20 June, 1902, the specimens in mature fruit; the label bearing the number 34,023.

CERASTIUM ALSOPHILUM. Perennial, the slender and sparsely leafy flowering stems a foot long or more, ending in a rather strict many-flowered cyme, the sterile shoots few, long or short, only loosely leafy, weaker than the others; the whole herbage green and apparently glabrous, a lens disclosing hirtellous hairs on all the parts, but most obviously on the stems: leaves all spatulate-linear, acute, thin, spreading: bracts of the cyme subulate: pedicels filiform, the primary ones an inch long or more, minutely glandular-hirtellous: sepals very acute, thin and rather faintly 1-nerved, sparingly glandular-villous; petals thrice the length of the sepals: capsule unknown.

This species, very well marked in habit, foliage, pubescence, etc., is also from the Chilliwack Valley, by Mr. Macoun. There are two sheets of it, one bearing the number 34,020, the other 34,021. The thin foliage and loose habit indicate it to be an inhabitant of shady places.

CERASTIUM NITIDUM. Perennial, 6 inches high, slender, sparsely leafy, the younger stems often purplish, the older whitish, shining and quite glabrous below, above more or less pubescent in lines: leaves oblong-linear, acute, mostly less than ½ inch long, suberect on the flowering stems, spreading on the sterile shoots, glabrous in every part except for occasional long hairs at the very base: inflorescence scarcely cymose, the flowers often solitary, sometimes 4 or 5: sepals thin, scarious tipped, sparingly pubescent, faintly nerved: petals thrice as long, obcordate: capsule not seen.

Habitat of the foregoing, though of a subalpine altitude (5,500 ft.); collected by Mr. Macoun, 29 Aug., 1901. (No. 34,022.)

CARDUUS MACOUNII. Perennial, slender, simple or branched above, 1 to 3 feet high, the stem and also the leaves beneath arachnoid-hoary; leaves of oblong outline; deeply pinnatifid and with open sinuses, the lobes toothed and spinescent, upper face green and sparsely scabrous, or some of the scabrous points developing a hair: peduncles slender, mostly monocephalous; heads about 1½ inches high, campanulate, the many bracts long-subulate, slenderly spinous from near the base and blackish, but, almost to the tips embedded in loose arachnoid wool: corollas rose-purple to dark-violet: anther-tips very acute, white: pappus-bristles very finely and loosely plumose except at the tip.

Chilliwack Valley, B.C., 13 June, 1901, collected by Mr. James Macoun (numbers 26,451 and 26,452). The species is well marked by the characters of its involucre, and more so by its perennial duration; the roots of almost all American species of this genus being strictly biennial.

ERIGERON ACUTATUS. Stems solitary, 4 to 6 inches high from an ascending rootstock, without distinctively basal clustered leaves, but leafy up to near the solitary short-peduncled large and showy head; stem canescently pubescent with short villous appressed hairs, the foliage green but pubescent on and along the margin; lowest leaves oblong linear, 2 inches long, abruptly acutish, short-petiolate, the others lanceolate, acute, usually apiculate, sessile, an inch long more or less: involucre hemispherical, its numerous equal somewhat biserial bracts linear, tapering to a slender recurved purple tip, not at all pubescent, but glandular-viscid: rays many, broad as those of an Aster, pinkish or purple.

Chilliwack Valley, B.C., at about 5,000 feet, 29 July, 1901, J. M. Macoun, number 26,469. A small-sized relative of *E. salsuginosus*, though of different underground growth, and inhabiting damp mossy places partly in shade.

ERIGERON OBTUSATUS. Smaller than the last, as to stature, only 3 or 4 inches high, much less leafy and with more showy heads; lowest leaves from round-obovate and retuse to oblanceolate and obtuse, ½ to 1 inch long, short-petiolate, glabrous on

both faces, but the margins finely pubescent : cauline leaves few and scattered, subulate-lanceolate, acute : bracts of the hemispherical involucre more numerous, less acuminate, more distinctly glandular-pubescent : rays many, rather broad, pink or rose-purple.

Growing on rocky slopes, dry at time of collecting but wet earlier in season; altitude 6,000 feet, being Mr. Macoun's number 26,470; from the Chilliwack Valley, B.C., 29 August, 1901.

PENTSTEMON GORMANI. Less than a foot high, the firm basal leaves spatulate-oblong, obtuse, entire, 2 inches long including the short petiole, glabrous, the cauline oblong-linear or spatulate-oblong, sessile, the uppermost of these, as well as the inflorescence villous or hirsutulous with gland-tipped hairs : sepals lanceolate, acute, villous-hairy : corolla purple, about ¾ inch long, little bilabiate, their rounded lobes spreading, the orifice very hirsute within ; the sterile filament strongly bearded almost throughout.

Dry gravelly slopes of hills in Yukon Valley, 9 June, 1899. M. W. Gorman.

LAPPULA ANOPLOCARPA. Annual, erect, with the numerous ascending branches loosely racemose and bracteate ; herbage cinerous and softly hirsute : nutlets ovate, with rounded base, the dorsal disk very small, ovate-lanceolate, circumscribed by a thick obtuse cartilaginous entire and wholly unarmed margin, the surface of it, however, muricate-tuberculate ; that of the dorsal part, or disk, minutely so.

Spence's Bridge, B.C., 25 May, 1889, collected by Mr. John Macoun ; number 17,038 of the Canadian Survey Herbarium. This is allied to *L. montana*, Greene, Pitt. IV., 96.

RECOLLECTIONS OF THE PASSENGER PIGEON.

Being remarks made by the Rev. Dr. C. J. S. BETHUNE, and the resulting discussion at the February meeting of the Ornithological Section of the Entomological Society of Canada.

In my student days, while attending the University in Toronto, I started a Naturalists' Calendar, in which I recorded not only entomological items but also notes of prominent occurrences among the birds, such as first arrivals of song sparrow, robin, etc. On turning up these notes I find two records only of the wild pigeon, one in the last week of March, 1858, and the other the 8th March, 1860; both of these notes were made in Toronto, and they refer to the large quantities of pigeons which were then seen. I remember most distinctly the occurrence in 1858, as I had been detained in Toronto during one week of the Easter holidays for a special examination, and at that time flock after flock of pigeons crossed from the south at Toronto. All of the flocks were fairly long, from east to west, and some of them reached farther each way than one could see, but all were of short dimensions from north to south. I could not, of course, give the exact depth of these flocks, but it would be something like 100 yards or less. In the distance the birds looked like a black cloud, and as there were no trees in front of my room, and but few buildings between it and the lake, I had a very good chance to observe them. The position of my window was so commanding that on a clear day I could discern Brock's Monument, and sometimes on a dull day the spray of Niagara Falls could be seen. Years before, as a child, when living at Cobourg, these birds were seen in immense numbers. In early summer, probably June or late in May, as the trees were in leaf, enormous flocks would come over the lake going north, and the people who were so inclined would then turn out with shotguns, and an incessant firing ensued. As those in the streets of the town fired up into the air, the shot would fall back on the heads of those standing by, and the rattling of the shot as it fell on the shingles of the houses was almost constant. The term "pigeon-shot" was applied to the size used, in the same way as we now speak of duck-shot. Back of Cobourg lay a range of hills perhaps a couple of miles from the lake, and when the flight was

on the men used to go back in the early morning to the brow of these hills, and wait for the pigeons there. The birds would rise but very little when they came to the hills, and consequently, would very often be within range of sticks in the hands of the men, but afterwards as they saw that the country remained constant at the new level they would gradually rise to a greater height. As a rule they did not fly closer than about 100 feet from the ground, and sometimes would be entirely out of gun range; on such occasions the people would get up on the house-tops and shoot from there. These flights would occur day after day, the flocks being 20 to 30 minutes apart as a rule; during the part of the day when the flight was on and number of pigeons was of course simply incalculable. They would then disappear in the north country, but during the summer quite frequently in the morning one of the children would run in to say that there was a pigeon in the garden and immediately whoever was considered the best shot would take the gun out and kill it. These birds were very tame in the trees; one could walk immediately beneath them without putting them to flight. The unavoidable result of such slaughter was that every person became thoroughly sick of pigeon pie and stewed pigeon before the flights ceased. I do not suppose that the pigeons crossed the lake always at the same place, as the whole country for hundreds of miles was covered with them in these early days. On one occasion in 1858 or 1859 while holidaying west of Dundas, I drove some twelve miles towards Guelph with two companions, for trout fishing. Part of the road lay through a pine forest so dense that in the early hours of the morning it was cold, even in August, and the shade was so thick that the road was dark. Beyond this forest lay an immense swamp through which ran a corduroy road about one mile in length, and just before entering the swamp there was a stubble field of about ten acres on the north side of the road. As we emerged from the forest we could see that this field was literally blue with pigeons, so that one could hardly see the ground in any place. The birds were feeding on the grain which had been shelled out before it was harvested. Of course we had a gun with us, and my uncle got out and went over to the snake-fence to get a shot, but before he succeeded, the sentinels who were stationed at the outskirts of the field, gave the alarm, (which

however was not detected by the boys) and all at once the pigeons rose to some little height and went over the woods. The tail feathers of these birds, have a large handsome brick-red spot on inner web, and the children were in the habit of picking up these pretty feathers shed by the birds as they flew over. Although these tremendous flights going north, were an annual occurrence for days at a time, I cannot remember that I ever saw a single large flock going south. The reason for this has always been a problem when one considers the enormous numbers which come from the south each year.

The motion of these flocks was far more swift than that of any other bird I had ever seen, so swift in fact that one could detect that a flock was moving as soon as ever it came in sight—as a cloud in the distance ; and as they passed by, one flock following another, it gave one the impression of battalions of soldiers following each other on the double.

Dr. Bethune then read some extracts from the *Canadian Naturalist*, Volume I, for 1857, prefacing them by a few remarks about the appearance of that magazine. Mr. Elkanah Billings, the editor, it seems had permission from the son of Audubon, and from some other naturalists, to use their writings in his magazine. Many very interesting details were brought out from these articles, one of which was rather startling when carefully considered ; this was a calculation by Wilson of the number of birds which he saw pass a certain point in a given time one day in Kentucky, in which his final estimate was that the birds he had seen would consume seventeen million bushels of grain in a day. Wilson's writing referred to the nest of the pigeon as containing but one egg as a rule, but Mr. Billings, in a note, stated that the nests usually contained two eggs. Some of the members present had read definite reports each way, and Mr. Keays has a single egg which constituted the whole set, and was taken by his brother in Minnesota years ago. Dr. Bethune had never heard of breeding grounds being near the localities where he had lived, although stragglers were to be seen all summer.

Mr J. J. Baker said that it is not over thirty years ago since roosting places existed about thirty miles northeast of Toronto.

These were called rookeries, but he believed they were not only roosting places but breeding grounds also. At the time of his youth, near Brougham, east of Toronto, pigeons were plentiful at all times after the wheat was cut, and when hunters went out looking for pigeons they felt certain of finding them in almost every field of wheat stubble. Some years before there had been a rookery a few miles north of Brougham, where there were plenty of young to be seen, and no doubt the birds nested. The migrations took place in the same immense flocks as Dr. Bethune had described; some of them would darken the sky, but he could not recall the shape of them.

Mr. T. C. Scott, said that in the summers of '69 and '70 in Halton County, there occured the last flights that he could recollect. He remembered counting as many as twenty flocks passing while he was on his way from the house to the school; all of these flocks were widely extended east and west, but not many yards in depth. On the mountains near Milton, there was a large pine forest, and old hunters said that during the regular spring flights, the pigeons rested on the mountains after having crossed the lake, alighting on the trees so thickly that the limbs would break with their weight. This occured every year as though it were a settled habit with the pigeons to rest in this place. He, too, had noticed the great width and short depth of the flocks.

Mr. J. E. Keays had heard his father describe how the farmers used to salt several barrels of pigeons breasts for winter use.

Mr. Saunders read from his note book the records he had kept of the flight of the pigeons, showing that the last regular flocks he had seen near London were in 1876. After that, five or ten birds at a time were seen, for two or three years, and then no further regular migration was noted in the spring at all, but occassional birds in ones, twos or threes, have been seen near London up to as late as '95. At Point Pelee small flocks of 5 to 20 were seen in August 1882, which may have bred there.

The latest record of birds that probably bred in the London District is that of 3 or 4 birds, a male, female and young, which were seen and the female and one young shot, about 15 miles east of London, on September 24th, 1885.

These two skins and a male taken at Point Pelee in 1882, were examined by the members present, and the large brick-red spots on the tail feathers were found as Dr. Bethune had stated.

In the Rockwood Review for November 1898, published at Kingston, a breeding colony of about twenty birds is reported in that part of the country, and similar small colonies, in various parts of the more remote regions of eastern Canada and Manitoba are occasionaly heard of. It is to be hoped that these bands will be sufficiently protected to prevent the utter extermination of this bird.

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE NORTHWEST TERRITORIES.

By EUG. COUBEAUX, Prince Albert, Sask.

II.

BIRD NOTES.

Since the publication of my list of birds of Southern Saskatchewan,* I made a number of observations during the fall of 1899, the winter of 1899-1900, the summer of 1900, and this winter, 1900-1901. I give the following as among the most interesting additions to that list :

1. BOTAURUS LENTIGINOSUS. Frequently met with last year during the whole summer, probably on account of the drought of the southern regions and the unusual rainfalls here for two years, that filled up throughout the country the numerous drains, marshes, ponds and lakes.

2. Noticed and captured during the last fall the four following species :

1. *Tringa Bairdii.*
2. *Tringa fuscicollis.*
3. *Tringa maculata.*
4. *Gallinago delicata.*

3. CANACHITES CANADENSIS. On February 8 of this year (1901) I received to prepare one splendid specimen ♂ of the Canadian grouse ; and according to inquiries I made about that bird, it seems to be rather rare.

* OTTAWA NATURALIST, Vol. XIV, pp. 24-31.

4. DRYOBATES PUBESCENS. On Octobet 25, 1900, I captured a male of this small species. I had noticed it before only three times without being able to secure a specimen to verify my observation and I supposed it rather rare.

5. TROCHILUS COLUBRIS. I had the pleasure for the first time to note on August 6, 1900, that living gem fluttering about poppies and sunflowers in my garden. Several persons noted it too that year, at that time, but, I consider, nevertheless, it as a very rare straggler.

6. OTOCORIS ALPESTRIS PRATICOLA. As I saw this species roaming in the town last year on June 21, and several times subsequently, I believe I may infer now that it is breeding in the country.

7. CYANOCITTA CRISTATA. Prince Albert:—More common here in the vicinity of the coniferous stations the garruli like particularly than south, the south branch of the Saskatchewan.

8. COCCOTHRANSTES VESPERTINA. At the beginning of this winter, (November 27) I noted for the first time in the town this beautiful grosbeak, which I enumerated in my list with doubt. Then all through the season I noted it in great numbers, in flocks of 8 to 20 with always a preponderance of males (7 males for 1 female, 9 males for 2 females, etc.). The last I noticed was on May 20.

9. ZONOTRICHIA ALBICOLLIS & Z. QUERULA. First noticed in company with *Spizella monticola*, *Junco hiemalis* and *Passerella iliaca* on September 2, 1900.

10. JUNCO HIEMALIS. Noticed on July 23, 1900, roaming in the town in small flocks of 6 to 10, and I guess I may infer that it must breed too in the country.

11. AMPELIS CEDRORUM. Observed several times last year in July plundering the berries of a *Lonicera tartaricum* I have in my garden, and in the bush. Common in the vicinity of the coniferous stations.

12. PETROCHELIDON LUNIFRONS. First observed on May 30, last year; then in great numbers building their nests in the town.

13. AMMODRAMUS CAUDACUTUS NELSONI. One specimen, August, 1899.

Prince Albert, March 18, 1901.

BIOLOGICAL STATION OF CANADA.*

A REVIEW OF ITS THREE YEARS' WORK.

The issue of the first fasciculus of scientific papers from the Marine Biological Station of Canada gives occasion for some account of that important institution and its work. The papers, which contain the results of the biological researches carried on by Canadian specialists at the Station, form the Supplement to the 33rd Annual Report of the Fisheries Department, Ottawa. The Supplement is not only of unique scientific interest, but a glance at the nature of the subjects treated of demonstrates its immense practical value to the Government and to the public. It is stated that the French, German and other foreign Governments have specially applied for copies of this publication, and the fact is not surprising in view of the technical value and practical bearing of the six or seven reports included in this Blue Book.

The Station was founded by the Dominion Government in 1898, the Order in Council authorising its erection being dated May 9th of that year. The steps which led to its foundation may be briefly told, and, for the details, reliance has been placed upon Professor Prince's article on the origin, equipment, and work of the Station, which forms the first of the seven scientific papers now presented to the public.

Professor Prince, as Dominion Commissioner of Fisheries, was rightly selected as head and director of the Station by the Canadian Committee of the British Association for the Advancement of Science, and he gives in a concise report, a rapid outline of the progress of Marine Biology in Canada onward from 1835, when Sir William Dawson began, as a youth of 15, to collect marine specimens in the vicinity of Pictou, Nova Scotia. It is an interesting story, and should be told in full detail some day, for Professor Prince's sketch was evidently written *currente calamo*, and there are many omissions of important zoological work done, which should find a place in a complete sketch of Canadian marine biology. The Station resulted, as Professor Prince tells us, from

* Contributions to Canadian Biology, being studies from the Biological Station of Canada, 1901. Supplement to the Ann. Report Mar. and Fish. Dept., Ottawa, 1900.

the action of a Committee of the British Association appointed in 1896. During the sittings of that august scientific body, in Toronto, in 1897, this Committee, under the chairmanship of Professor Louis C. Miall, President of the Biology section, formulated a scheme, and chose a Canadian Board consisting of Professors Prince, Macoun, A. B. Macallum, E. W. MacBride, T. Wesley Mills, Dr. Thistleton Dyer (of the Royal Gardens, Kew) and Professor Penhallow (Secretary). These gentlemen organised an influential deputation who waited upon Sir Louis Davies, then Minister of Marine and Fisheries, and in 1898 a Parliamentary grant was made, resulting in the erection and equipment of a Biological Station which commenced work at St. Andrews, New Brunswick in 1899. Prior to the movement inaugurated by the British Association, the scheme had been warmly advocated, first by Professor Prince himself in his report as Commissioner in 1893,* and by Professor Knight, of Kingston, two years later.† In 1896 the Royal Society discussed the matter and adopted a resolution (in Section IV) relating to the founding of such a marine biological station, the proposal being made by Dr. T. J. W. Burgess, of Montreal.

In the summer of 1899 scientific researches were actively commenced at St. Andrews, N.B., in the building described by Professor Prince as "a neat one-story structure of wood, well-lighted from the roof and sides, and somewhat resembling a Pullman car, with a row of eight large windows along each side," and having a total length of 50 feet. Besides a spacious main laboratory containing workers' tables, aquaria and glass tanks supplied with fresh and salt water, wash-basins, bottle racks, bookshelves, etc., there are six small rooms for the accommodation of the Director and staff, for the attendants, and for chemical and scientific apparatus, books, memoirs, etc. The nucleus of a valuable library has been already collected, including "the fifty magnificent volumes of the report of H. M. S. *Challenger*, a munificent gift, obtained through the kind offices of the Rt. Hon. Joseph Chamberlain, His Majesty's Principal Secretary of State for the

*See 26th Ann. Rep. Mar. & Fish. Dept., 1893. Special Appendix by the Commissioner of Fisheries, pp. clxxxviii—cxcv.

†Proc. Royal Soc. of Can., 1895, pp. xiii and xiv.

Colonies." This costly gift from England, with its elaborate encyclopædic treatises and superb colored plates, is a library in itself; but a large series of English, German, French, and American memoirs and works, has been also secured. The Station is well equipped with nets, dredges and deep sea tackle, including a beam-trawl, besides possessing a small launch, row-boat and appropriate gear.

The management of the Station was placed by the Government in the hands of a Board of nine members, a distinguished company, including some of the most brilliant scientific men in the Dominion. As already stated, at their head is Professor Prince, Commissioner of Fisheries, and a former President of our Society, while Professor Ramsay Wright is Assistant Director, and Professor D. P. Penhallow is Secretary, and the remaining members are Professors Bailey (Fredericton, N.B.), A. P. Knight (Kingston, Ont.), A. B. Macallum (Toronto), E. W. MacBride (Montreal), the Rev. Abbé Huard (Quebec), and Dr. A. H. Mackay, Superintendent of Education (Halifax, N.S.). A number of these eminent authorities have conducted original investigations in the Station for longer or shorter periods, during its three years of existence; two years of which it was located at St. Andrews, N.B., and one year (1901) at Canso, N.S. Of other scientific workers who have occupied research tables, mention may be made of Dr. R. R. Bensley (Toronto), Dr. Joseph Stafford (Montreal), Mr. B. A. Bensley (Toronto), Dr. F. Slater Jackson (Montreal), Miss Ganong (St. Stephen), Mr. Bower (Kingston), Dr. F. H. Scott (Toronto), Prof. Fowler (Kingston), Mr. C. Maclean Fraser (Toronto), Mr. G. A. Cornish (Toronto), and Dr. Linwood, of New York. The Government enjoined that scientific work should be carried on, as far as possible, with practical objects in view, in return for the pecuniary support granted from the public funds ($5,000 for construction, and $2,000 per annum for current expenses). That this understanding has been abundantly fulfilled is apparent from the papers now printed, and it may be questioned if any marine station in the world has within three years from its foundation, furnished results so extensive, so valuable in a utilitarian sense, and so interesting, scientifically, as this Canadian Station. To take some concrete examples,—for over a hundred

years the vexed question of sawdust and fish-life has been discussed, and Professor Knight has, for the first time, conducted exact scientific experiments and made tests in regard to that all important matter. His report is certain to attract wide attention, and the results which he reports, appear to show that sawdust is not fatal to adult fishes, but affects mainly their food, eggs and young; a result very much at variance with the views of loud-voiced theorists, who have spoken of fishes as being choked and killed in large numbers by that kind of pollution. Dr. Knight also gives details of his exact and thorough study of the effects of the other water pollutions. He states that a report of Professor Prince, published in 1899, stimulated him to take up the investigation, and he was much assisted by the chemical analyses of Mr. F. T. Shutt, who, like Professor Prince, is an ex-President of the Ottawa Field-Naturalists' Club. An account of the sand-clam (*Mya*) and of the New Brunswick fishery for that valuable mollusk by Dr. Joseph Stafford, is of great interest, covering 21 pages and illustrated by four beautiful plates. The paper is of much practical importance though the detailed description of the shell and internal organisation seems somewhat redundant and out of place in a series of original papers. Nothing very new or original can be said on that phase of the subject. Indeed, every scientific student can find a full account in the current class-books of zoology. The pages, however, dealing with the food, reproduction, etc., are both original and valuable, and important additions to science. The fourth paper, by Professor Fowler, is open to criticism. The flora of St. Andrews might have been made extremely valuable by incorporating in it some account of the algæ and microscopic plants of Passamaquoddy Bay: but as Dr. Fowler's list stands, it adds little or nothing to the very excellent reports already published by Dr. G. U. Hay, Mr. J. Vroom and other New Brunswick botanists. The three last reports are creditable in every way, for they add to our knowledge, and they show how valuable work can be done by busy men in a short time at a properly equipped Station. Dr. Scott gives us some very unexpected results in his study of the sea-urchin's food. Many authorities have stated that the sea-urchin lives on shell-fish and the like, an opinion apparently supported by the powerful

jaws and teeth possessed by Echinus : but Dr. Scott tells a different story. It is to be regretted that he did not at the same time study the food of the star-fish. We should have then learned if these two Echinoderms are identical or differ in their food. Professor Prince and Dr. MacKay furnish a most interesting, though too brief, paper on an anatomical subject of very great importance. They studied the remarkable breast-fins of the mackerel shark (*Lamna*). The fins of fishes are not less interesting than the wings of birds, perhaps more so, and the three plates illustrating paper No. VI. are commendable for clearness and accuracy. It is to be hoped that the two authors will continue their joint-papers on a subject of such uncommon scientific interest. The last paper, on the Sardine Fishery, by Mr. Bensley, is attractive and valuable so far as it goes. It appears unquestionable that these sardines of commerce, caught by Canadian fishermen but practically all canned in Eastport, are not sardines at all, being simply immature herring 5 in. to 9 in. in length Thousands of hogsheads are caught every summer, and it is a grave question what effect this is likely to have upon the Bay of Fundy herring supply in the future. Mr. Bensley's paper is invaluable on that account.

Professor Prince and his brilliant and learned colleagues are to be congratulated on this first publication from the Marine Biological Station. It is a valuable and most creditable report ; but it is permissible to hope that some place in future reports will be given to faunistic work, and that Canadian zoology will gain by additions to its marine animals and fishes at each location selected for biological study as the station moves northward along the Atlantic shores.

Zoologists have, of course, learned with interest of some of the interesting forms, vertebrate and invertebrate, which have already been secured by the staff of the Station. Thus, the blue or sand shark (*Carcharias littoralis*, Mitchell) which Dr. Jordan separates from *Carcharias glaucus*, was brought to the Station last summer, and this record extends the range of the species 400 or 500 miles further north than was specified by the United States' authority mentioned. Sharks are, however, of essentially wandering habits, and other records of southern species of fishes taken by the staff of the Station at Canso are more surprising. Thus

the Spanish mackerel, or chub mackerel (*Scomber colias*, Gmelin), resembling and yet unlike the common mackerel, was captured on several occasions, while the interesting *Scomberomorus maculatus*, Mitchell, usually called Spanish mackerel by United States writers, was also secured. Neither species is generally regarded as occurring so far north as Canso. Specimens of *Lycodes*, a curious eel-pout, probably *esmarki*, were got at St. Andrews, which was surprising, and also at Canso, both being an entirely new records. On many occasions enormous skulpins of a rich orange colour were caught, quite different in size, and other features, from *Hemitripterus americanus*, which they most closely approached. A ponderous sea-wolf was also added to the collection of the Station. It was not *Anarrichas lupus*, being of a dirty lead colour, and in dentition far less formidable than the common brown or yellow, barred species. An old naturalist says of *A. lupus*: "Its ferocious-looking cat-like head, and exceedingly coarse skin, covered with slime, gave it a hideous appearance"; but when he adds: "The voracious and savage character of the wolf-fish . . . is apparent from its formidable array of teeth, and its vicious propensities," the description does not so aptly apply to the large specimen examined at Canso, in which the teeth were far less prominent. It no doubt belonged to the Arctic species, *Anarrichas latifrons*. Amongst other noteworthy captures was a swordfish (*Xiphias gladius* L.) which exhibited several parasites (*Penella*) of unusual size, projecting like long dark whip-lashes from the skin of the fish, each provided with a brush or feather-like terminal appendage. Amongst the invertebrates collected were many Protozoans and Annulates which may turn out to be new to Canada, and possibly new to science, so that the faunistic work has already assumed an important character.

It is exceedingly interesting to learn from the Director's report that the tables have on the whole, been fully occupied during the three years of the Station's work. That shows, if such evidence were needed, that Canada has no lack of able and original workers, whose brains and talents have found congenial opportunities, hitherto, in the biological stations and laboratories of the United States. Most of the American Stations give lectures and elementary instruction, and demand fees; but the Canadian Station is

devoted solely to original research, and offers its advantages to qualified naturalists without fee or charge. There is no field so vast, so inviting, and so unexplored as the waters off our Canadian shores, and the Government Marine Station has a bright future before it.

WINTERING OF BEES.

The wintering of bees, in this latitude is, I know, a question of some anxiety to the bee-keeper, and for the benefit of those who are at all concerned in the subject, the following experiment, I think, will be of some interest :—

Last autumn, I had six hives of bees, and instead of putting them all away in the cellar as usual, I left four of them outside, where they remained during the entire winter.

I had to prepare them however for the ordeal, by putting on each hive an empty super to take off the moisture, which I believe accumulates from the cluster of bees hibernating during the winter months.

I then placed the hives close together on an elevated piece of ground some foot or so above the rest of the garden, and quite sheltered by the house on the north and west sides. I also took the precaution to place three or four boards over the top, to serve as a roof, over which I laid a carpet. I also placed a board all along against the hives and in front of the entrances, to prevent the snow from drifting into and closing them up—so that they could have all the ventilation necessary. And of course when the winter came on, everything would be covered with snow, and it was intended that with this shelter and covering they would keep sufficiently warm.

This spring, these four hives of bees came out much stronger than any bees that I have yet succeeded in wintering, and much better than the two hives put away in the cellar, one of which latter, I may say I lost from some reason or other which I have not been able to account for, as the hive was quite full of honey and seemed perfectly healthy.

A. H. LAMBART.

NOTES ON SOME WINTER BIRDS.

By W. E. KELLS.

PINE GROSBEAKS. On New Year's day, 1902, I noted, for the first time this winter, a flock of some fifteen individuals of this species. When first seen they were flitting among the fruit and shade trees in the gardens and the streets, and occasionally feeding on the berries of the mountain ash—which, while these lasted, appeared to be their principal food. Among them, when first seen, were a few red-polls, and as the crossbills continued to be observed every day for the next seven weeks, a few red crossbills were at times seen among them. The last time the grosbeaks were noted was on the 21st of February; there was then only six in the flock. It has been stated that these birds make their appearance in Ontario every five years, but I think that it is over ten since I last noted them in this vicinity. It is probably the lack of food in their more northern haunts, rather than the severity of the weather, that causes them to migrate towards the east and the south. All the members of this species that came under my observation this season, were in the dark plumage, though a few had reddish shading on the upper parts. These visitants appear to have been noticed by all observers throughout the province.

EVENING GROSBEAKS. No specimens of this species came under my observation in this vicinity this winter, but correspondents in widely distant localities have reported their appearance, yet in rather limited numbers. Mr. A. Macalister, formerly of Guelph, writing from Harperville, Manitoba, Jan. 23rd, says: "I have seen the snowy owl a number of times, and also a flock of evening grosbeaks, the first I had ever seen." And writing from Guelph, Feb. 24th, Mr. F. Norman Keating states: "I have noted a number of evening grosbeaks, and taken one specimen, a male. Prof. Doherty also secured a fine male."

GOLDEN EAGLE CAPTURED. On Tuesday, Feb. 11th, Mr. A. Cole, of the township of Grey, west of Listowel, captured a large black or golden eagle, that had been feeding on the carcass of a horse which was exposed in the woods on lot 24, con. 13. When discovered, there were two of the species devouring portions of the dead beast, and Mr. Cole in firing at the birds wounded the larger one in one of its wings, so that it was unable to fly. The

other specimen, a smaller and apparently a younger bird, arose on the wing and made its escape. The wounded eagle was secured, and is still living in captivity. It measures seven feet from tip to tip of its outspread wings. It is now very rarely that a specimen of this species of the feathered race makes its appearance in these parts.

OWLS. The appearance of snowy owls has also been reported from various localities, but no specimen of this species came under my notice during the past season, indeed it is a number of years since any of the species have been seen here. All the family are rare in this locality, but Mr. S. McGeorge, my son-in-law, who resides some five miles west of this town, reports that a "little horned" or mottled owl, which is in the habit of visiting his barn every winter. again made its appearance there the present season, and remained about two months. He also states that three years ago he saw in a piece of swampy woods adjoining his farm a nest of this species containing three young. This nest was placed on the horizontal branch of a small swamp elm, ten or twelve feet off the ground, and was probably the deserted nest of a crow.

SNOW-FLAKES. These birds usually make their appearance here in large flocks with the first snow-fall, and are frequently seen hovering over the fields and along the roadways, until the winter is nearly over, and the first members of the thrush family—the true harbingers of spring—make their appearance. With these exceptions, and the ever-present English sparrows, the only other species of the avifaunian race noted in this vicinity the past winter, were bluejays, chickadees, and some woodpeckers.

SPRING BIRDS. On the 17th of February, the first horned lark was noted, and a week later this species had become common. On the 24th the first crow was observed, and in a few days these were also common. On March 11th, robins, blue-birds, song sparrows, and bronzed grackles were seen. Next day a pair of red-wing blackbirds were seen, and again on the 14th and on the 15th the notes of the killdeer plover and the song of the meadow lark were heard. On the morning of March 17th a cold "nor-wester" set in, and for a time put a stop to bird migration; yet it was surprising amid the arctic coldness to hear how sweetly a number of song sparrows gave vent to their song notes.

BIRD NOTES.

THE LONG-TAILED JAEGER IN ONTARIO. On October 2nd, 1900, at Rondeau (Lake Erie), Ont., Mr. F. D. Bates saw a pair of strange birds and shot them both. Being an old hunter, he felt sure they were rare, and sent them to London, where they eventually fell into the hands of Mr. H. Gould and myself. They proved to be young specimens of the long-tailed jaeger (*Stereorarius longicaudus*), the habitat of which is given in the A. O. U. list as "northern part of the northern hemisphere, breeding in far northern countries. South in winter to the northern United States." This is, I believe, the first capture of this bird in Ontario, their usual line of flight being doubtless along the ocean shores.

THE WHITE PELICAN AT BELLEVILLE, ONT. The following particulars of the capture of a specimen of this bird at a ducking ground on the Bay of Quinte, eight miles from Belleville, have been furnished by Mr. P. C. Jones, who shot it. The bird flew over the decoys, thus giving an opportunity for a shot. It weighed 20 pounds and measured 8 feet 3 inches from tip to tip of the wings. Through the kindness of Mr. Jones, an excellent photograph of the mounted specimen was shown at the February meeting of the Ornithological section of the Entomological Society at London, when the above facts were presented.

The present winter has been notable, in southwestern Ontario, for an influx, not only of pine grosbeaks which are to be found everywhere, but also of evening grosbeaks and snowy owls. The latter have been fairly well distributed, but appear to have been especially numerous not very far north of London; for instance, there have been many of these seen at Guelph, one taxidermist there having had as many as eleven in his shop at once. In the township of Biddulph, north of London, a taxidermist has had over twenty brought to him, and others have been reported from different stations, such as five or six at the west end of Rondeau, two at Kirwood, one at Walford, etc. These birds are usually very scarce in this locality.

The evening grosbeak is even more noteworthy than the owl, as it has only been seen once before in the recollection of the present race of ornithologists. It also is reported as quite common near Guelph, flocks containing over forty having been seen. General reports are not in concerning this species, but a few have been seen near Ridgway in the Welland peninsula, and three have been seen at London. Doubtless they will be reported from many other stations, particularly those in the north.

W. E. SAUNDERS.

SOIRÉE.

The fifth soirée was held in the Assembly Hall of the Normal School, February 25, when Prof. E. W. MacBride lectured on "The present position of Evolution."

The lecturer commenced by pointing out that the century which had just passed away had witnessed a great revolution in our ideas on many things, and notably on our conception of our relation to the universe. This had been largely brought about by the acceptance of the doctrine of evolution as laid down by Darwin. This doctrine had profoundly influenced not only biology but sociology and historical science, as was candidly admitted by one of the latest writers on the New Testament. It was of importance, therefore, to define first what exactly is asserted by the doctrine, second on what evidence it rests, and thirdly what light it has thrown on the history of the human race. The root idea of evolution as expounded by Darwin was to explain the present state of the world of animals and plants as the outcome of its past condition under the operation of orderly laws. The idea that various types of animals might have descended from a common ancestor was as old as the Greeks; so long, however, as the transformation could not be shown to be a possible out-

come of causes at present operative, evolution was an unscientific hypothesis rightly rejected by leading comparative anatomists such as Cuvier. Darwin, however, showed (1) that every species tends to multiply at such a rate as would, if unchecked, completely fill the world in a short space of time ; and that so long as the relative numbers of members of the various species inhabiting the globe remained about the same, on an average only two of the young produced by a pair of parents survived ; (2) that no two of any brood or litter were ever exactly the same, and that these individual peculiarities were often inheritable ; (3) that in the struggle for existence which must necessarily ensue between the too numerous progeny of every species some of these slight individual peculiarities would often determine the survival of their possessors and so be handed on to posterity, and in this way the whole species would slowly change its character. If the species were to spread into two localities where the conditions were dissimilar, different peculiarities would be advantageous in the two cases, and the species would split into two divergent groups or or new species. Three main objections had been made to Darwin's view—(1) that species were separated from one another by a barrier of mutual infertility, whereas the breeds of domestic animals produced by artificial selection were all mutually fertile ; (2) that geological evidence afforded no evidence of gradual transitions such as he postulated, and (3) that if organs were derived originally from small rudiments, such rudiments must have been at first useless, and therefore could not have determined the survival of their possessors. All three difficulties had been completely cleared away by subsequent investigations ; in answer to the first, it had been shown that two extreme varieties of the common European frog refused to breed together though each would breed with intermediate types, so that infertility was of various grades and that no sharp line could be drawn between races and species ; with regard to the second difficulty, continued investigation was continually bringing to light series of fossils which exactly agreed with Darwin's postulates, and lastly, it had been shown that organs were never developed out of useless rudiments but out of simple organs and ultimately out of undifferentiated protoplasm in which all the

properties manifested by the special organs were latent. Biologists now considered the evolutionary doctrine proved and were occupying themselves with the question as to the origin of the individual peculiarities which were the bricks with which evolution worked. This difficult problem was as yet far from being solved, but the trend of the evidence was to show that they were due to chemical influences acting on the germ in the first period of its existence. The evidence that man was descended from a monkey-like ancester had since Darwin's day become overwhelming. The unborn baby was provided with a short tail and with a thick covering of hair, and the skulls of the oldest known fossil men were intermediate in capacity between those of the highest age and the lowest negro. Evolution had not, however, ceased when man had become man ; by its continued operation the human race had been split into a black, a yellow, and a white division. The Anglo-Saxon race belonged to the last, which was essentially an arctic type and had originated where the struggle against nature was fiercest. In consequence of this the white race was possessed of superior virility and human history largely consisted of a series of raids carried out by the white race on the less vigorous race lying to the south of them.

In conclusion the lecturer pointed out that the nature of the human spirit, that most fundamental of all problems, could not be determined by zoological methods ; for to attempt to resolve the soul into the results of the congeries of atoms, when atoms themselves were its own conceptions was a manifest absurdity. It was better to frankly admit that a consistent scheme could not be constructed out of our knowledge of eternal nature and our knowledge of our inner life—and with Harnack to live in the faith that this apparently irreconcilable contradiction would one day receive its solution.

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MARL DEPOSITS IN ONTARIO, QUEBEC, NEW BRUNSWICK AND NOVA SCOTIA.[1]

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

THE MARL DEPOSITS OF EASTERN CANADA.

The presence of shell-marl in the provinces of Ontario and Quebec, at many widely separated points, has long been known, and many localities where this material occurs have been described in the Reports of the Geological Survey from a very early date.

Value of marl deposits

The chief value attributed to this substance was for many years supposed to be confined to its use as a fertilizer for soils lacking in calcareous matter, since it furnished a ready kind of lime, easily applied, and showing good results in regard to the cultivation of certain crops where its application was carried out with proper judgment.

Within the last few years, however, marl has been found to be especially adapted to the manufacture of the best grades of cement, when mixed with a proper proportion of clay. Large

Manufacturing plants for cement

manufacturing establishments have been already established at several points and others are in process of construction, more especially in the province of Ontario, where large and valuable deposits of marl occur at many places. Among these may be mentioned the great works at Marlbank, a few miles north of Belleville, and at Strathcona, about five miles northwest of Napanee, where the manufacture of high-grade Portland cement has been prosecuted on a large scale for several years.

The demand for marl deposits conveniently situated near to railway lines or other means of shipment has increased

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

very largely. Enquiries are frequently made as to the existence of these deposits, and in order to present in a readily accessible form such information as is available from the published reports of the Geological Survey, some of which are long out of print and others not convenient for reference, the present paper has been prepared. While it is not maintained that the subject has been exhaustively treated, since the information relative to the occurrence of this substance increases from year to year as the scope of the Survey's operations is extended, the present paper will incorporate all available information on the subject in regard to its occurrence in the provinces of Ontario, Quebec, New Brunswick and Nova Scotia, taken from the published reports of the Geological Survey and from other sources of information, brought down to the present time.

Sources of information re "marl"

Fresh-water marl occurs usually in marshes and shallow lakes, and generally contains the shells of several species of fresh-water mollusks. In the Geology of Canada, 1863, a good description of the mode of occurence and physical characters of this material is given, which may be here quoted. "Although belonging to the present geological period, this marl is not always of recent formation; inasmuch as the beds of it are sometimes overlaid by peat, or by a soil supporting a growth of large trees. At other times however, the marl covers the bottom of shallow lakes or ponds, and is evidently in the process of deposition. It appears to be formed by the waters of springs highly charged with lime, which is at first held in solution as bicarbonate but is deposited when these waters come to the air. It is thus similar in its origin to the deposits of calcareous tufa, which occur in many places where such calcareous springs flow over earth, rocks and vegetation, instead of falling into lakes or marshes. The presence of carbonate of lime is a necessary condition of the development of shells, and various species of mollusca abound in such waters. These by their remains, which often form a considrable portion of the deposits, give to them the name of shell-marl, which is frequently applied. This substance is white and earthy in its aspect, and, unless mingled with clay, is a nearly pure carbonate of lime, which from its finely divided state is well adapted to serve as a dressing for such soils as are deficient in

Mode of occurence and origin

calcareous matter. When calcined, marl yields a nearly pure and very white lime, well adapted for mortar and for other uses. In many parts of Vermont large quantities of lime are thus manufactured. The marl is moulded in the shape of bricks which are dried and burned in a kiln."

"When pure, marl may be used as a substitute for prepared chalk or whiting in cleaning metals and for similar purposes. In many parts of the country it is commonly employed by the people for whitewashing their buildings. It has also been used for the production of carbonic acid gas in the manufacture of soda-water and other aerated waters in place of the pulverized chalk or marble dust which is generally employed."

Uses of marl

Marl deposits are numerous in many of the lake bottoms throughout the province of Ontario. They are also found at various points in the province of Quebec, though, as a rule, such deposits are not so large as in the former province. Further east in New Brunswick this material also occurs at several points around the Bay des Chaleurs, and also near the city of St. John, but the occurences are still less abundant than in Quebec, while in Nova Scotia shell-marl, in so far as at present known is comparatively rare, It may, however, be remarked in connection with the maritime provinces that many lakes which should naturally contain marl are supplied with extensive deposits of infusorial earth, this material being very abundant in the lakes which are scattered throughout the Cobequid mountain range in Nova Scotia, and also in the eastern portion of the province including the island of Cape Breton. In New Brunswick, also, large and valuable deposits of infusorial earth have long been known to occur in the southern and east portions of the province. This material has recently come into considerable demand and several large lake-deposits have been quite extensively worked, the output being principally shipped to points in the United States.

Distribution

The successful manufacture of Portland cement, which in Ontario is destined apparently to utilize many of the large deposits of fresh-water marl found in the province, depends upon the proper admixture of the marl with certain proportion of clay. These materials after mixing thoroughly are burned, and the resulting compound very finely ground, the success of the operation

Portland Cement

being due to a very careful series of experiments which have been carried on for some years till the proper adjustment of materials and the right degree of burning and subsequent reduction to an almost impalpable powder has been reached.

ONTARIO.

Among the largest deposits of the marl, some of which have already been utilized on an extensive scale, may be mentioned the following localities: At Marlbank in the township of Hungerford, on the line of the Bay of Quinte railway the great works of the Deseronto Cement Co. are located. The raw material is derived from the beds of White and Dry lakes, the deposit extending over several square miles and having a depth in places of at least 20 feet. Large works in connection with this company are also located at Strathcona, formerly Napanee Mills, which is about five miles northwest of the town of Napanee, the capacity of the plant being over 100,000 barrels annually.

Localities of Marl deposits

Marlbank

Another very important deposit is situated in the bottom of Shallow Lake, Keppel township, county of Grey, about nine miles from Owen Sound on the west side of Georgian bay. The property here comprises nearly 600 acres, the marl having a thickness of from one to six feet, with an average depth of four feet, underlaid by clay with a thickness of two feet.

Another large deposit is found in Williams lake in the township of Holland, in the same county, near the line of the Toronto, Grey and Bruce Ry., and also near Durham which is also convenient to railway communication.

Williams Lake Grey Co.

Marl also occurs on lots 25 and 26, ranges VII and VIII, Flos township, Simcoe county, but the thickness and extent of the deposit is not yet definitely known, though apparently quite large. This area lies a short distance to the southeast of Georgian bay.

Large deposits of excellent marl are found in the counties of Peel and Dufferin. In the first-named county a deposit in the fourth and fifth concessions of the township of Caledon, in close proximity to the railway, is reported as covering about 350 acres with an average

Peel and Dufferin Co's Caledon

depth of 13 feet, overlaid by a deposit of peat from two and a
Orangeville half to six feet in thickness. This is near Orangeville
East Garafraxa station. In Dufferin county on lot I, range B, East Garafraxa, there is a deposit of marl extending over at least 20 acres with a depth of six feet. Large plants are contemplated for working these areas.

Peterborough Further east, at Lakefield, near Peterborough, there is
Buckley's Lake an area of marl lands amounting to about 800 acres, at what is known as Buckley's Lake, where the marl deposit is reported to be 20 feet deep. Large areas of excellent peat are in close proximity, and the district is connected by rail with the town of Peterborough.

Sheffield Tnp. The deposit at Marlbank has already been referred to;
White Lake but in the township of Sheffield other large areas of marl have been reported which should be of value. Among these may be mentioned the following—In White lake and on the brook flowing from it to Beaver lake, as also on the fifteenth and sixteenth lots of the second concession, and on the twelfth lot in the third and fourth concessions. The deposit on the first named is stated to extend over at least 200 acres with a thickness throughout the greater portion of at least ten feet, the bottom of the deposit not being reached, having a thin covering of soil with a luxuriant growth of grass.

The second of these deposits extends over an area estimated at from 300 to 400 acres, but the thickness was not ascertained. It is covered by an accumulation of peat with a thickness of four feet or more in places.

Storrington. In the township of Storrington, about ten miles north
Loughborough Lake of the city of Kingston, there is a large deposit of marl occupying the bottom of Loughborough lake, more especially the southeastern portion. The depth of water is not great, and the marl extends over many acres of the lake bottom, but the thickness was not tested, though the extent of the deposit is apparently very large. The marl is also found in the bottoms of many of the lakes between this place and White lake in Olden township. The Loughborough lake deposit can be easily removed by dredging, and the locality is little more than a mile from the present line of the Kingston and Pembroke railway, while by hauling from Bat-

tersea village on the south side of the lake to the shore of Dog lake, two miles distant, communication can be made with the Rideau canal.

Belleville — Near the city of Belleville marl also occurs, but no data are to hand regarding its extent. It is presumably not so extensive as the Sheffield deposits.

Yonge Tnp. Athens — In the township of Yonge, near the village of Athens, and in close proximity to the line of railway from Westport to Brockville, there are several deposits of marl which have never been exploited. One of these is on lot 13 range VIII., and is said to occur over an area of at least 25 acres, with an ascertained depth of seven to fifteen feet. The material is also reported as occurring on lots 7, 8 and 9, range IX, in the bottom of Mud lake, and possibly at other points in the vicinity.

South Elmsley, Bass Lake — In the township of South Elmsley it is found underlying portions of Bass lake, with a thickness of three to four feet, but the exact extent of the deposit is uncertain. This place is but a short distance from the foot of the Rideau lake at Oliver's Ferry.

Wilberforce Mink Lake — In the township of Wilberforce, near the Bonnechére river, and about three miles from the line of the Canadian Pacific railway between Douglas and Eganville, is Mink lake. This lake has an area of over 1,000 acres, the marl being visible at many points and probably occupying most of the bed of the lake. The thickness of the deposit has been proved to be at least nine feet in places and may be much greater in parts of the lake basin. The area can be easily drained so as to expose a large surface of the deposit.

McNab Tnp. White Lake — In the township of McNab the lower end of White lake shews a large area of the marl, extending over some 700 acres, and ranging from five to seven feet in depth. The area could be readily drained so as to expose a large body of the material, but the distance from the town of Arnprior and railway communication is about eight miles. It is about the same distance to Glasgow station on the Canada Atlantic.

Ross Tnp. Green Lake — In the township of Ross, several deposits are found in connection with a chain of lakes which extend southeast from Muskrat lake, near Cobden village. On one of these,

known as Green lake, on lot 13, range IV, about one mile north of the line of the Canadian Pacific railway, the marl is found along the shores of the lake, in one place with an exposed extent of five acres, and a depth of from five to twelve feet, and also along the southeast shore of the lake over a space of ten acres, having about the same thickness. On lot 15, range II, in another small lake the marl is found banked up four to five feet near the outlet, extending for several hundred yards, and probably underlying the water of the lake. In several others of this chain of lakes, which extends across into the township of Horton, there are indications of marl, but the extent of the deposits has not been determined. The locality probably represents an old valley of the Ottawa river extending from Pembroke eastward.

Westmeath

In the township of Westmeath, on lots nine and ten, east front B, shell-marl is seen all round the shores of a small lake, but the depth and extent of the deposit are unknown.

Emerald Lake Temiskaming District

On Emerald lake, about five miles west of Opimika narrows, Lake Temiskaming, there is a deposit of marl of unknown depth, but of considerable thickness, since the bottom could not be found on sounding with a long pole. Though the lake is of small size the amount of the marl will here be of importance.

Lanark

Among other places where the material is found in this province but where the extent of the deposits have not been determined, may be mentioned, lot 13, range IV, Lanark Co., six

Chalk Lake Reach Tp. Ont. Co.

acres and seven feet deep; Chalk lake, lots 1 and 2, range I, and lot 1, range II, township of Reach, Ontario Co., in a lake of 75 acres with a marl bottom, the thickness of which is considerable but not definitely stated; White

White Lake Huntingdon Tp., Hastings Co.

lake, on lots 18 and 19, range IX, Huntingdon, Hastings Co., the deposit extending out under the waters of the lake, the extent unknown, but found to be 30 feet thick in

Eramosa Wellington Co.

places; Eramosa branch of Green river, Eramosa township, Wellington Co, the extent of the deposit unknown but reported to be at least three feet thick with a cover-

Artemisia Tp. Grey Co.

ing of three feet of peat; and in Artemisia township, Grey Co., where it occurs over an area of at least 12 acres, with a depth of at least seven feet.

Sebastopol Tp Clear Lake

In the township of Sebastopol, at the lower northwest end of Clear Lake, near the outlet, there is a large quantity of marl, the depth of which has not yet been proved, and it occurs also in several small lakes adjacent. This locality is about eight miles from the Canada Atlantic railway at Eganville.

MacKay Lake New Edinburgh

On the shore of Hemlock or MacKay lake in New Edinburgh, Ottawa, marl has long been known to exist, extending over 100 acres or more with a depth of at least five feet. The deposit is, however, largely covered with soil and forest growth, but has been locally used to some extent in the manufacture of white bricks.

The localities mentioned for the province of Ontario do not profess to describe the occurrences of marl for all portions of the area. Doubtless many deposits occur at various localities, the details of which have not yet reached this Department, but sufficient has been stated to show that the material exists over a great area and frequently in very large and economic quantities.

West Hawksbury

In the vicinity of the Ottawa river, on lot 18, range IV, west Hawksbury, there is a deposit the extent of which has not been definitely determined, but it is known to extend over an area from five to ten acres, with a proved depth of 2 to 4 feet, and covered with peat for four feet. It has been locally used as a fertilizer by the settlers in the vicinity.

PROVINCE OF QUEBEC.

In the province of Quebec, marl deposits, while not so widely distributed as in Ontario, are also found at points from the western limit to the peninsula of Gaspé.

Argenteuil near Lachute

In the township of Argenteuil, lot 3, range I., marl is found occupying the basin of a lake, in depth from five to thirteen feet, overlaid by about nine feet of peat. The area of the overlying peat is about 22 acres. On the same lot, another peat-bog with an area of half a mile from east to west and a breadth of 150 yards occurs underlaid by marl which has a depth of 12 feet. The locality is not far from the line of the Canadian Pacific railway at Lachute.

Wentworth Tp Eagle Nest Lake

On lot 22, range VIII, Wentworth township, marl is reported as occurring in the bed of Eagle Nest lake, which is a short distance south of 16-Island lake, the quantity not

being stated, but apparently considerable. The nearest shipping point to this place is the line of the Montford Colonization railway near the latter lake. It is also reported as occurring in a small lake on lot 5, range IV, Harrington township, but at present this locality is too far removed from railway communication to be practically available.

Vaudreuil Point à Cavagnol, Ottawa River.

In the seigneury of Vaudreuil, at Point Cavagnol on the lower Ottawa, a bed of marl extends over at least twenty acres, the thickness being apparently from a foot to a foot and a half. It has been locally used to some extent as a fertilizer. Small deposits of excellent marl are also known to

Montreal

exist in the vicinity of Montreal, as at Thornberry in the rear of Montreal mountain, and on the St. Pierre river, between Montreal and Lachine, which are overlaid in part by beds of peat. The extent of these deposits has not yet been definitely determined, but a company for the manufacture of cement has been established at Pointe Claire.

East of the St. Lawrence

In the area east of the St. Lawrence river a small deposit of marl has been long reported as occurring near the foot of Yamaska mountain, near the junction of the road to Granby, with that leading to St. Pie, the thickness of the material being stated to be one foot, and extending over about seven acres.

St. Armand

In the township of St. Armand on lots 156 and 157, about one mile southeast of Phillipsburgh, it is also found in a small lake with a thickness of seven feet, and extending, as far as known, over thirty to forty acres. This locality is in close proximity to the Phillipsburgh branch railway, and also to the shore of Missisquoi bay, through which the Chambly canal passes. The deposit here rests upon a bed of marine shells. In the township

Stanstead

of Stanstead it also occurs in a small lake bottom on lots four and five, ranges X and XI, with an area of 20 acres and a reported thickness in places of 30 to 40 feet. This is within a short distance of the village of Stanstead Plain.

A small deposit of marl has recently been reported by Mr. Obalski as occurring near the village of Beauport, a few miles east of Quebec city, and also at Lake a la Peinture in the township of Neigette, but the extent of these deposits is not stated.

Gaspé Matane

In the eastern part of the province of Quebec marl has been reported as occurring on the south side of the St. Lawrence at a point about five miles below the mouth of the Matane river. The deposit extends over an area of 60 to 70 acres and has a depth of one to two feet, and another deposit occurs at the upper end of the lower Metis lake, the extent of which has not been stated.

Bay des Chaleurs New Carlisle New Richmond Blue Lakes

In the peninsula of Gaspé several important deposits of this substance are found, especially along the north side of the Bay des Chaleurs. All of these are but a short distance from the line of railway running from Metapedia to Paspebiac. Among localities in this area may be mentioned several lake bottoms lying to the north of the village of New Carlisle and in a narrow valley about two miles distant from this place, in all of which and around their margins the marl occurs with a depth of from one to six feet. Further west it is also found in lake bottoms a short distance north of the village of New Richmond near the Great Cascapedia river, and in what are known as the Blue lakes to the west of that stream, the bottoms of which are apparently filled with this substance. The depth and extent have not been determined, though the quantity appears to be considerable. The latter place is in the Irish settlement.

ANTICOSTI.

On Anticosti island deposits of excellent marl were reported by Mr. James Richardson from his exploration of this area in 1856, as occurring at several widely separated points. He states that "the bottoms of all the lakes and small ponds examined, with the exception of such as were surrounded by peat, were more or less covered with it. Marl lake at the northwest extremity of the island near the West point lighthouse, showed a deposit of about 90 acres, with a considerable thickness, which however was not definitely ascertained, and the brook which empties this lake carries down with it to the shore a large quantity of marl as a sediment where it was spread out along the beach for a considerable space."

Another locality noted was about three miles west of South west Point, where marl was observed along the bank of a brook and

extending inland for a fourth of a mile. It had a thickness of about one foot, and was covered with peat. In a lake about half a mile inland it was seen to cover an area of about 200 acres but the thickness here was not ascertained; and near South Point, which is near the southeast end of the island, about twenty-six miles west of Heath Point, it was also seen along the shore, resting upon the rocks and covered with a deposit of peat about ten feet thick.

NEW BRUNSWICK.

Baydes Chaleurs Charlo River

In the province of New Brunswick shell-marl in so far as yet known is rarely seen. In the northern portion around the Bay des Chaleurs it occurs on the shore at Belledune underlying peat, the quantity apparently not being very large, and also at Charlo river in the bottom of a small lake where the marl is said to have a depth of nine feet. This deposit has been locally used to some extent as a fertilizer.

Lawlor's Lake St. John.

In the southern part of the province, marl occurs at several points. The most important of these apparently is in the bed of Lawlor's Lake, which is about five and a half miles from St. John city on the line of the Intercolonial railway. The marl has been exposed by a partial drainage of this lake, the deposit apparently underlying the whole of the lake basin, but is apparently thickest at the two extremities, especially the eastern, where the depth of the marl is reported as two feet. In places this deposit is associated with peat. In the western part marl has been found in the bed of a small lake a short distance above Burnshaw Brook on the right bank of the Tobique river.

NOVA SCOTIA.

Canaan near Kentville.

In Nova Scotia no deposits of special economic value have as yet been reported with the exception of an area on the South Mountain ridge at Canaan to the south of the village of Kentville. This has been locally used as a fertilizer for some years and has been to a large extent exhausted. The beds of many of the lakes, especially on the range of the Cobequid mountains as well as in portions of Cape Breton are filled with large deposits of infusorial earth, as is also the case with several lakes in eastern New Brunswick.

ON THE NEPHELINE ROCKS OF ICE RIVER, BRITISH COLUMBIA.[1]

By Alfred Ernest Barlow, M.A., D.Sc.

In the May number of the *Geological Magazine* appears an article on a "Sodalite Syenite (Ditroite) from Ice River Valley, Canadian Rocky Mountains" by Prof. T. G. Bonney, D.Sc., LL.D., F.R.S., &c.[2] In referring to the work previously done on rocks from this locality, Prof. Bonney was evidently ignorant of the fact that the occurrence of an igneous complex at this place was pointed out by the writer in an article read before the Royal Society of Canada in May, 1900, an abstract of which appeared in *Science*, N.S., Vol. XI, No. 217, page 1022, At the time it was intended by Dr. Dawson that the writer should pay a special visit to this locality in order to study the relations of the various types in the field, collecting sufficient and suitable material for further study in the laboratory. Pressure of other work, however, has not only prevented this, but also the publication of the details of some of the interesting phenomena observed in the specimens already available. In view of the publication of Prof. Bonney's interesting paper, it is considered advisable to give immediate publication to some of the general results of the detailed petrographical examination of the rock specimens furnished to the writer by the late Dr. G. M. Dawson, in February, 1900. These were collected on August 13th, 1884 by Dr. Dawson, while engaged in a geological reconnaissance of this portion of the Rocky Mountains, but in the hurry necessarily attendant on such preliminary work, only the morning of that day was devoted to the examinations of their fields relations They were obtained from exposures along and in the vicinity of the Ice river a branch of the Beaverfoot river in British Columbia. The area covered by these rocks as outlined by Dr. Dawson on the reconnaissance map of part of the Rocky Mountains, published in 1886, comprises portions of the Ottertail, and Vermilion Ranges. The northwestern edge of the mass

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

[2] *Geol. Mag.*, New Series, Decade IV., Vol. IX., No. V., May, 1903, pp. 199-206.

is believed to come within about four miles of the Canadian Pacific Railway between Ottertail Crossing and Leanchoil stations. Thence with an approximate width of two miles it extends for a distance of about sixteen miles, the strike of the belt gradually bending around in this interval from southeast to east. As far thus as our present knowledge goes, the area underlaid by these rocks is about thirty-two square miles.

The hand specimens which were made the subject of examination and study, were of necessity collected rather hurriedly. and were chosen simply as representative of the several varieties of igneous rocks seen to occur at this locality. It is therefore a very agreeable surprise to find that the material thus selected at a time when magmatic differentiation was very little understood, should illustrate a passage so complete that no appreciable gap occurs unrepresented by specimens from the most basic ijolite containing 36,988 per cent. of silica to sodalite syenite or foyaite with 53,638 per cent. of silica. A large number of thin sections were prepared from the material at command as it was believed that considerable information would be gained by their study under the microscope regarding the phenomenan known as magmatic differentiation, which it is confidently believed is so well represented at this locality. Perhaps one of the most significant developments in petrographical geology during the last few years has been the enunciation of the principle, that no sharp line of delimitation exists between what has hitherto been regarded as the main types of families of igneous rocks, but that these merge by insensible gradations into one another. Many of the prëexisting gaps have of very recent years been so well bridged by hitherto unknown species that it is now certain that at no very distant date, such sequences will be practically perfected by the recognition and description of the various transitional types now lacking. Repeated and conclusive observations have likewise shown that no considerable area of igneous rocks occurs without furnishing some proof of this diversity in composition, so that at the present time it is considered the exception rather than the rule, to meet with any extended rock exposure which does not give some evidence of such gradation of one rock type to another.

These facts bearing so intimately on the genesis of igneous rocks have caused the formulation of the hypothesis known as magmatic differentiation. This hypothesis or phenomenon may be briefly described as the division or differentiation of a more or less viscous or molten magma or fused mass of rock, into chemically and mineralogically diverse parts, which on cooling, yield correspondingly diverse types of rock. It would be manifestly unwise in this connection to enter into a discussion of this very generally accepted hypothesis, as the conditions attending the crystallization or consolidation of a large body of magma are now believed to be much more complex than at first supposed. Moreover, our knowledge regarding these conditions and the several processes which are no doubt involved, is so vague and incomplete, that no full or satisfactory explanation has yet been offered of this phenomenon. All petrologists of repute are, however, agreed on the main fact that magma differentiation furnishes the only reasonable explanation of the facts observable in regard to the mode of occurrence or field relations of these rocks. In the present instance it will doubtless be sufficient to state that mineralogically the exposures at Ice river furnish abundant proof of their intimate relation to one another, and their derivation from the same magma. This strong disposition towards differentiation is a marked feature of nepheline syenite and kindred eruptives, and it is very reasonable to suppose from the studies already undertaken that nowhere in the world is it better exemplified than by these British Columbia outcrops.

The following rather distinct types of rock have been recognized in the hand specimens collected by Dr. Dawson, which with the intermediate or transitional forms, exhibit a rather perfect gradation throughout the series.

1. A rock composed mainly of hornblende, pyroxene and nepheline, together with sphene, which although accessory, is so abundant as almost to characterize the rock. Occasional thin sections show small individuals of anorthoclase, but as a rule no felspar is present (Ijolite).

Macroscopically the hand specimen representative of this type is a black glistening rock made up chiefly of the darker coloured minerals (hornblende and pyroxene) with a very subordinate

amount of interstitial lighter coloured material (nepheline). It is sprinkled all through with comparatively large and conspicuous phenocrysts of honey-yellow sphene.

II. A rock composed of hornblende, pyroxene and nepheline with a very little felspar (anorthoclase or microperthite). This last mineral, however, is in such small quantity that it must be regarded as distinctly accessory (Ijolite, transition type).

This rock is much lighter in colour and evidently less basic in composition. It is irregularly mottled or spotted, owing to the segregation of the coloured minerals leaving areas composed chiefly of the lighter coloured nepheline.

III. A rock composed essentially of hydronephelite (ranite) biotite and ægirine. The hydronephelite is evidently secondary, resulting from the alteration of nepheline originally present, so that the rock may be considered as a biotite-ægerine-ijolite. It is of a delicate pale red colour and might be readily mistaken at first sight as an ordinary red syenite.

IV. A rock made up of nepheline and felspar (chiefly microperthite but also albite and a little oligoclase) in nearly equal proportions with a smaller quantity of pyroxene, hornblende and biotite and also abundant and comparatively large porphyritic sphenes (Nepheline Syenite).

V. A rock composed mainly of felspar (chiefly microperthite and albite) and sodalite with a little nepheline, biotite, augite and ægirine (Sodalite Foyaite or Syenite).

VI. A rock composed mainly of granular cancrinite and ægirine very much squeezed. The cancrinite is evidently secondary and derived from nepheline, which is also present. Sodalite also occurs. (Canrcinite Syenite.)

Besides these, which may be regarded as the integral and important members of the parent plutonic, there are dykes of Nepheline-Syenite-Pegmatite, and Tinguaite. These, which are regarded as practically contemporaneous and differentiates of the same magma, apparently cut the main mass in all directions, filling up cracks formed during its cooling. The pegmatite is composed chiefly of microperthite (made up often of three felspars, orthoclase, microcline and albite) with varying amounts

of sodalite, nepheline and ægirine. Secondary calcite is rather abundant, while some clear isotropic areas with delicate cubic cleavage, are probably analcite. Some small colourless needles in radiating groups are probably rosenbuschite, according to Dr. Washington. A pale brownish-yellow isotropic mineral is probably perofskite but possibly pyrochlore. Very often comparatively large, brilliantly striated cubes of pyrite are present in this coarse facies. The tinguaite dykes present no unusual features.

It is thus evident that under these headings (I & II) we have varieties of the exceedingly rare type of rock for which the name Ijolite was proposed in 1891 by Ramsay and Berghell.[1] At present this species is known to occur at only three localities, Mt. Iliwaara in Finland, Kaljokthal in the Kola Peninsula in Arctic Russia, and at Magnet Grove, Arkansas, U.S. Its true nature was first suspected by Rosenbusch and proved by Ramsay, but it remained for Dr. Washington to describe its true relations and position with regard to the other associated nepheline-bearing intrusives.[2] As far as can be ascertained, however, the occurrences at Ice River are far more complete and satisfactory, for purposes of study, than any of the localities mentioned. Felspar, which is absent from the European occurrences, is abundantly present at Ice river, while plagioclase, which is unknown in Arkansas, is represented by albite, oligoclase and anorthoclase at the British Columbia locality. The Ice river types are of special interest from the greater proportion of ferromagnesian minerals present than in the occurrences of Kola or Magnet Cove, and are remaskable in that hornblende (barkevekite) largely replaces the pyroxene of the others. They are really a new variety, hornblende (barkevekite) ijolites. The titanite which replaces in part at least the garnet of the others, is also a marked feature. Garnet or Schorlomite, however, is also present at the Ice river, and Mr. F. G. Wait has analyzed a specimen of this mineral which was handed to him by Dr. Hoffman.

The silica contents in the specimen represented under (I) was ascertained by Prof. N. N. Evans, of McGill University, and this was as before stated 36,988, but a complete analysis was made of the variety (II).

[1] Geol. Foren Förhandl. Stockholm, 1891. Bd. 13, 4afl, 4 pp. 300-312.
[2] Bull. Geol. Soc. Am., Vol. 11, 1900, pp. 389-416.

For purposes of comparison the following table of analyses are given of the ijolites from the various localities at present known.

Analyses of ijolites from several localities.

	1	2[1]	3[2]	4[3]
SiO_2	39.250	41.75	42.79	46.63
Al_2O_3	16.012	17.09	19.89	15.03
Fe_2O_3	4.313	6.35	4.39	5.91
FeO	9.640	3.41	2.33	5.09
MgO	4.242	4.71	1.87	3.47
CaO	13.423	14 57	11.76	11.23
Na_2O	4.917	6.17	9.31	8.16
K_2O	2.256	3.98	1.67	1.96
H_2O (ignit)	0.797	0.62	0.99	0.35
H_2O (110°)		0 28		
TiO_2	4.019	0.58	1.70	1.12
MnO	0.349	trace	0.41	trace
P_2O_5	0.905	1.09	1.70	....
	100.123	100.60	98.81	99.57

1—Ijolite, Ice river, British Columbia.
2— ,, Magnet Cove, Arkansas, U.S.A.
3— ,, Mt. Iiwaara, Finland.
4— ,, Kaljokthal, Umptek, Kola.

The hydronephelite which is such an important mineral constituent of the biotite-ægirine-ijolite was separated by means of Thoulet's solution, the specific gravity of the powder thus ascertained varying from 2.243—2.275. An analysis of this powder was made by Mr. R. A. A. Johnston, which shows it to have the composition given under 1 in the following table.

Analyses of Hydronephelite and Rauite.

	1[4]	2[5]	3[5]
SiO_2	42.80	38.99	39.21
Al_2O_3	28.50	33.62	31.79
Fe_2O_3	0.34	....	0.57
CaO	1.90	0.07	5.07
Na_2O	14.33	13.07	11.55
K_2O	0.30	1.12	....
H_2O	10.81	12.98	11.71
	98.98	99.85	99.90
Spec. grav...	2.243—2.275	2.263	2.48

[1] Bull. Geol. Soc. Am., Vol. 11, 1900. No. IV, p. 399.
[2], [3] Rosenbusch: Elem. Gesteinlehre, p. 180.
[4] Ann. Rep. Geol. Surv. Can., Vol. XII, p. 13R.
[5] Dana's Mineralogy. 1892, p. 609.

1. Analysis of Hydronephelite from Ice river.
2. Analysis of Hydronephelite from Litchfield, Me., U.S.A.
3. Analysis of Ranite from the Island of Lâven.
(also called Lâmo) Langesund fiord, Norway.

Brögger has shown that the last mentioned mineral includes part of what has passed under the name of spreustein.

Schorlomite, a mineral closely analogous in composition to garnet and which may be regarded as a titanium-rich melanite, also occurs at the Ice river locality in association with these nepheline rocks. The mineral, according to Mr. F. G. Wait, of the Geological Survey of Canada, "is massive without cleavage; the colour velvet-black, here and there tarnished blue, and occasionally with pavonine tints: that of the streak, hair-brown; the lustre is vitreous; it is brittle; the fracture is irregular, occasionally subconchoidal; it is opaque; fuses quietly at 3 to a black enamel; has a hardness of 6.5 and a specific gravity at 15.5C. of 3.802. Its analysis afforded him the results under 1 of the following table:

	1[6]	2[7]	3[7]	4[8]
SiO_2	25.77	29.24	29.08	25.66
TiO_2	10.83	18.14	18.54	22.10
Al_2O_3	3.21	1.72	1.44	....
Fe_2O_3	18.59	22.61	22.01	21.58
Fe O	.....	.....	.....	.....
Ti O	8.23	.....	.....	.....
Mn O	0.76	1.17	0.83	.....
Mg O	1.22	0.46	....	.....
Ca O	31.76	26.25	26.79	29.78
Sn O	.....	0.87	0.87	.....
	100.37	100.46	99.56	99.12

1 —Analysis of Schorlomite from Ice river.
2 & 3—Analysis of Iiwaarite from Mt. Iiwaara, Finland.
4 —Analysis of Schorlomite from Magnet Cove, Arkansas, U.S.A.

[6] Ann. Rep. Geo. Surv. Can., Vol. XII, p. 12R.
[7] Ramsay & Berghell: Geol. För. Förh. Stock. Vol. XII, 1891, p. 395.
[8] Dana's Mineralogy. 1892, No. 1, p. 448.

ON THE GENUS *ARCTOPHILA*, RUPR.

By THEO. HOLM.

(With one plate.)

The old genus *Colpodium* of Trinius was founded upon two species : *monandrum* and *Steveni*, which by Trinius himself were considered as "species facie dissimiles", and they are indeed so unlike that Robert Brown a few years later segregated the former as *Phippsia algida*, *R.Br.*, and retained the latter only as a *Colpodium*. To the latter genus was furthermore referred *C. latifolium* R Br., although Robert Brown was not certain about the real affinity of this species with those of Trinius and especially not with *C Steveni* and *compressum*. At present Robert Brown's species *latifolium* is generally placed under Grisebach's genus *Arctagrostis : A latifolia* (R. Br.) Griseb.

While *Colpodium* of Trinius was adopted by Grisebach with the omission of *C. monandrum* (*Phippsia*), the genus was nevertheless augmented with certain species, placed as a section "*Arctophila*" in contrast to *C. Steveni* and its natural allies, representing the section "*Eucolpodium*." By including the species of *Arctophila*, Rupr., the genus *Colpodium* became actually an aggregate of incongruities, as it had been before with *Phippsia* and *Arctagrostis*. By Bentham the genus was finally restricted to the section *Eucolpodium*, while *Arctophila* became transfered to *Graphephorum* Desv., next to *Glyceria* R. Br. ; another disposition was made by Hackel, who followed Grisebach by placing them both (*Eucolpodium* and *Arctophila*) as sections of the original genus *Colpodium*,and characterized as having the "spikelets one—to two-flowered etc." This same classification is, also, followed by Beal in his lately published monograph of North American Grasses, with the same erroneous characterization, erroneous, because it was originally intended for *Colpodium* alone in the sense of Trinius.

Three species are enumerated by Beal as representatives of the genus(*Colpodium*)in North America : *C. fulvum* (Trin.) Griseb., *C. pendulinum* (Laestad.) Griseb., and *C. mucronatum* (Hack.) Beal Considering the fact that *Colpodium* in the sense of Trinius was originally intended for both *C. Steveni* and *Phippsia algida*,

it seems difficult to find any good ground for admitting species of so little affinity as those of *Arctophila*, and still crediting the genus to Trinius. And the species of *Arctophila* have themselves been transferred from one genus to another. Thus we find them as members of *Poa*, *Glyceria*, *Graphephorum* and finally of *Colpodium*.

Considered by themselves the species of Ruprecht's *Arctophila* constitute an excellent little genus, and we might cite Ruprecht's own words, when he proposed the genus in his "Flores Samojedorum cisuralensium":

"*Arctophila* a *Catabrosa* (*airoide*) praesertim differt glumarum conformatione et longitudine, hac nota etiam et insuper valvulis ecostatis a *Glyceria* R Br. recedit. *Atropis* Trin. (*P. distans*) *Catabrosæ* quoad glumas proxima, spiculas habet (saltem in statu virgineo) lineares, fere teretes; in *Arctophila* nostra semper ex ovato-oblongæ vel lanceolatæ. E conditione glumarum generum series fortasse sequens: *Dupontia*, *Arctophila*, *Poa*, *Atropis*, *Catabrosa*, *Phippsia*, *Coleanthus*. Conjunctioni *Arctophilæ* cum *Poa* obstant: valvulæ dorso concavæ vel saltem minus compressæ; flosculi lana numquam cincti, nec ad nervos dorsales sericei, sed ad callum more *Avenacearum* pilis rigidis brevibus obsiti; valvula inferior apice vix integerrima, sed margo plerumque irregulariter denticulatus et erosus, saltem crenulatus et apex sæpe obtusus vel truncatus; habitus etiam nobilior colore fulvo paniculæ sæpe intermixto; spiculæ majores plerumque et flosculi demum patuli, remotiusculi."

The species that are best known are: *Arctophila fulva* (Trin.) Rupr., *A. pendulina* (Læstad.) Ands. and *A. effusa* Lge., especially the first of these since the Greenlandish plant, *A. effusa*, was for many years considered identical with *A. pendulina* by Fries, Grisebach and several other authors.

Both *A. fulva* and *A. pendulina* possess spikelets with as many as six or seven flowers, at least the spikelets fully developed, but it is not uncommon to find two or three-flowered spikelets upon the basal rays of a panicle in which all the others are from five- to seven-flowered. Typical *A. pendulina* has usually 5- to 7- flowered spikelets, as figured in Flora Danica, and the species differs in this respect from *A. effusa*, in which the number of flowers does not exceed three, and there are often only

two. The empty glumes are relatively longer and more acute in *A. fulva* (Fig. 2.) than in *A. pendulina* (Fig. 1.) and *A. effusa* (Fig. 3,); the flowering glume is also narrower and longer in *A. fulva*. We might state, moreover, that the base of the spikelets seems to afford an additional character by being more or less acute in *A. fulva* and *A. pendulina*, but obtuse in *A. effusa*, during the anthesis; this character follows the relative number of flowers in the spikelet, thus where more than three or four flowers are developed, the spikelets are generally acute at base, but obtuse, where a smaller number is present as for instance in *A. effusa*. The panicle of *A. effusa* is erect with the capillary rays deflexed, while the whole inflorescence is nodding in the two other species.

In regard to the geographical distribution of these species, *A. fulva* has been reported from a number of places in arctic Russia and Siberia, but the only specimens which we have seen from North America were collected at Muckelung River in British Columbia and on the west coast of Hudson Bay, Lat. 56.; the specimens from the former locality were by Beal, referred to *A. pendulina*, but they do not agree with this species, of which we have studied typical material from arctic Europe.

A. fulva occurs in Lapland under two forms: *maxima* and *minima*, as recorded by Brotherus, but in accordance with Nylander none of these are referable to the type, but represent his var. *Lapponica*: "panicula laxa ramis undique sparsis, pendulis, flexuosis, spiculis 2-5 floris versicoloribus, valvulis basi pilorum fasciculo barbati."

In regard to *A. pendulina* no definite geographical range can be given at present since Grisebach included *A. effusa* in this species, and since Kjellman in reporting *A. effusa* from the Siberian coast refers to both Lange's *A. effusa* and Grisebach's *Colpodium pendulinum* as synonyms; we only know for certain that it occurs in arctic Europe in the places recorded by Hartman and Hjelt, while we have not, so far, seen any specimens from this continent.

The third species *A. effusa* is known from the west coast of Greenland, Spitzbergen and Arctic Siberia; the plant from Spitzbergen formerly considered as a distinct species: *Colpodium*

Malmgreni Ands., is now generally refered to *A. effusa* as "*forma depauperata.*"

While thus *A. fulva* and *A. pendulina* are the only species recognized by Grisebach, seven others have been described previously by Ruprecht, but merely refered to as synonyms in Flora Rossica; they were collected on the island Kolgujew and on the Russian coast near Kambalnitza and Bjelaja. Judging from the diagnoses and figures in the work of Ruprecht, cited above, it seems very unsafe to include all these species under *A. fulva* and *A. pendulina*, and we have thought it worth while to insert his diagnoses in this paper, in order to give as complete as possible a representation of the genus. These seven species of Ruprecht are described as follows:

Poa (*Arctophila*) *deflexa.*

Differt a *Poa* s. *Arctophila Laestadii* (*Glyceria pendulina* Laest. e loco classico! et Herb. norm, Suec. !) spiculis latioribus, flosculis majoribus, acutioribus, radiis paniculæ rigidioribus et culmo plerumque duplo tenuiori.

Poa (*Arctophila*) *trichoclada.*

Proxima *P. Læstadii*, sed differt habitu triviali, panicula densiflora, forma spicularum magis ovata, flosculis infimis longioribus, aliter coloratis; semiverticillis radiorum infimorum vix callosis, densius floriferis. A. *Poa deflexa* diversa: radiis paniculæ minus strictis, fere squarrosulis, culmo (et quoque rachi) intra paniculam triplo crassiore, ultra lineam fere lato; spiculis bilinealibus et minoribus, subtrifloris et c.

Poa (*Arctophila*) *fulva* Trin.

Poa (*Arctophila*) *latiflora.*

Habitus *P. fulvæ*, sed differt statura minore 6-9 poll., panicula rigidiore, apice non nutante; spiculis latioribus, basi minus attenuatis, apice multo obtusioribus (ob flosculos fere truncatos) trifloris tantum, hinc etiam brevioribus, vix ultra 1½ lin. longis.

Poa (*Arctophila*) *pœcilantha.*

Similis quidem *P. trichocladæ et deflexæ*, sed radii infimi magis contracti, a basi fere spiculis obsessi, non refracti. Culmus 15-20 poll., crassus, nodis 3 exsertis; folia plana ut in antecedentibus; spiculæ variegatæ, 3 lin., 4 floræ, flosculus infimus 1½ lin., superiores duo remotiusculi; panicula erecta.

Poa (*Arctophila*) *remotiflora.*

Culmus ½-1 pedalis, minus crassus ac in præcedentibus, nodo uno alterove exserto; folia præced. angustiora, ad summum lineam lata, flaccidiora, complicata; panicula apice erecta, radii infimi semiverticillati, divaricati et unus sæpe deflexus; longiores ultra medium nudi; spiculæ 3-3½ lin. longæ, 3-4 floræ: flosculi satis remoti, erecti, acutiores quam in reliquis specc. hujus sectionis, pedicellis partialibus (jam flosculi secundi) visilibus.

Poa (*Arctophila*) *similis.*

Valde similis quoad habitum *P. arcticæ* R. Br. et commutatu facilis, differt vero: spiculis subbifloris, e fulvo et purpurascenti variegatis; flosculo secundo longius pedicellato, basi setulis (nec lana) obvallato, dorso et lateribus glabro, ecostato, glumisque angustioribus, longioribus. *A. P. remotiflora* (quacum promiscue? crescit) diversa: statura minori: 3-5 pollicari, nodis omnibus obtectis; radiis infimis geminis vel ternis; spiculis minoribus, vix bilinealibus et c. Vix var. hujus esse crederem.

Poa (*Dupontia*?) *scleroclada.*

Transitus quasi inter *Arctophilas* et *Dupontias*; habitus plane idem ac *P. latifloræ*, *remotifloræ* et rel.; folia eadem, nodus unus alterve exsertus. Spiculæ sequentis, sed gluma quælibet flosculo suo distin te brevior. Culmus 12-15 pollicaris, radii infimi paniculæ semiverticillati, patuli, unus interdum deflexus ut in *P. remotiflora*, cujus habitu gaudet, sed tota panicula multo rigidior est, spiculæ crassiores, majores, color fulvus magis prædominans; spiculæ interdum 4-floræ cum rudimento.

The genus seems to be rare in North America, but has been collected in various parts of Alaska and on the adjacent islands, besides in the British provinces, mostly south of the arctic circle. These specimens have been generally identified as *A. fulva* or *A. pendulina*, but as stated above, the former is not with certainty known except from Muckelung River and the Hudson Bay region, while we have seen no specimens of the latter from this continent. A very peculiar plant was collected on the arctic coast near Point Barrow by Dr. Murdoch (1883) and having been submitted to Professor Hackel for identification, it was at once distinguished from all the others and described as *A. mucronata* Hack. As indicated by the specific name the midrib of the flowering glume is produced

into a short mucro, while in all the other known species, the midrib does not protrude beyond the apex of the glume. The species shows in all other respects a close resemblance to *A. effusa*, being of low stature with very broad leaves, thick culm, with the branches of the loose-flowered panicle deflexed and, furthermore, by the spikelets being two-flowered and rounded at the base. Hackel (in litteris) placed it nevertheless under *Arctophila* even if it be somewhat anomalous in this genus on account of the mucro, but as stated by him, it would be still more anomalous in *Colpodium* Trin. (as understood by Bentham), because there the midrib never reaches the top of the undivided glume. It would seem as if this interesting addition to the genus *Arctophila* would warrant its final segregation altogether from *Colpodium* of Trinius, but strange to say, it is placed together with *A. fulva* and *pendulina* as a true *Colpodium* by Beal, in his lately published Monograph of the North-American *Gramineæ*.

And besides this species of *Arctophila* with the flowering glume mucronate, there is, still, another and even more interesting type, hitherto undescribed, which we found in the herbarium of the Canadian Geological Survey, which had been collected on Mansfield Island, north of Hudson Bay by Dr. Robert Bell. In this species the flowering glume is distinctly awned, not simply mucronate, a fact that excludes the plant absolutely from *Colpodium*, while it may be well understood as an *Arctophila*, and placed next to *A. mucronata*. It constitutes a species distinct from this not only by the presence of a true awn, but also by the larger number of flowers in the spikelet, the slender culm, much narrower leaves and by an altogether more graceful habit ; we have designated the name *A. trichopoda* to this species, and a full description and illustration will be published at an early date in a work upon the Hudson Bay Flora.

The discovery of this well marked species induced the writer to study some more material of the genus as represented in North America, and our investigation has resulted in the separation of three other species, which appear to us as very distinct from those previously described ; they had been identified as *A. fulva* and *A. pendulina*.

These new species are:

ARCTOPHILA GRACILIS (Figs. 3 and 4.)

Rhizome wanting: culm glaucous, slender, glabrous, the internodes longer than the leaf-sheaths: leaves glaucous, glabrous, the sheaths split to about the middle: ligule lacerate; leaf-blade flat, very narrow, much longer than the internode, erect: panicle relatively long and narrow, the almost capillary rays semiverticillate: the basal and several of the upper ones deflexed, giving the plant somewhat the aspect of *Poa sylvestris* Gr.: spikelets glaucous, quite numerous near the end of the branches with capillary pedicels, two to four-flowered: empty glumes very unequal, obsoletely three-nerved, acute: flowering glume relatively narrow, the apex obtuse and erose, three-nerved, longer than the bidentate, glabrous palea: rhacheola hairy at the joints· stamens and pistil as in *A. fulva*.

Very characteristic by its narrow panicle, the narrow leaves and glaucous hue.

Collected by Dr. R. Bell in bogs and swamps north of Lake Superior; in flower July 1883.

ARCTOPHILA BRIZOIDES. (Fig. 8.)

Rhizome robust, stoloniferous: culm glabrous, about 60 cm. in height, the upper internodes longer than the leaf-sheaths the basal shorter: leaves glabrous, the sheaths split to about the middle; ligule large, almost entire. leaf-blade flat, quite broad, much longer than the internode, erect: panicle nodding, very short, but broad, the rays semiverticillate, two or three together, drooping, very slender; spikelets pale green with a slight tinge of purple, mostly four-flowered, quite numerous in proportion to the small panicle, broadly ovate, on very slender pedicels: empty glumes subequal, the lower one-nerved, the upper three-nerved: flowering glume rather broad, obtuse, erose, nerveless, longer than the palea: rhacheola, stamens and pistil as above.

Recorded as *A. fulva*, but very distinct from this and the others by the short and broad inflorescence with its drooping, broadly ovate spikelets, rendering the plant the aspect of a *Briza*.

Collected by James M. Macoun on St. Paul Island, Behring sea; in flower August 1892.

ARCTOPHILA CHRYSANTHA. (Figs. 6 and 7.)

Rhizome stoloniferous, somewhat robust : culm glabrous, about 30 cm. in height, the upper internodes very little longer than the leaf-sheaths, the basal shorter : leaves glabrous, deep green, the sheaths closed from above the middle : ligule almost entire : leaf-blade flat, relatively narrow in the upper leaves, much longer than the internodes, erect : panicle rich-flowered, nodding, somewhat contracted, the slender rays three to five in the basal verticils : spikelets numerous, small, yellowish-brown, shining, short-peduncled to nearly sessile, two- to three-flowered: empty glumes variable in length, both five-nerved in fully developed spikelets, broad and slightly acute : flowering glume relatively broad with the acute apex entire or minutely erose : rhacheola, stamens and pistil as in the other species.

Identified as *Colpodium fulvum*, from which it, however, is very distinct by the characters mentioned above. Collected by J. B. Flett in swamps near sea-shore, 16 miles west of Nome City, Alaska; in flower Aug., 1900.

These species of Arctophila may naturally be classified in two sections :

I. *Macrostachyæ*.

Spikelets, when fully developed, five- to seven-flowered, the base acute during anthesis.

A. fulva, *A. remotiflora*, and *A. pendulina*.

II. *Brachystachyæ*.

Spikelets two- to four-flowered, the base obtuse during anthesis.

A. brizoides, *A. chrysantha*, *A. deflexa*, *A. gracilis*, *A. latiflora*, *A. mucronata*, *A. pœcilantha*, *A. scleroclada*, *A. similis* and *A. trichopoda*.

Brookland, D.C., April, 1902.

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EXPLANATION OF PLATE NO. 1.

Fig. 1—Spikelet of *Arctophila pendulina*.

,, 2— ,, *A. fulva*.

Figs. 3 and 4—Spikelets of *A. gracilis*.

Fig. 5—Spikelet of *A. effusa*.

Figs. 6 and 7—Spikelets of *A. chrysantha*.

Fig. 8—Spikelet of *A. brizoides*.

OOLOGY.

NOTE ON THE NESTING OF THE NORTHERN RAVEN (*Corvus corax principalis*) IN CANADA.

By J. F. WHITEAVES.

The Museum of the Geological Survey has recently acquired a full and perfect clutch, of five eggs, of the Northern Raven, from Mr. R. W. Tufts, of Wolfville, Nova Scotia, who took them, on the 22nd of March last, from a nest in the Gaspereau Valley. The label accompanying these eggs states that the nest from which they were taken and which was not disturbed, is placed in a "large hemlock about fifty feet from the ground," that it is "composed of sticks and lined with wool and coarse grass stems," that it had been "repaired year after year," and that the five eggs were "one-third incubated" when taken. These eggs are unusually small for the species, an average one measuring 48.5 x 32.5 mm. Evidently, Mr. Tufts writes, they were laid by old birds, which may account for the small size of the eggs. The nesting place, he adds, has been occupied for a number of years, and there is a large accumulation of material there. Prior to the receipt of this clutch, there were, in the same Museum, seven eggs of the Northern Raven, two from Nova Scotia and five from the Mackenzie River District, but no complete and perfect set. The two from Nova Scotia are two-fifths of a clutch of five eggs taken at Truro, in 1897, by or for Colonel T. J. Egan, of Halifax, three of which were broken. The two remaining are unusually large, one of them measuring 54 x 34.5 mm. The other five were brought to the Museum by Mr. J. W. Tyrrell, and are labelled "Raven's eggs, found on Artillery Lake, May 24th, 1900, by C. Fairchild." Artillery Lake, it may be mentioned, is north-east of Great Slave Lake, and Mr. Fairchild was Mr. Tyrrell's assistant in his explorations of the Barren Grounds between Great Slave Lake and Hudson Bay. Three of these eggs were, unfortunately, slightly damaged in transit. All of them are end-blown, and it is not stated whether they are from the same nest or not. By their coloration they could quite easily be separated into two sets, one of two eggs and the other of three. An average one measures 51 x 35 mm.

Ottawa, May 19, 1902.

ORNITHOLOGICAL NOTES FROM KINGSTON, ONT.

Two rather important finds have been made at Kingston this spring, and we are now in a position to speak positively regarding some of the birds, we were quite certain bred here regularly. From the fact that from time to time, I came across long-eared owls—*Asio Wilsonianus*—in the early summer, I inferred that these nocturnal birds bred in the vicinity. During the winter I saw one, and this spring came across a pair in Rockwood grounds. On April 30th, a boy told me that owls were breeding at the back of Rockwood property, and I began to investigate the problem as thoroughly as possible. On May 5th, a lad informed me that he had found five white eggs in a last year's crows' nest in a pine tree. Examination proved that the bird was a long-eared owl, and the eggs were in different stages of incubation, but none far advanced. In this case the owl left the nest directly, and did not remain near by when disturbed. Three of the eggs measured were, in inches :—1.60 x 1.28 ; 1.62 x 1.32 ; 1.66 x 1.27.

On April the 28th, in the same locality, another lad found a nest of the long-eared owl containing five eggs. The owl was much disturbed, and flew but a short distance to a small pine where it snapped its beak, and in many ways showed its resentment. Next day the lad returned to the nest and found only four eggs, which are now in the possession of Mr. Edwin Beaupré. These are somewhat larger than those in my set. In this case the nest was one left by the crows last year, and is only about twelve feet from the ground, in a stunted clump of pines near the edge of the marsh.

Merganser Americanus.—On April 10th, Mr. Edwin Beaupré, in company with Rev. C. J. Young, investigated an eagles' nest on one of the Thousand Islands, in the vicinity of Kingston. While descending the tree, Mr. Beaupré looked into a cleft and discovered three fresh duck eggs, presumably those of the *Merganser Americanus*. These he took, and as mergansèrs were seen near the island, and the eggs were of large size, there was little reason to doubt the correctness of the opinion. On April 18th, the cavity in the tree was again examined, and beyond four or five apparently fresh feathers, there was nothing to make one suspect that the birds had not abandoned the nest. Twelve days after-

wards, (April 30th) Mr. Beaupré and I again went to the tree and not only found the merganser at home, but making a futile endeavor to cover no less than eighteen eggs.

The bird (female) was most reluctant to leave the nest, in fact would not flush until stirred up by Mr. Beaupré, with a dip net. The eggs were quite fresh. There were three interesting points in connection with this find, first, the early date of nesting; second, the number of eggs; and third, the absence of feathers. As a matter of fact the eggs were simply deposited on the rotten wood at the bottom of the hollow. Several pairs of mergansers were about the island, and no doubt two birds had deposited eggs in the same tree. We are certain, too, that the other trees were occupied by mergansers from what we saw, but having no desire to disturb them did not investigate further.

FALCO PEREGRINUS ANATUM.—A third find of some importance was made by Mr. Edwin Beaupré and myself on May 8th. On a cliff in a lake in Leeds County, we found the peregrine falcon breeding. The eggs were on a ledge of rock in an almost inaccessible cliff, a hundred and twenty-five feet in height. The ledge was seventy or seventy-five feet above the water, and we had great difficulty in reaching the nest, but finally succeeded and obtained a series of interesting photographs As may be imagined it was a decidedly inconvenient spot for the practice of photography, but the results were most satisfactory and give an excellent idea of the appearance of the eggs in the nest, which was little more than a depression in the earth that had accumulated there. Fortunately the camera used was of the long bellows variety, otherwise it would have been quite impossible to make a satisfactory exposure. The eggs, two in number, had been sat upon, probably a week. When we reached the cliff the female flew off the nest, and being joined by her mate, a vigorous protest was made against the intrusion of the investigators. Near the nest the remains of a flicker were found, and it was evident that small birds formed the chief part of the food. We were much impressed by the graceful and free movements of the magnificent birds, and were lost in admiration when watching them sweeping and sailing around the cliffs. As soon as we were two hundred yards from the cliff the female bird at once returned to the ledge.

These birds are known to have nested in this particular rock for fifteen years, and are said to be the only pair about the lake.

C. K. CLARKE, M.D.

EXCURSIONS.

During April and May the Club held the following sub-excursions.

April 19th. About one hundred and seventy-five members and friends of the Club visited Aylmer, *Epigæa repens* was abundant.

May 3rd. Beaver Meadow, Hull, was visited and although the day was chilly and threatening about fifty attended. Several species of plants were collected.

May 10th. Rideau Park, Billing's Bridge, was chosen as the Club had not collected there for some years. Between forty and fifty were present. The severe frost of the previous night destroyed many plants, but a few species were found unharmed. A small collection of Utica fossils was also made.

Excursions had been arranged for April 12th and 26th but rain prevented their being held.

It is seldom that an excursion is as entirely satisfactory as that of the first general excursion of the Ottawa Field Naturalists' Club to Chelsea on Saturday, May 17th. The weather was perfect, being neither too hot nor too cold, and the scene of the outing afforded plenty of interest, not only for botanists and geologists, but also for those who simply wanted to enjoy nature. The only thing that was lacking was bird life. As Mr. A. G. Kingston explained to the company, when the time for speech-making came, one can see just as many birds in the city, during the migrating season, as in the country, and in either case, the afternoon is not the time when they are most in evidence.

The party included nearly all the students of the Normal School, accompanied by Dr. Sinclair, Miss Keyes and Miss Bolton and numbered about three hundred. On arriving at Chelsea at two o'clock, wraps and lunches were deposited in one of the cottages of the "deserted village," formerly occupied by the employees of Gilmour's mills, and then the company broke up into smaller groups, which scattered far and wide and spent the afternoon according to individual inclination. Dr. Fletcher conducted a party of botanists, and a detachment of small boys went geologizing along the railroad track with Mr. W. J. Wilson. The clearing in Gilmour's grove was appointed as the place of *rendezvous*, and shortly before seven the company reassembled to listen to speeches by Prof. Macoun, Mr. Kingston, Mr. Jas. Ballantyne, Dr. Fletcher and Dr. Sinclair.

Dr. Sinclair referred to the natural beauties of Chelsea, which he considers unsurpassed in the world, and Dr. Fletcher said a few words about the plants that had been found. Mr. Wilson spoke

of the geology of the district, and exhibited specimens of marine shells which are found in large quantities in the clay banks. They were laid down just after the glacial period, their age being placed between 7,000 and 90,000 years, and precisely the same species may be found living in the ocean to-day.

The proceedings were enlivened by the signing of the "Maple Leaf" by the Normal students, and everyone joined in "God Save the King" at the close. The party returned to town at about half-past eight.

CORRESPONDENCE.

The Editor OTTAWA NATURALIST.

In what appears to be a comprehensive and fair review of the work done at the Canadian Biological Station there was, in the last number of THE NATURALIST an oversight which should not be left uncorrected. Referring to Dr. Fowler's list of plants published in the report under consideration the reviewer says: "As Dr. Fowler's list stands it adds little or nothing to the very excellent reports already published by Dr. G. U. Hay, Mr. J. Vroom and other New Brunswick botanists."

While it is quite true that Dr. Fowler's list adds little to our knowledge of the flora of New Brunswick the reviewer forgot, or did not know, that Dr. Fowler's work in New Brunswick was pioneer work and that it is to his published lists that we still look for information. Such a local list was probably wanted for the report or it would not have been published. The younger New Brunswick botanists have done, and are doing good work, but no reference to what has been done botanically in New Brunswick can fairly be made in which any name takes precedence of Dr. Fowler's.

Yours truly,

JOHN MACOUN.

Ottawa, May 13, 1902.

To illustrate Dr. Holm's paper on Arctophila.

THE OTTAWA NATURALIST.

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NOTES ON SOME FRESH-WATER AND LAND SHELLS FROM KEEWATIN, NORTHERN ONTARIO AND BRITISH COLUMBIA.

BY J. F. WHITEAVES.

The Museum of the Geological Surveyof Canada has recently received several fresh-water shells, collected in the summer season of 1901, from the Ekwan (Equan) River, and Sutton (Trout) Lake, Keewatin, by Mr. D B. Dowling ; from the Ontario side of Lake Abitibi by Mr. W. J. Wilson ; and from Chilliwack and Sumas lakes, in the New Westminster district of British Columbia, by Mr. J. M. Macoun ; also a few land shells from the valley of the Chilliwack River, B.C., collected by Mr. Macoun in 1901.

The following lists of the species represented in these collections are submitted as a contribution to our knowledge of the geographical distribution of the inland mollusca of Canada.

A.--FRESH-WATER SHELLS.

From the Ekwan River, Keewatin.

Anodonta Kennicotti, Lea. Varieties. Eight specimens.

Anodonta marginata, Say (= *A. fragilis*, Lam.). One specimen.

Lampsilis luteola, var. *ochracea*, Dekay. Three specimens.

From Sutton Lake, Keewatin.

Valvata tricarinata, Say. One dead and bleached specimen.

Valvata sincera, Say. " " "

Planorbis parvus, Say. " " "

Limnæa stagnalis, L. Two badly broken but fresh-looking specimens.

Limnæa palustris, Muller. Two specimens.

Limnæa catascopium, Say. Small, thick-shelled variety ; several.

From the Ontario side of Lake Abitibi.

Anodonta grandis, var. *Footiana*, Lea. A full sized left valve.
Lampsilis luteola (Lamarck). One perfect and adult specimen
Sphærium striatinum. (Lamarck). Four specimens.

From Chilliwack Lake, B.C.

Anodonta Nuttalliana, Lea. Several perfect and "living" specimens.

From Sumas Lake, B.C.

Anodonta Oregonensis, Lea. Several.
Anodonta Wahlamatensis, Lea. Several
Planorbis trivolvis, Say. Several.
Limnæa palustris, Muller. Several.
Physa, species uncertain. Several, but mostly immature.

B.—LAND SHELLS.

From the valley of the Chilliwack River.

Epiphragmophora fidelis (Gray). Four adult living specimens.
Polygyra (*Arionta*) *Townsendiana* (Lea). Typical form ; one specimen.
Polygyra (*Stenotrema*) *germana* (Gould). One specimen.
Circinaria sportella (Gould). Four specimens.

Most of the species of Unionidæ in the foregoing lists were kindly determined by Mr. C. T. Simpson, of the U. S. National Museum, who has charge of the types of Unionidæ described by the late Dr. Isaac Lea, and now preserved in that institution.

In regard to two of the species of *Anodonta* enumerated in these lists, the following remarks may be made.

Anodonta Kennicotti, Lea. In Mr. Simpson's "Synopsis of the Naiades", published by the Smithsonian Institute in 1901, *A. Simpsoniana*, Lea, and *A. Dallasiana*, Lea, are included among the synonyms of *A. Kennicotti*. The types of *A. Kennicotti* are from Great Slave Lake, at Fort Erie, and the north end of Lake Winnipeg ; the type of *A. Simpsoniana* is from Fort Rae, Great Slave Lake, and that of *A. Dellasiana* from Lake Winnipeg, at the mouth of the Saskatchewan. The types of all three were

collected by the late Major Kennicott. Under the name *A. Simpsoniana*, *A. Kennicotti* has been recorded by the writer as occuring on the Ontario shores of lakes Erie and Superior, in lakes Nipigon, Winnipeg and Manitoba, and in the district of Saskatchewan. Mr. Simpson gives the geographical range of *A. Kennicotti* as "upper and middle St. Lawrence River system; north-west into the Mackenzie drainage", so that its occurrence so far to the north-eastward as the Ekwan River is of considerable interest.

Anodonta Wahlamatensis, Lea. In the Revista do Museu Paulista, vol. I, p. 220, San Paulo (Brazil) 1895, Dr. H. von Ihering says that *A. Wahlamatensis*, Lea, and *A. Californiensis*, Lea, are synonyms of *A. Nuttalliana*, Lea, but that *A. Oregonensis*, Lea, and *A. angulata*, Lea, are different species.

Ottawa, May 30th, 1902.

THE PARULA WARBLER.

BY ROBERT ELLIOTT, Bryanston, Ont.

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

The commonest birds are not always the best known. Ask an ornithologist to describe off hand an American Crow and the chances are that, however used he is to seeing the bird in his walks afield, he has waived the minute points which differentiate this bird from closely allied forms not found here. Now had we a second species of more pointed wing, or of slenderer build, or possessing some slight whitish lines on the neck, how critically would he watch our common crow to distinguish it from its relative! He would in time know two kinds better than he now knows one.

Mr. Joseph Beck and I, usually working together, have taken in this locality, nine specimens of Lincoln Sparrow. As an almost necessary result, we have become much better acquainted with the Song Sparrow than we were before we became familiar with its congener.

For several years after I began the study of birds, while my rarer specimens were all preserved, I had no collection of my own. That sylvan gem—the Parula—has passed several times through

my hands. How convenient to say—"That is a Parula Warbler !" For two or three years after I began preserving specimens, I did not meet with a single example of this bird.

My interest in the species became quickened when I read in *The Auk*, vol. xiii, page 44, Mr. William Brewester's description of a new sub-species to be known as the Northern Parula. To obtain a Parula Warbler would no longer suffice.

From the given range, I surmised ours should be the northern form, but I wished to verify the theory. Since then I have taken one specimen only—an adult ♂ shot in a thick thorn tree in the Thames valley, 16th May, 1899. On my request for the loan of specimens, Mr. W. E. Saunders kindly placed three adult ♂ ♂ at my disposal.

While the series is much too small to expect very definite conclusions, I offer the following notes on the classification of these four birds.

To briefly summarize Mr. Brewester's comparative diagnosis —the Northern Parula, *Compsothlypis americana usneæ* may be distinguished from typical *C. americana* by the following points: Slightly larger, with shorter bill. Adult ♂ with less yellow on under parts, more black on lores, collar across jugulum broad and black, chest spotted with rich brownish chestnut.

On being compared with my specimen, two of Mr. Saunders's birds are seen to belong to the northern form. His third specimen so closely approaches mine and differs so much from the first two as to afford a rather striking contrast to them. The only feature in which my specimen differs from *C. americana*, is in the extent of the black on lores and malar region This is more pronounced in mine than in any of the others ; in typical *americana* it is less. A row of minute white feathers bordering the yellow on throat may be ascribed to albinism. In all other respects—viz : smaller size, larger and longer bill, amount of yellow, narrowness of collar and diffusion of the chestnut with the yellow of chest—mine agrees completely with the published description of *americana*.

Mr. Saunders's third specimen has unfortunately lost the tip of the bill, but, judging from its size at base, it was apparently larger than in the other two. Mr. Brewester moreover expressly

states that not one of the features he has used in separating the two forms is quite constant. Bearing this in mind, I have little hesitation in arranging the series as follows.

1. *C. americana usneæ*, ad. ♂. Coll. W. E. S. London, May 1881.

2. *C. americana usneæ*, ad. ♂. Coll. W. E. S., Komoka, 24th May, 1888.

3. *C. americana usneæ*, ad. ♂. Coll. W. E. S., Komoka, 6th May, 1893.

4. *C. americana usneæ*, ad. ♂. R. E., Plover Mills, 16th May, 1899.

The first two being typical of the new Northern Parula, the last two being not quite typical of the original species now known as the Southern Parula.

The breeding range of the Northern Parula is given as "New England, New York and westward along the northern tier of States, northward to the Maritime Provinces and Canada." That of the Southern Parula, "The South Atlantic and Gulf States east of Texas, northward near the Atlantic Coast to the District of Columbia and in the interior to Mt. Carmel, Ill."

With respect to the last named, Mr. Brewester had examined no summer birds from immediately north of Washington or Illinois, and, while doubtless the vast majority of the Parulas of Ontario will prove to belong to the northern sub-species, yet the extreme southern edge of the Province being in the same faunal zone as Illinois, the Southern Parula may prove to be a not rare summer visitor to the counties bordering on Lake Erie.

I would urge on the members of our Ornithological Section the desirability of collecting more specimens, especially of adult males taken in spring. It is needless to add that accurate measurements made in the flesh are of great value to any one attempting the classification of such closely related forms.

OOLOGY.

ADDITIONS TO THE GEOLOGICAL SURVEY'S COLLECTION OF EGGS, IN JUNE, 1902.

The following sets of eggs of Canadian birds have been received from Mr. R. W. Tufts, of Wolfville, Nova Scotia, who collected the whole of them and who has kindly furnished the information in regard to them.

"GOLDEN-CROWNED KINGLET (*Regulus satrapa*).

"Set I, of nine eggs, collected at Wolfville, May 12, 1902. Bird seen, incubation fresh. Nest hanging from thick spruce limb, near the end, about fifteen feet from the ground, composed of green moss outwardly woven with "beard moss" (*Usnea*) and lichens, and lined with long hair and feathers. Entrance at top.

"Set II, also of nine eggs, collected at Greenwich, King's Co., N.S., May 13, 1902. Bird seen, incubation fresh. Nest in spruce tree, hanging from end of limb about fifteen feet up, composed outwardly of green moss and beard moss, lined with hair and robins' feathers. It was found about half completed April 2, and the eggs were taken May 13. This shows how long it takes these little birds to build their nests.

"RED-BREASTED NUTHATCH (*Sitta Canadensis*).

"One set, of seven eggs, collected at Wolfville, May 8, 1902. The bird was seen, and the incubation one-fourth advanced. Nest in a dead stump about twenty feet up, composed of fibres of decayed wood, mixed with grass and a few feathers. Entrance smeared with fir balsam.

"RUSTY BLACKBIRD (*Scolecophagus Carolinus*).

"One set, of five eggs, collected at Davison's Lake, Hants Co., April 29, 1902. Birds seen, incubation fresh. Nest in a small spruce tree about six feet from the ground, composed of twigs and lined with fine dead grass and rootlets. No mud used."

J. F. WHITEAVES.

Ottawa, June 12, 1902.

CANADIAN HUMMINGBIRDS.

By W. E. SAUNDERS.

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

Hummingbirds belong to the order Macrochires, which includes, so far as Canada is concerned, only the Goatsuckers, Swifts and Hummers. Of these families the first two are separated from the third by the presence of more than 6 secondaries, a short broad bill with deeply cleft gape, and the absence of metallic-coloured plumage The principal characters of the Hummingbird family are :—secondaries 6, a slender, often attenuated bill, gape not deeply cleft, colours of the plumage more or less metallic.

The family embraces many genera and about 400 species, entirely confined to America, and most of this large number are residents of the South only.

Among the many species in the tropics there are, as one might suppose, many curious forms. Some of them have very long tail feathers, while one at least has the bill longer than all the remainder of the body, a character not known elsewhere among birds. The colours exhibit all of the most brilliant tints, and often the most striking contrasts ; one bird, mostly metallic green. having pure white tail feathers and coverts. The tongue is protrusive, as is that of the Woodpeckers, and is composed of two tubes for obtaining honey from the nectaries at the base of a flower.

The breast bone is very large, with an enormous keel to accommodate the immensely developed muscles which are required to move the wings at the great speed usual with these birds. The reason for this extremely quick wingbeat is that the upper arm bone is very short, and it is a fact that birds which have this bone very short must use quick wingbeats, while a long one produces a slower beat or a sailing flight. Thus the Grouse and Quail have a short upper arm, and the Gulls and Buzzards a long one.

All the Hummers ranging into Canada were formerly included in the genus *Trochilus*, but in more recent years the species therein contained have been mostly placed in other genera, whose

characters, however, are not structural but appear to relate entirely to the colours of the birds.

While there are about 400 species known to science, only 18 are found in North America. Five of these come as far north as Canada, four of which are confined to the neighbourhood of the Pacific coast. These are the Allen's, Rufous, Black-chinned and Calliope; the two latter far exceeding the others in numbers.

It is characteristic of the whole family that they build beautiful nests, diminutive certainly, but put together with the greatest skill and unsurpassed neatness. Usually they consist of white cotton from willows and other trees, but in the case of one, the Black-chinned Hummer, the buff-coloured cotton of the sycamore is often used exclusively, producing a nest of the colour of a sponge. Those built of white cotton are always covered, one eastern species using lichens, but those in the West appear to use anything that is convenient, mosses, strips of bark, fragments of weed stems and a few lichens being generally found.

The most common Hummer in California is the Annas, which does not wander into Canada, but its abundance in the South makes it worthy of a few remarks here.

It has iridescent red feathers on the throat, a feature so common with the males in this family, and has a similar patch over the head, giving it a most gorgeous appearance. Moreover the male has what Mr. Charles A. Allen calls "a very nice little song," which he delivers from some twig or perhaps a telegraph wire.

This species often builds on the nest of the previous year, a habit which seems more or less common throughout the family. The earliest record of a Hummer's nest in the United States belongs to this bird, a nest having been found on January 20th by Mr. Emerson at Hayward, Cal.

Turning, however, to Canadian species, we notice first Allen's Hummer, a small chestnut-bodied bird with greenish back. This is a bird of wide distribution, but not so much so as is the Rufous Hummer, which it resembles closely, except that the back of the latter is reddish-chestnut. Allen's Hummer is found in the south-western parts of British Columbia only, which constitute the northern portion of its range. Mr. Allen, after whom it was

named, has found its nest at altitudes ranging from 10 to 90 feet from the ground, and says that its courage is unsurpassed. Once he saw a pair of these birds attack and drive away from the neighbourhood a western Red-tailed Hawk.

The Black-chinned Hummer has a very extensive range, from the Pacific Ocean eastward as far as the Alberta foot hills, and from Northern Mexico in the South at least as far as Banff in the Canadian Rockies. It is one of the smallest birds of the tribe, and has several pecularities more or less uncommon.

With regard to the eggs, which do not materially differ from those of the other species, a number of sets of three have been taken, and once a set of two was found in a House Finch's nest in New Mexico, without any apparent addition or alteration whatever. The throat of this species has the lower part dull iridescent purple, and the upper part dull black, a peculiarity seldom seen among these gaudy little birds.

The Rufous Hummer has the widest range of any, breeding over a distance of at least 2,500 miles north and south, and ranging from Mt. St. Elias, Alaska, in latitude 61, down to the table lands of Mexico.

Its nest is usually of cotton covered with mosses, shreds of bark and occasionally a few lichens. One nest contained three eggs, and Capt. Bendire mentions that this is the only instance he knows of, except those of the Black-chinned Hummer. One nest found by Mr. A. W. Anthony at Beaverton, Oregon, had been built on top of last year's nest, the lining having been thickened to cover a pebble which had lodged therein and the sides raised, but no apparent alteration had been made otherwise.

The Calliope is the smallest and, to my mind, the most beautiful of all Canadian Hummers. The throat, instead of being covered with a solid block of iridescent colour, has elongated feathers of ruby-purple in narrow streaks on the upper part, then forming a band across the middle, and extending nearly half an inch farther down on each side. The effect of this colouring is unique and beautiful.

This appears to be a mountain loving species, which does not penetrate far above our southern border, though, if mountains were the longed-for home, British Columbia ought surely to be able to attract them in vast numbers; yet it appears to go only some 3 or 4 degrees north of the 49th parallel. At Fort Klamath, Oregon, Capt. Bendire found it in enormous abundance in the vernal migrations and is sure that there must have been 1000 birds to the acre on one occasion. These were about three-fourths Calliope and one-fourth Rufous Hummers. It is reported to breed at from 4000 to 8000 feet elevation in the pines on the edges of the mountain meadows and parks. It places the nest on a twig of *Pinus contorta* (*Murrayana*) 8 to 15 feet from the ground, usually on or beside a bunch of cones, and the nest itself so closely simulates the appearance of a cone that it would readily be taken for one of the bunch.

A nest found in Nevada was built on a knot of rope which was hanging from an outhouse, and by covering the outside with bits of bark, pieces of wood and flakes of whitewash the nest was made to look like the knot on the rope and did not resemble a pine cone at all.

I have a specimen shot by my brother, Mr. F. A. Saunders, late in July of 1892 at Agassiz, B.C., which is a hint that in the northern part of its range it nests at a lower elevation than in the southern.

With all these species living in British Columbia, it seems strange that only one ever visits the eastern part of the continent. That one, however, has a breeding range exceeded by but few birds, extending from Florida to Labrador, and in the interior as far north as Lat. 57, more than 550 miles north of the 49th parallel, giving to its range a total of over 1000 miles of latitude in Canada alone.

This species is the Ruby-throated Hummingbird, a well known favorite throughout Ontario, where it visits every flower garden to suck the sweets and catch the small insects living in the flowers. With us it is not very common, for, though a good garden may attract Hummers a dozen times in an afternoon, yet these will probably consist of but 3 or 4 individuals, and, when one

walks in the country, he will usually see not more than 1 or 2 in a morning and often none. Under these conditions, nests are seldom found, and in all the years I have studied birds I have found but 3, one of which was never completed. This first was found near Ottawa on July 7th, 1890, and was seen under exceptionally favorable circumstances. My brother and I spent quite a long time watching the tiny builder. The nest had not yet begun to show cupping, and she was very busy ; her absences were short and her visits frequent ; 20 or 30 seconds was often sufficient for her to get a load, and she took only from 10 to 30 seconds, usually 20, to finish working it in. The universal testimony seems to be that, while the female is useful, the male is merely ornamental, and takes no part whatever in the work ; that was certainly the fact in this instance. When we took this nest, we wound cotton carefully around it and then cut off the limb, and thus succeeded in safely collecting the whole. The only other nest I have taken was at Port Stanley, on June 2nd, 1893. It was placed on a dead twig of a wild cherry tree and was certainly difficult to secure, but by following the same tactics as before, winding it with cotton and sawing off the limb, I secured it safely.

These little birds have very dainty habits, and one can spend no hours more pleasantly than in watching them. I was once favoured by being allowed to view the morning toilet of a Hummer in my garden. There had been a heavy dew, and the little fellow bathed in the moisture-laden leaves of the grape and raspberry, fluttering his wings and shaking his body and feathers, just as larger birds do in larger vessels. It seemed like a burlesque, and one could hardly help the idea that this little mite "thought he was a bird."

On another occasion I saw one drink the juice of a cherry that the robins had broken.

While one notices these tiny creatures only while they are on the wing, he will discover by watching them that their rests are frequent and long, but their wee, faint "chirp" is seldom uttered except while on the wing. During the longer rests, generally made on a dead or bare twig, or a wire, the bird will often plume itself for many minutes at a time and shows in many ways its neatness and cleanliness.

I once saw two males go through a curious performance. They were feeding at a trumpet creeper growing on a fence, one on each side, and, when they rose to where they could see each other, they flew together and, without touching, rose perpendicularly about 12 feet, facing each other all the time, then separating came down ; but, if they were in mutual view when they reached their feeding flower, up they went again, and sometimes for three or four flights in succession. This performance was repeated several times, but without apparent object. I guessed that it was a game of bluff on each side, but the other fellow wouldn't be scared.

Dr. Bendire quotes from Mr. Otto Widmann, of Old Orchard, Missouri, relating a still more curious play. Mr. Widmann says :

"A peculiarity of the Ruby-throat which I have only once seen mentioned in print, is the pendulum play of the male Hummer. In time, it coincides with the period of sexual excitement ; it begins here about May 12th, with the arrival of the bulk of the females, and lasts until incubation has commenced. In this play the bird is swinging to and fro, as if suspended from a fixed point. It describes one-fourth of a circle and travels about a rod. This movement is continued a dozen times, the bird emitting chirps all the time."

With Dr. Fletcher I witnessed this action on the Ottawa Experimental Farm in May, 1901, when we saw the bird pass through an arc of about 12 yards, and looked for the female near by, but without success.

In the *Ornithologist and Oologist* for May, 1882, Mrs. C. M. Crowell, Haywards, Cal., describes the habits of a pair which she raised from the nest by feeding on syrup only, though she says they would frequently pursue and capture a house fly and doubtless they ate a small number of other insects ; they lived for nearly four months.

The feeding habits of the young birds are peculiar, resembling to a certain extent those of the pigeons, the bill of the old bird being inserted deep into the throat of the young. But, while this would lead us to infer that the young are fed with a semi-digested food, we have the testimony of one observer that he took a number of small spiders from the throat of a young bird whose contents he investigated.

The earliest date on which the spring arrival of the Ruby-throat at London has been noted, is May 9th, but usually it is a few days later. In the fall the latest was noted on October 2nd, 1890, and the average of seven years is September 23rd.

The more one studies birds, the more certain he becomes that the best way to learn their habits is to be still and keep quiet. Particularly is this true with the Hummers, whom we can scarcely ever follow, even if we tried, while when one is quiet they are likely to feed around, alight, preen themselves and occasionally favour us with an insight into some previously unknown phase of their life.

ORNITHOLOGICAL NOTES.

NOTES ON THE BREEDING OF THE SHORT-EARED OWL (*Asio accipitrinus*) NEAR KINGSTON, ONT.

Until this season I had always considered the Short-eared Owl a migratory species whose visits occurred with singular regularity, for, as each succeeding year came round, I invariably saw a bird of this species rise from one particular part of Cataraqui marsh. It is now clear to me that, on these occasions, I was very cleverly decoyed to that part of the marsh in which the birds never had a nest.

On visiting the marsh on the 23rd of last May, the actions of the owl clearly indicated the presence of the nest, from which a few minutes later the female rose, or rather tumbled into the long grass. The nest, which was composed of sticks, grass and one or two feathers, was placed out in the open marsh and contained seven eggs far advanced in incubation.

Upon examining the spot from which the male bird rose, I found pellets of hair containing the complete heads of four field mice.

EDWIN BEAUPRÉ.

ANNUAL REPORT OF THE BOTANICAL SECTION OF THE OTTAWA FIELD-NATURALISTS' CLUB.

(Read to the members of the Club Feb. 11th, 1902.)

The Botanical Section reports that, as usual, the Club's excursions were well attended by those interested in Botany. At all of these excursions one or more of the botanical leaders were present and assisted in the determination of the difficult species collected. One of the rarest plants in this vicinity—*Petasites palmata*—was found by Miss Matthews near Britannia, on May 4th, the date of the Club's excursion to that place, and the Hon. F. R. Latchford found the same species near Mountain View about the same time.

Several new species have been added to the local list during the year. These include a number of Violets new to science: *Viola cardaminifolia*, growing near Aylmer, Que., *V. subviscosa*, from the same place, *V. leucopetala*, back of Rideau Hall, and *V. Fletcheri*, from the woods near Creighton Lodge. The first two were discovered by Dr. Fletcher, the last by Mr. J. M. Macoun, and *V. Fletcheri* by Dr. Fletcher and Mr. Macoun when working together. The violets of this vicinity are yet far from being worked out, but, as descriptions of all the new species have been published in THE OTTAWA NATURALIST, even a beginner in botany may determine the common species. Other species added to our flora are *Thalictrum confine*, Fernald, collected by Prof. Macoun near McKay's Lake, *Agrimonia hirsuta* and *Triosteum aurantiacum*.

An unusually large number of botanical papers and notes were published during the year. The most important of these were: "Some New Canadian Gentians" by Dr. Theodor Holm, "New Plants from Alberta" by Dr. Edw. L. Greene, "On the Autumn Flowering of Various Wild Plants in 1900" by Mr. Cephas Guillet, Part xiv. of "Contributions to Canadian Botany" by Mr. J. M. Macoun, "Allies of *Stellaria media*" by Dr. Holm, and descriptions of new Violets and Senecios by Dr. Greene. In addition to these, short notes on local species were published from time to time.

It is proposed to complete the publication of Dr. Fletcher's *Flora Ottawaensis* this spring. The Carices and grasses have now been thoroughly worked up and nothing remains but to get the manuscript ready for the printer. The list will be a very complete one, as both Dr. Fletcher and Prof. Macoun have made a special study of these orders during recent years.

Several members of the Club did good botanical work in remote regions during the year. Mr. Dowling brought home a collection from Equan River and Mr. Wilson from Abitibi River. Dr. Fletcher collected on Mount Che-am and Mount Arrowsmith and in other parts of British Columbia. Mr. J. M. Macoun made a thorough examination of the flora of the Chilliwack Valley, B.C., and has added about fifty species to the Canadian flora, most of them new to science. Prof. Macoun made very large collections in south-western Ontario, and added many species to our flora. Two species new to science have already been described from his collection—a *Helenium* and a *Vernonia*—and there are several still to be described.

In conclusion, the botanical leaders would urge upon the members of the Club the necessity of a careful study of the local flora. The plants of this region are supposed to be well known; but so many of the supposed species have been found to include two or more species that growing specimens of even the commonest of them should be examined and compared with the description. The Rosaceæ, the Umbelliferæ and the Ranunculaceæ are especially worthy of study. The recently published "Manual of the Flora of the United States and Canada" by Dr. N. L. Britton is the only book in which descriptions of all the new eastern American species can be found.

J. M. MACOUN.
CEPHAS GUILLET.
D. A. CAMPBELL.
A. E. ATWOOD.

SOIRÉES.

The sixth soirée was held in the Assembly Room of the Normal School on March 11th, when Mr. W. E. Saunders, of London, Ont., lectured on "Native Birds: their Characteristics and Habits." The lecturer showed about 70 slides, which comprised most of the better known birds of Canada. Many peculiarities of these species were mentioned, and frequently the different families were treated as a group; the modifications of structure and habit which fit them for their place in nature, were also explained. Particular attention was paid to the relation the various tribes and species of birds bear to agriculture, and their influence on this important industry was deduced not only from their own direct efforts but indirectly by their attitude towards other species of birds and animals, both beneficial and injurious. The lecture was illustrated by anecdotes which had come within the speaker's personal experience, and the audience enjoyed especially the imitations of the various bird-songs and call-notes, some of which, particularly the plain clear whistles, were very faithful to nature. Deprecating mention was made of the enormous destruction which had nearly exterminated some species of gull, terns and herons on the Atlantic coast and in Florida, aud a short account given of the methods which are now being employed to preserve the remnant and, if possible, to restore them to something of their former abundance.

The last soirée of the season was held in the Assembly Room of the Y.M.C.A. on March 18th, when officers for the ensuing year were elected. A paper entitled "Notes on the Arboretum at the Central Experimental Farm, Ottawa," was read by Mr. W. T. Macoun which is printed in this number of THE NATURALIST.

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EARLY NESTING IN 1902.

By W. E. SAUNDERS, London, Ont.

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

On March 28th, 1902, I made a short trip in the afternoon to look after the Prairie Horned Lark. On a common in the eastern part of this city I found two pairs. One female was feeding rapidly, so that I judged she was in a hurry to get back and protect her eggs from the drizzling rain which was then falling, and her wet appearance hinted that she had been off the nest a good while. After feeding a while she preened herself and shortly after went behind a tuft of grass and rested there, screened from the wind and rain by the height of the tuft. After flushing her once or twice, I decided that she could not have eggs, and left her. The other female was found as usual by following the male, and she had not been watched more than fifteen minutes before she went on the nest, which was situated on the open common. Going over, I found 3 young, apparently about ⅓ grown, with feathers sprouting on the wings and in good general condition, probably 4 days old. Allowing 11 days for incubation and 3 for laying, the first egg would have been laid on the 11th of March, which is so extraordinarily early that it drew me into a comparison with other birds and other years. These birds often have young flying before May 1st, and I found a nest on April 9th, 1898, with 3 eggs, half incubated, but never earlier. Mr. Morden once took a fresh set of 4 on April 7th, and his only earlier set was of 3 eggs, incubation ¼ on March 27th, 1889; but these were far from being 3 young on March 28th!

I find that the snow on open ground was practically gone this year on March 2nd, which gave the birds 9 days to build and prepare before laying In other years there is usually snow much later than this ; for instance, in 1901, the winter's covering was all melted on March 25th, and in 1900, about April 25th. It is evident from these dates that this Lark is a species of which certain individuals are much influenced by the state of the weather, although a number of other pairs observed this season, were on April 2nd still feeding in couples, and evidently not nesting as yet. On the other hand, the majority of birds seen along the roadsides between March 22nd and 28th were single males whose mates were probably engaged in the task of incubation.

The only other bird we have that regularly breeds very early, is the Great Horned Owl, and unfortunately the local data at hand from which we can make a comparison with the Larks, are exceedingly meagre, consisting of the record of two sets of eggs in 1902 and one in 1901.

Of course one would naturally expect that large birds would be more slowly influenced by abnormal conditions of weather than would small ones, and the data of these 3 sets fully confirm this conclusion. In 1901, when the snow left us on March 25th, and when no Larks' eggs, *probably*, were laid before March 28th or 30th, I took a set of Great Horned Owl, consisting of 2 eggs, almost fresh, on March 19th, six days before the snow had vanished on the open levels ; whereas, this year, a set of two was taken near London on March 25th, of which one was almost fresh and the other had been incubated for perhaps 4 or 6 days. These two eggs were probably laid about March 18th and 22nd, after over two weeks of bright warm weather with the ground free of snow, and four or five days later than the date of those found before the snow had vanished in the previous year. These sets were both taken from open nests, that of 1901 from a nest built by a crow in 1900, and that of 1902 from a nest of undecided origin.

The other set from 1902, also confirms the conclusion that these birds do not regard the weather, but in a different way. It consisted of 3 eggs, and was taken on March 21st, from a hole in a basswood stub 42 feet above the ground. Two of these eggs were addled, but the shell of the other one was pipped and the

chick was almost ready to emerge. As these birds doubtless incubate about 30 days, the one egg must have been laid about February 19th, at which time there was absolutely no sign of approaching spring and the thermometer often fell to the neighbourhood of zero in the night. The bird must therefore have laid these eggs entirely by faith in the hope of better weather to come.

The later breeding birds have also been affected by the long spell of early, fine weather, and the first set of Red-shouldered Hawks eggs for the year was taken on April 5th, five days earlier than the earliest previous record. Another was taken on April 11th. Crows were noticed building on March 28th.

ENTOMOLOGICAL NOTES.

TENT CATERPILLARS (*Clisiceampa disstria*) IN RAT PORTAGE DISTRICT, ONT.—The Rat Portage district suffered severely from the above pests during the latter part of June, when an area of many miles in extent, covering both the mainland and the islands on Lake of the Woods was devastated by immense numbers of these caterpillars. They fed very generally so that all classes of deciduous trees and shrubs suffered, and the trees were literally stripped. During the first week in July the larvæ were full fed, and, helped by the unusual amount of rain, the trees at this writing are putting forth some scanty supply of leaves. No parasites were noticed in the larvæ collected.

THE NEGUNDO LEAF-ROLLER (*Cacœcia semiferana* Walker) IN WINNIPEG, MAN.—The Ash-leaved Maples or Negundos were seriously threatened with this pest early in the season, the trees being covered with rolled leaves. The very wet weather of June, however, seemed to completely exterminate them. The affected leaves shrivelled up hard, seemingly under the influence of warm sunshine following rain, and afterwards no larvæ were seen. Search failed to reveal any parasites or other enemies.

A PLANT-LOUSE ON WILLOW.—From a point west of Portage came reports of considerable damage to a grove of young poplars. No specimens were sent, but the description given seems to indicate the Willow-grove Plant-louse, *Melanoxanthus salicis*, Harr., or a related species.

THE COCK'S-COMB ELM GALL-LOUSE (*Colopha ulmicola*, Titch.) was extremely prevalent on elms throughout the city of Winnipeg this season.

Winnipeg, July 14th, 1902. W. A. BURMAN.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS AT OTTAWA FOR THE YEAR 1900.

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Average height of barometer at 32°, reduced to sea level..	30.003	29.954	29.966	29.963	29.896	29 857	29.851	29.974	30.022	30.122	29.964	30.024	29 966
Highest barometer	30.64	30.60	30.62	30.42	30.34	30.18	30.13	30.21	30.30	30.56	30.59	30.64	30.64
Lowest "	29.39	29.03	29.32	29.61	29.52	29.46	29.36	29.71	29.56	29.65	29.28	29.58	29.03
Monthly and annual range....	1.25	1.57	1.30	0.81	0.82	0.72	0.77	0.50	0.74	0.91	1.31	1.06	1.61
Average temperature of air (F.)	15.17	15.18	18.62	44.41	53.35	66.62	68.95	69.16	60.66	53.75	33.28	17.25	43.03
Difference from average.... .	+4.67	+2.58	-3.58	+3.71	-1.65	+1.42	-0.35	+3.66	+2.86	+8.85	+1.38	-0.05	+1.96
Highest temperature.....	39.0	42.5	43.0	74.8	84.8	85.8	87.8	88.8	89.3	78.8	63.0	38.0	89.3
Lowest "	-10.0	-24.0	-11.0	20.0	27.0	46.0	48.0	49.0	37.0	26.0	9.0	-12 0	-24.0
Monthly and annual range....	49.0	66.5	54.0	54.8	57.8	39.8	39.8	39.8	52.3	52.8	54.0	50.0	113.3
Average maximum temperature	25.7	24 2	28.3	54.9	65.0	77.8	78.0	78.8	69.8	63.8	39.4	24.6	52.5
Average minimum "	4.6	6.1	8.9	34.0	41.6	55.5	59.9	59.6	51.6	43.7	27.2	9.9	33.5
Average daily range.....	21.1	18.1	19.4	20.9	23.4	22.3	18.1	19.2	18.2	20.1	12.2	14.7	19.0
Average pressure of vapour..	0.065	0.067	0.075	0.178	0.307	0.526	0.609	0.617	0.470	0.365	0.155	0.071	0.292
Average humidity of the air...	63	69	67	88	70	77	86	87	91	91	83	74	79
Average temper. of dew point.	9.0	9.8	12.0	31.6	45.7	60.4	64.7	65.0	57.2	50.3	28.7	11.0	37.1
Amount of rain in inches....	0.20	1.20	0.20	0.76	3.00	3.21	5.99	2.72	3.56	1.45	2.40	R	24.69
Difference from average	-0.30	+0.77	-0 84	-0.74	+0.41	+0.29	+2.52	-0.32	+0.87	-1.01	+0.80	-0.70	+1.75
Number of days of rain	2	3	2	6	9	7	9	10	9	9	5	0	71
Amount of snow in inches....	25.4	14.0	35.0	.....	.....	.....	.....	.....	.....	.....	11.0	16.0	101.4
Difference from average.....	+0.5	-7.7	+18.2	-4.7	.... .	.....	.....	.....	.....	-0.9	+'1.6	-5.8	+1.2
Number of days of snow.....	9	7	6	... .	....	.....	.....	.....	.....	.... .	7	5	34
Percentage of sky clouded....	61	54	46	35	46	37	57	46	54	48	67	56	51
Number of days completely clouded	9	8	8	3	2	3	4	1	4	4	11	7	64

Average force of wind.....	II	III	III	III	II	II	II	I	I	II	III	III	II
Number of auroras.....	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of thunder storms....	0	0	0	0	0	0	2	1	4	4	0	0	0	11
Number of fogs.....	3	0	0	0	0	0	0	0	0	1	3	1	0	8
Number of days without rain or snow.....	19	17	23	24	21	20	13	17	17	19	14	18	222	

Days of rain and snow only reckoned when at least 0.01 inch fell.

Frequency of the different winds, observations at 8 a.m. and 8 p.m. daily.

1900	N	N E	E	S E	S	S W	W	N W	Calm
January...	7	9	4	2	10	6	15	7	2
February..	4	21	2	1	1	6	18	3	0
March ...	3	4	5	1	2	18	11	18	0
April.....	6	2	8	5	10	9	10	10	0
May	8	11	8	2	7	9	4	13	0
June.....	8	4	5	3	6	8	21	3	2
July	2	2	4	1	9	12	20	8	4
August...	1	8	5	4	4	8	13	6	13
September	2	12	7	3	4	11	8	9	4
October ..	2	15	12	2	4	8	9	7	3
November	8	8	9	9	3	9	11	3	0
December.	6	3	12	2	2	10	16	9	2
Year..	57	99	81	35	62	114	156	96	30

1900

Coldest day of year.....	Feb. 2....	Mean temperature.	—14.0
Heaviest snow of year..	March 1-2	Depth	29 in.
Last measurable snow..	" 16.	"	1 in.
Last frost	May 11....		
First thunder	June 8....		
Heaviest rainfall of year.	July 17....	Amount.....	2.26 in.
Warmest day.....	August 26.	Mean temperature.	79.4
Last thunder.....	Sept. 27..		
First frost.....	Oct. 17 ..		
First snow.....	Nov. 11...		
Stormiest day of year..	" 15. .	Approx. velocity.	55 miles.
First record below zero.	Dec. 10...	....	—12.0

ABSTRACT OF METEOROLOGICAL OBSERVATIONS AT OTTAWA FOR THE YEAR 1901.

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Average height of barometer at 32°, reduced to sea level..	29.972	29.871	29.864	30 035	29.841	29.996	30.037	30.041	30.074	30.152	30.065	30.099	30.004
Highest barometer	30.90	30.43	30.46	30.46	30.21	30.20	30.27	30.33	30.66	30.75	30.50	30.63	30.90
Lowest "	29.10	29.47	29.33	29.62	29.44	29.62	29.09	29.81	29.55	29.58	29.28	29.47	29.09
Monthly and annual range ...	1.80	0.96	1.13	0.84	0.77	0.58	1.18	0.52	1.11	1.17	1.22	1.16	1.81
Average temperature of air (F.)	11.72	11.35	24.33	46.44	57.17	67.52	71.82	68.29	60.73	47.79	28.07	18.49	42.81
Difference from average	+ 1.22	- 1.25	+ 2.13	+ 5 74	+ 2.17	+ 2.32	+ 2.52	+ 2.79	+ 2.93	+ 2 89	- 3.83	+ 1.19	+ 1.73
Highest temperature	40.0	34.0	40.0	81.0	81.0	96.8	98.3	96.8	95.8	71.0	58.0	52.0	98.3
Lowest "	- 24.0	- 10 0	- 8.0	27.0	39.0	44.0	50.0	44,0	31.0	26.5	- 2.0	- 12.0	- 24.0
Monthly and annual range ...	64.0	44.0	48.0	54.0	42.0	52.8	48.3	52.8	64.8	44.5	60.0	64.0	122.3
Average maximum temperature	21.6	20.8	32.9	55.8	67.2	78.4	82.3	78.3	71.1	55.9	33.8	25.9	52.0
Average minimum "	1.8	1.9	15.8	37.1	47.1	56.6	61.4	58,3	50.4	39.6	22.3	11.1	33.6
Average daily range	19.8	18.9	17.1	18.7	20.1	21.8	20.9	20.0	20.7	16.3	11.5	14.8	18.4
Average pressure of vapour. .	"	"	0.088	0.201	0.355	0.601	0.660	0.581	0.464	0.296	0.142	0.098	"
Average humidity of the air ..	"	"	61	59	74	85	83	86	90	91	92	92	"
Average temper. of dew point.	"	"	15.5	34.6	49.5	64.3	66.9	63.2	56.9	44.7	26.2	18.0	"
Amount of rain in inches.....	0.20	0.00	0.90	2.99	3.91	3.76	3.18	3.23	1.91	1.45	0.40	2.13	24.06
Difference from average.....	- 0.30	- 0.43	- 0.14	+ 1.49	+ 1.32	+ 0.84	- 0.29	+ 0.19	- 0.78	- 1.01	- 1.20	+ 1.43	
Number of days of rain.....	1	0	3	15	15	9	7	11	9	12	5	6	93
Amount of snow in inches. ...	31.1	8.0	13.0	*	.....	.....	.... .	.....	.....	.....	18.5	21.9	92.5
Difference from average.....	+ 6.2	- 13.7	- 3.8	- 4.7	.....	.... .	.....	.....	.....	- 0.9	+ 9 1	+ 0.1	- 7.7
Number of days of snow.....	8	4	8	0	. ....	.....	.....	.....	.....	.....	7	9	36
Percentage of sky clouded....	61	44	69	70	56	47	48	52	48	53	70	77	58
Number of days completely clouded.....	10	5	13	16	9	2	1	3	3	1	12	12	87

Average force of wind.	III	III	III	II	II	II	I	I	II	I	I	I	II
Number of auroras..	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of thunder storms....	0	0	0	0	0	3	2	1	0	0	0	0	6
Number of fogs.....	0	0	0	0	0	0	0	0	5	1	0	1	7
Number of days without rain or snow.....	17	22	18	14	15	15	18	18	19	14	12	14	196

Days of rain and snow only reckoned when at least 0.01 inch fell.

Frequency of the different winds, observations at 8 a m. and 8 p.m. daily.

1901	N	N E	E	S E	S	S W	W	N W	Calm
January...	8	4	15	2	3	9	18	3	0
February..	3	5	2	1	0	6	33	6	0
March....	4	7	14	2	6	10	11	8	0
April.....	13	15	20	3	6	0	0	3	0
May.. ...	3	9	15	4	7	5	11	7	1
June..	1	9	5	7	5	13	15	4	1
July.....	4	7	7	7	2	17	9	8	1
August...	1	15	2	12	1	9	6	10	6
September	0	9	2	7	1	15	1	21	4
October .	1	2	2	13	1	9	5	24	5
November	3	7	9	3	0	2	8	28	0
December.	1	9	14	8	1	4	10	14	1
Year..	42	98	107	69	33	99	127	136	19

1901

Heaviest snow of year..	Jan. 12...	Depth..... 9 in.
Stormiest day of year ..	" 14...	Approx. velocity. 30 miles.
Coldest day of year	" 19...	Mean temperature —17.5
Last measurable snow..	March 22.	Depth.... ..... 1 in.
Last frost	April 20..	
First thunder	June 1st..	
Warmest day.....	July 2nd..	Mean temperature 83.9
Heaviest day's rain....	" 30....	Amount... ..... 1.54 in.
Last thunder	August 22.	
First frost..	Sept. 25..	
First snow	Oct. 17...	
First record below zero.	Nov. 29.	. —2.0

REPORT OF THE ENTOMOLOGICAL BRANCH, 1901.

The leaders of the Entomological Branch are glad to be able to report that a satisfactory amount of work has been done by the members during the last two years. Accidentally, no report was submitted to the Club last year, although a considerable amount of work was done. A gratifying interest in the study of insects has been shown by some of the younger members of the Club, as as well as by the students of the Public Schools, and particularly by those attending the Normal School.

Mr. Harrington continues his studies on the distribution of the various orders of our local insects, and is preparing local lists for publication. His last contribution to the Fauna Ottawaensis "Hymenoptera, Superfamily 2, Sphegoidea," appeared in the OTTAWA NATURALIST for January last.

Mr. C. H. Young continues active work, particularly among the Lepidoptera. He has added many interesting species to the Ottawa list. One of these a very beautiful Agrotid has been named *Semiophora Youngii* in his honour by Prof. J. B. Smith, our highly esteemed Corresponding Member

Mr. Young and Mr. Arthur Gibson have added largely to their collections of inflated larvæ during the present season.

Dr. Fletcher and Mr. Gibson have been vigorously prosecuting the interesting work of rearing insects from the egg through all their stages, and much valuable original work has been done not only upon our local species of Lepidoptera but upon many others, the eggs of which have been sent to them from a distance by mail. The value of learning the preparatory stages of insects cannot be overestimated, and forms one of the most necessary factors in devising remedies for injurious species.

A most important addition to the works upon Entomology, which has recently appeared, is Dr. Howard's "Insect Book," a work of the same nature as Dr. Holland's "Butterfly Book," but of much wider scope. With Dr. Howard's and Dr. Holland's books it is now possible for beginners to take up the delightful study of insects and learn something at any rate about almost any insect they may come across ; for all the orders are now treated of with the exception of the Moths and Beetles, upon which there is

already a great deal of published matter available to students. Until the present time this was almost impossible, and a great many boys and girls were deterred from studying insects by the lack of available literature. Among helps of a general nature available to the local members of our Club, mention must be made of the collection of insects now being built up at the Experimental Farm. The fine collection in the Geological Survey Museum consists mostly of Lepidoptera, although there are a few specimens in other orders. The collection at the Experimental Farm is a general one, and great pains have been taken to have the preliminary stages represented. Dr. Fletcher and his assistants are always pleased to welcome visitors and exhibit the collections to any who wish to see them. They are also particularly anxious to help any beginners who may apply to them. This is likewise the case, of course, with all the Leaders who have private collections and are always willing to show them, or to help others in identifying their specimens.

Many rare or interesting species have been reared or collected during the past year. Several of our members living at points distant from Ottawa have helped materially in this work. Rare species of Hymenoptera and Coleoptera have been sent from Vancouver Island, by the Rev. G. W. Taylor, and from Kaslo, in the Rocky Mountains, by Mr. J. W. Cockle. Similar help has been received from Mr. W. McIntosh, in St. John, N B. Eggs of Arctians, which have been reared to the perfect moths, were received from Mr. A. Kwiat, of Chicago, and some of the stem-boring larvæ of the genus *Hydrœcia*, were sent from Rye, N.Y., by Mr. Henry Bird. Mention is made of this merely to draw attention to the fact that every member may do good work, whether interested in Entomology or not, by sending living specimens of insects by mail to the Leaders at Ottawa. Living insects, if packed in close tin boxes, without "holes for them to breathe through," with some of the food plant, may be sent by mail from all parts of Canada within a reasonable distance of railways, and will travel in perfect safety.

The two most noticeable injurious insects of the year in this district were: (1) The Small White Cabbage Butterfly, *Pieris rapæ*, which did much harm in cabbage, turnip and rape fields

This outbreak, however, was terminated suddenly late in August and in September by a bacterial disease of a very virulent nature. (2) The Birch-tree Skeletonizer (*Bucculatrix Canadensisella*, Chambers). This is a minute moth, the caterpillars of which sometimes occur in vast numbers and attack the foliage of all kinds of Birches. Last summer there was an excessive outbreak of this insect, and Birches throughout the Province of Ontario were much disfigured by having their leaves skeletonized by the tiny caterpillars. The insect is of considerable interest to the Entomologist, from the peculiar habit of the caterpillars, unusual among larvæ, of spinning on the leaves small circular flat shelters called pseudo-cocoons, inside of which they moult their skins. The true cocoons are beautiful little brown objects of an entirely different appearance, resembling a tiny clinker-built boat turned upside down. When full-grown the caterpillars let themselves down to the ground and, after wandering to some distance in search of a suitable place to pass the winter, spin these elegant cocoons. The work of construction is a most interesting one to watch; three-fourths of the cocoon is spun from one end, the caterpillar then crawls inside and closes up the other end. Sometimes many of these cocoons may be found beneath a convenient slab of rock, at other times they are spun on fallen leaves, or on stems of plants close to the ground.

Among the most interesting insects reared during the summer was a family of the minute hymenopterous parasite *Bæus niger*, of which Mr. Harrington reared four males and 20 females from a single cluster of spiders' eggs. This is one of the smallest insects we have, and the females are wingless, while the exceedingly rare males are winged.

Some of our members have made collections of insects in various parts of the Dominion. Mr. J. D. Evans has done good work at Trenton, Ont. Mr. J. M. Macoun, Naturalist of the International Boundary Commission, brought back some choice specimens from the Cheam Mountains, in British Columbia, a locality also visited by Dr. Fletcher with good results.

Of equal value with the work done in working out the life histories of rare insects is a great increase to our knowledge of the preparatory stages of many of our common species, which has been

made by some members of the Club. This is a field of useful work where, with little trouble, if care be taken in observing and recording accurately, many, even with small knowledge and experience, may do good useful work. What is wanted more in every branch of natural history, is a few earnest students who will content themselves with doing a little, but doing that little as well as possible.

Pityophthorus coniperda, Schwarz, a scolytid, or small bark-boring beetle, mentioned in previous reports as infesting the cones of red pines at Aylmer, was observed on May 26th last, by Mr. Harrington to be seriously infesting the cones of white pine in a grove near the top of the long hill between Ironsides and Chelsea, Que.

Anthophylax attenuatus, Hald. A perfect specimen of this rare species was taken at Chelsea, Que., by Mr. Young, on June 1st. At the same time several specimens of the more beautiful *A. malachiticus*, Hald., were secured.

Homohadena badistriga, Grote. For several years the caterpillar of this moth has been troublesome on the Experimental Farm upon honeysuckles. When very small they attack the clusters of flower buds and do much harm.

Sphinx canadensis, Bdv. Two specimens of this rare moth were taken at electric light by Mr. Gibson in June.

Achatodes zeæ, Harris. Several specimens of this species were reared from larvæ found by Mr. J. W. Hart at Kingston, Ont. They were boring in the young shoots of Elder (*Sambucus Canadensis*) causing them to wither and die. About the same time several specimens were collected at Ottawa, by Dr. Fletcher, in shoots of *Sambucus pubens*.

Anarta cordigera, Thun. A fine specimen of this attractive little moth was taken on the Mer Bleue, on May 30th, by Mr. C. H. Young. It is rare at Ottawa, one specimen only having been previously taken. This was in the same locality, on May 17th, 1898. In Europe, the caterpillar which "is reddish ochreous, with a lighter lateral line and several larger and smaller dots on each segment," is said to feed on *Vaccinium*. It should be looked for by our members on Blueberry bushes in summer and autumn.

Heterocampa marthesia, Cram. A fine specimen of this very beautiful moth was reared from a larva collected in Clarke's bush, in September, 1900.

Heterocampa biundata, Walker. A remarkably fine specimen was taken at light in June.

Some interesting butterflies were taken during the season :—

Chionobas jutta, Hbn. At Mer Bleue on 31st May, and *Lycæna comyntas*, Gdt. (the second Ottawa record), at Aylmer, Que.; both by Mr. Gibson.

Lycæna lucia, Kirby. Was seen by Dr. Fletcher to lay 3 eggs on the young forming berries of *Vaccinium Canadense*, a new food plant, and the larvæ were fed to maturity on the flowers and green berries of *Cornus*.

Debis portlandia, Fab. Some specimens of this interesting satyrid were collected near Beechwood Cemetery, in 1900 and 1901, by Mr. A E. Richard. This species is very uncommon at Ottawa.

Pieris protodice, Bd.-Lec. Never before taken at Ottawa, was collected at the Experimental Farm on September 21st. On the same day a few specimens of *Colias eurytheme*, Bdv., were also collected.

JAMES FLETCHER.
W. H. HARRINGTON.
ARTHUR GIBSON.
C. H. YOUNG.

REVIEW.

HUMAN FOOD INVESTIGATIONS. By Harry Snyder. (Univ. of Minnesota, Bull. No. 74).

The value of the foods used in these experiments was determined by feeding to men weighed quantities of food of a known composition and then carefully determining the amount of food which had been digested and made available for the body. In the part of the work published are discussed : the dairy products (butter, cheese and milk), oleomargarine, the comparative nutritive value of graham, entire wheat, and standard patent roller-process flour milled from the same lot of wheat, the digestibility of toast and bread; and also oatmeal and beans, as types of cereal and leguminous foods. The effects of different methods of cooking have also been considered, as well as the influence of combinations of foods upon digestibility.

One of the interesting results of this work may be mentioned. The addition of milk to a ration, with bread, butter, beans, eggs and potatoes, rendered a larger percentage of these foods digestible. Thus, milk is valuable, not only for the nutrients which it contains, but also because the soluble ferments which are present make the foods with which it is combined more completely digestible.

NOTES ON BIRDS IN COLORADO, 1902.

By Rev. W. A. Burman, Denver, Colorado.

While staying in Denver, during the past winter, I have been noticing some things about bird life that have interested me a good deal. My home being in Winnipeg, I have naturally noticed the effect of the different climatic conditions of this comparatively southern State upon the birds. The spring having now come here, I have also been on the look out for the migration of birds common to this State and North-west Canada.

First, I may mention the surprise with which I found ducks and various other birds here all through the winter. I at least had always imagined they went further south to the lower Mississippi and Gulf States. But in January I saw mallards, pintails, teal and red-heads, whi h were got on the lakes among the mountains just west of this. They were in good condition, indicating good feeding. What food they find is not clear to me, for though this winter was mild up to January 25th, we have had very cold spells since, and the cold in the mountain must have been pretty severe, as it froze up the lakes. In ordinary winter, during the most severe weather they are said to be found in lakes out on the plains. The northward flight seemed to me to begin about two weeks ago (say March 15th) ; it is now in full swing, and the birds which are shot are in much better condition than those we usually get in Manitoba in the spring. Is it lack of food or hard work that accounts for their leanness?

The first robins appeared about the same date, at first, stragglers, the advance guard. A week later the robins were in bands of ten or twelve, slipping about the lawns feeding on berries of Virginia Creeper, also on seeds of Russian thistle and other seeds growing on vacant lots. It is very amusing to watch their bustle and unrest, quite after the fashion of other biped tourists so common here. Even their feeding seems to be hurried, lunch counter style; it only needs the toothpick to complete the likeness. The only exception to this hurry was during stormy weather, as last week, when we had high winds with snow. Then, wisely enough, the robins took their leisure and really "did" the city. During the past few days—since April 1st—they have been fewer, evidently the crest of the wave has passed.

Perhaps the most interesting thing to me here, has been to note that our old friend, the English sparrow, has at length met his match—a foeman worthy of his steel. His aggression is not totally checked — I opine it never will be, — but his undisputed sovereignty of the city is no longer a matter of course. The sparrow vanguard reached this point about ten years ago, beating their way on some box cars. After the western fashion they soon tried to run the town, but found, no doubt to their surprise and mortification, that others were in that line of business. War was declared between the rival factions, which is still going on — guerilla fashion — the sparrows at any rate doing no more than to win the right to live in town to a limited extent. Numbers, in consternation at the unheard of prowess of their foes, have given it up as a bad job and have gone to live in the rural districts, until the whirligig of time shall enable them once more to be "monarchs of all they survey" amid the busy haunts of men.

The brave defenders of their native chimney tops and eave-troughs are known here as "House Finches." (Probably *Carpodacus mexicanus frontalis.*— Ed.) They are a trifle smaller than sparrows and of more slender build, the body generally dark brown, the males with dark brick red-breasts and crowns. Their flight is peculiarly soft and noiseless. Until recently, when mating began, they were to be seen in flocks of from twenty to fifty — feeding often upon Russian thistle and other seeds, sometimes finding food the nature of which I could not discover, under the trees. I have a suspicion, however, that they were perhaps taking out the seeds from the samaras of the ash and box elder, *Negundo aceroides*, as these lay about in profusion. It is very gratifying to find these little people able to defy the tyrannical sparrows, the more so that their song is very sweet,—seeming to resemble more than anything else short selections from the song of the house-wren, — sung fortissimo, but with wonderful expression and pathos. As I write, the air is quite musical with their love-songs, in very pleasing contrast with the querulous harsh chirp of our friends the sparrows. It will be interesting to watch the final issue of the struggle now going on. It will probably be an armed peace — after the manner of other bipeds similarly placed.

WHAT THE SWALLOWS DID.

By W. H. MOORE, SCOTCH LAKE, N.B.

During the summer of 1901 there were two pairs of swallows nested at our barn—a pair of Cliff Swallows outside and a pair of Barn Swallows inside. The Cliff Swallows were late in coming and were probably driven from some other barn by having their nest destroyed. They repaired the remains of a nest built the summer before, but left the entrance or door much larger than is usual for that species, it being fully four inches by one and one half, the ordinary way being to leave the door about 1½ inches in diameter. At the time, we wondered why they did not finish building.

The eggs were duly laid, sat upon for about twelve days and hatched. The weather during this time had been warm, and some days were extremely so. The young were well supplied with food ; and, not until they were able to meet the old birds at the door when they came with food, was the door closed to the usual size.

Then the question to us was, Why did they not make the doorway of the usual size, when the nest was first built ? Why did they change it after the young were nearly fledged ? After some consideration, we concluded, first, that the nest was cooler and better ventilated by having the large doorway, and, secondly, that less work was required to build it thus ; we accordingly congratulated ourselves on having such an intelligent pair of swallows

When we had solved, this question to our own satisfaction, they began to build another nest which was left unfinished. Now we thought our answer to the first question was surely wrong. It could not be to save work that the doorway was left large, for here they were making another nest.

The days were still very warm, and we found that the old birds, when resting from feeding the young, used this other nest to sit on in the shade of the eave of the barn instead of sitting on the roof as other people's Swallows are wont to do, or else are crowded in the nest with the young.

About this time we were confronted with another question. The parent birds partly walled up the entrance to the nest. Why did they do so only when the young were nearly fledged? So far, the young, as they grew stronger, would sit with heads to the door, waiting for food. It must have been much nicer for them than if they had been only a small hole for a doorway. But the parental love of the old birds ruled all the family affairs, and now the doorway was sealed up to a small passage such as other nests have. Then the young, when crowding to the front, could not fall out, as there was only room for one to get food at once, and an old bird was there to keep that one back.

About a week after, the young were able to fly; they were removed to a locality along a river where there was an abundance of insects. It was at this latter place that the writer had the pleasure of watching them go to roost. There was a flock of about three hundred birds composed of Cliff, Barn and Bank Swallows. After sundown on a damp day they were seen to settle in some tall coarse grass; then, as if frightened, they would all rise, wheel about in the air and be joined by more of their kind. This performance was several times rehearsed, and, while flying about, they would occasionally shake themselves to throw the collected water from their backs. This they could do while flying as well as perching birds could do if standing on a limb or other firm footing. Several were seen to thus shake themselves, and on two or three occasions were within twenty feet of the observer. At last, when nearly dark, all settled into the coarse tall grass again and were at rest.

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NOTES ON THE ARBORETUM AND BOTANIC GARDEN, CENTRAL EXPERIMENTAL FARM, OTTAWA, CAN.

By W. T. MACOUN, Curator.

Although several of the other important British colonies had been setting us a good example for many years, no successful attempt had been made to establish a National Arboretum and Botanic Garden in Canada previous to 1886. A good opportunity occurred, however, when the Dominion Experimental Farms were organized ; and, when the Central Experimental Farm was purchased in 1886, sixty-five acres were selected for an Arboretum and Botanic Garden on the east side of the Farm. The site chosen was a good one, as most of the land is high and a fine view is obtained of the city of Ottawa on the north and east, while to the south there is a pleasing view across country with glimpses of the Rideau River in the distance. The Arboretum is bounded on the south side by the Rideau canal, which at this point has marshy banks, that take away much of the sameness which the canal would otherwise have and also afford a splendid opportunity for testing aquatics, though little has yet been done in this direction.

The Arboretum and Botanic Garden has developed so rapidly that, although the first planting was done as recently as the autumn of 1889, a collection of trees, shrubs, and herbaceous plants has been brought together since that time, which, as far as the number of species and varieties is concerned, will compare very favourably with some of the oldest established Arboreta and Botanic Gardens in the North Temperate Zone. The original plan was to arrange the trees, shrubs and herbaceous plants in their proper botanical order. This has in a measure been adopted : but the number of species and varieties which it was found could be obtained, has made it impossible to keep all plants of one genus in

a single group, and in some cases even three separate groups have had to be made. Furthermore, in many cases the soil was not suitable where a certain genus would come if kept in the regular sequence, and it was thought better to plant the trees which would succeed in wet soil in that kind and reserve the drier parts for those which would not; in like manner, to use the heavy clay and sandy loam soils for those trees and shrubs which would be most likely to succeed in them. This arrangement, however, has not always been possible. Up to the present time little has been done with a view to landscape effects in the Arboretum. The place is beautifully situated, and great improvements could be made by the judicious planting of masses of shrubbery and clumps of trees for this purpose. There is, however, no special grant for the maintenance of the Arboretum and Botanic Garden, what money is spent being taken from the Experimental Farm vote. It has, therefore, been thought that the best use that could be made of the money available, was to make the collection as large as possible, keep the place in order, and leave the ornamental planting until later.

The trees and shrubs are, in most cases, planted far enough apart to permit of their developing into full-sized specimens without being crowded by each other.

One of the prominent features of the Botanic Garden is the herbaceous perennial border, which is situated on the east to south-east side of an Arbor-vitæ hedge, which serves as a great protection from the wind, helps to hold the snow in winter and is a fine dark background to the flowers. This border is 12 feet wide, and the plants are set in rows three by three feet apart. This distance has made it possible to keep the different kinds separated and renders cultivation easy. The Arboretum and Botanic Garden was in charge of Dr. James Fletcher, Botanist and Entomologist to the Dominion Experimental Farms, from the time it was laid out until the spring of 1895, when the work was undertaken by the writer, who, in the spring of 1898, was appointed Curator. From the first, Dr. Saunders, Director of the Dominion Experimental Farms, has taken a keen interest in the work; the planning of the grounds and the procuring of plants and arrangement of the material has been done in conjunction with him.

Twelve years ago, when the first planting was made, comparatively little was known of the hardiness of a large number of trees, shrubs and herbaceous plants, as the number of species and varieties found in gardens was limited. In 1889, 200 species and varieties of trees and shrubs were set out, and by the autumn of 1894 about 600 were being tested; up to the present time 3,728 species and varieties of trees and shrubs have been tested, and about 4,500 specimens were living in the autumn of 1901, representing 2,871 species and 185 genera. Of herbaceous perennials 1,586 species and varieties were living in the autumn of 1901, making, in all, a total of 4,457. This large collection has been obtained from many sources. From donations of seeds from Botanic Gardens throughout the world, a large number of species and varieties have been grown, the Royal Gardens at Kew, supplying many of them. The catalogues of nurserymen in America, Europe, and Asia, have been searched to increase the collection, until now it is difficult to obtain additional species of many genera. As far as possible, two specimens of each species of tree and shrub have been planted; but there are so many cultivated varieties that in many cases only one specimen of each of them has been utilized. At first, three specimens of each kind of herbaceous perennial were planted, but for the same reason the cultivated varieties of these are usually limited to one, unless it is especially attractive.

Nearly all the Arboretum is now seeded down to lawn grass and this is kept cut with a pony lawn mower. These large lawns add very much to the attractiveness of the place. In order that the trees and shrubs will not suffer by growing in sod, circles are kept cut around them and the surface soil is loosened with the hoe. Most of the specimens are neatly labelled with a zinc label fastened to a stiff wire which is pushed into the ground near the specimen, and as fast as possible duplicate labels are being written and attached to them as the others get cut off or broken off from time to time, rendering identification somewhat difficult. Each label bears a number which corresponds to a number and name in the record book.

Every year the trees and shrubs are examined and notes are taken on each individual specimen. The principal notes recorded relate to the hardiness and growth of the plants. The dates of

blooming are also recorded, as far as possible. The work entailed in recording notes on 4457 species and varieties of plants in the Botanic Garden is very considerable. The data accumulated every year are becoming more and more valuable and reliable.

In 1899 a catalogue of the trees and shrubs which had been tested in the Arboretum was published conjointly by Dr. Saunders and the writer, which has been received very favourably by those engaged in botanical work. In this catalogue the scientific names of the trees and shrubs are arranged alphabetically, and, when a species or variety has a common name, this is also given. The countries are named, of which the trees and shrubs are native, also the year in which they were planted. In compiling this work, the nomenclature and classification of the "Index Kewensis" and the "Kew Guide" were adopted. The name of the species or variety is printed in bold faced type, followed by the author's name in small capitals. The term "Hort." indicates a garden or gardener's variety. Synonyms of genera and species are printed in italics. The common names given are those found in the leading botanical works of modern authors.

While a large number of synonyms have been recorded, it is probable that there are still included in this catalogue some which are listed as species or varieties which are really synonyms. In recording the synonyms, the names given are only those under which the species or varieties have been received at the Experimental Farm and do not include all the known synonyms in each case. When the catalogue was published in 1899, the total number of species and varieties which had been under test was 3071. Of these 1465 had been found hardy, 330 half hardy, 229 tender, 307 were winter-killed, and 740 had not been tested long enough to admit of an opinion being given as to their hardiness. The different degrees of hardiness were fixed as follows :—Hardy, when the tree or shrub had passed through one or more winters uninjured or with very slight injury to the tips of the branches. Half hardy, when the new wood was killed back one-fourth or one-half. Tender, when the wood was killed to the snow line or to the ground.

In addition to this catalogue the writer published in his report for 1897 a descriptive list of what was considered the best one

hundred hardy ornamental trees and shrubs and the best one hundred herbaceous perennials, which has proven very useful to those who desire to improve their grounds. In the writer's report for 1898 a short additional list of herbaceous perennials is given. In the report for 1899 are another short descriptive list of perennials and a descriptive list of twenty-five of the best low-growing flowering shrubs. The report for 1900 contains descriptive lists of the best woody and annual climbers, and that for 1901, a descriptive list of the different species and best varieties of lilacs.

Some further notes regarding the trees and shrubs may be of interest.

As examples of how largely some genera are represented, I may state that there were growing in the autumn of 1901 in the Arboretum :—

200 species and varieties of *Pyrus*,

134 of *Prunus*,	93 *Lonicera*,	89 *Ulmus*,
110 *Acer*,	155 *Syringa*,	121 *Salix*,
75 *Berberis*,	100 *Quercus*,	66 *Picea*,
80 *Crataegus*,	92 *Fraxinus*,	64 *Thuya*.

Canadian trees and shrubs have been thoroughly tested, and are well represented. All of the trees mentioned in Prof. John Macoun's paper on "The Forests of Canada and their Distribution" having been tried, with the exceptions of a few western species which have not been given a thorough trial as yet. Among these are *Salix scouleriana*, Baratt ; *Pinus flexilis*, James ; *Pinus albicaulis*, Eng. ; *Pinus monticola*, Dougl ; *Tsuga pattoniana*, Eng. ; *Tsuga mertensiana*, Carr. ; *Abies grandis*, Lindl. ; *Abies amabilis*, Forbes.

Of Canadian trees which have been thoroughly tested, the following have not proven hardy :

Asimina triloba, Duval (Papaw). This has killed out root and branch.

Liriodendron tulipifera, Linn. (Tulip-tree). The tulip-tree kills to near the ground every winter. A variety of this species, however, *integrifolia*, imported from Berlin, Germany, in 1897 has proven hardy for the past three years.

Cercis canadensis, Linn. (Judas-tree or American Red-bud). The tree now living in the Arboretum was planted in the autumn

of 1896. That winter it killed to the ground and only made weak growth in 1897 ; the next winter it killed back ⅔, the third ½ ; the fourth winter it was almost hardy to the tips, and it was also the same last winter. This is a good example of the acclimatization of trees.

Cornus florida, Linn. (Flowering Dogwood). One specimen of this tree was practically hardy from 1897 until last winter, when it killed to near the ground. Other specimens were not as hardy.

Nyssa sylvatica, Marsh (Sour Gum). The tree now living was planted in the spring of 1897 ; the first winter it killed back ½, the next ½, the third it was hardy nearly to the tips, and again the same last winter.

Sassafras officinale, Nees. (Sassafras). This has killed out root and branch thus far, though it has not been as thoroughly tested as some of the others.

The following other trees peculiar to south-western Ontario, appear to be hardier than the above, and some individual trees are perfectly hardy.

Platanus occidentalis, Linn (Buttonwood).
Castanea sativa, Mill, var. *Americana* (Chestnut).
Fraxinus quadrangulata, Michx. (Blue Ash).
Gleditschia triacanthos, Linn. (Honey Locust).

Some of the rest, such as *Gymnocladus canadensis*, *Crataegus Crus galli*, *Pyrus coronaria*, and *Juglans nigra*, are quite hardy.

A few of the coast trees of British Columbia kill out root and branch, among such being *Acer macrophyllum*, *Arbutus Menziesii*, *Cornus Nuttallii* and *Quercus garrayana*.

It is interesting to note that, out of the list of 121 species of native trees published by Prof. J. Macoun, about 100 have proven hardy or half hardy here, and the writer has no doubt that, when all the species are tested, there will not be more than 10 which can not be grown at Ottawa.

The question of the acclimatization of trees, shrubs and plants is a very important one, and one in which there is a good field for work at the Central Experimental Farm. I have mentioned a few instances where native trees have gradually become hardier after being planted several years. It might have been further

stated that other specimens of these had been killed out root and branch. These furnish excellent examples of the individuality of trees. We have noticed over and over again in nursery rows, that some trees of the same species are hardier and more vigorous than others. It has also been noticed that a tree which has a wide range from north to south, will not be as hardy when imported from the south as from the north. An excellent example is the Red Maple, *Acer rubrum*. This tree imported from some parts of the United States has killed back and made scrubby trees, while from further north it has done well.

There is no doubt, in the writer's opinion, that many trees which we have great difficulty in getting to fruit here, will eventually be much hardier when raised from seed ripened at Ottawa.

Much could also be said and written of the herbaceous perennials which make such an attractive and useful feature of the Botanic Garden from early spring until late autumn. The collection is growing rapidly and the information regarding the different species and varieties when grown in this climate is getting more valuable every year.

The Arboretum and Botanic Garden is a public institution and should be made use of by the public. Every assistance will be fully given to those who desire to study the plants growing there, and it is hoped that this paper will induce some of the members of the Ottawa Field Naturalists' Club to make a closer study of trees, shrubs and herbaceous plants in cultivation than they have done in the past.

Contributions of plants and seeds, especially of rare Canadian species, will be gratefully received, as the desire is to increase the collection as rapidly as possible and to have the native flora well represented.

NOTES ON SOME CANADIAN BIRDS.

By WM. H. MOORE, Scotch Lake, N.B.

TURKEY VULTURE (*Cathartes aura*).

Accidental. One was taken in Victoria Co., and is now in the Crown Land Department at Fredericton. One other was observed the same spring, but, no dates being given, it may have been the same one.

MARSH HARRIER (*Circus hudsonius*).

Of common occurrence about large tracts of marsh where the birds breed. They occasionally take poultry for food.

SHARP-SHINNED HAWK (*Accipiter velox*).

A rather uncommon summer resident. The birds arrive from the south about the last of April and stay until September. They are a great terror to young Blue Jays upon which they feed. Have never known them to molest poultry.

AMERICAN GOSHAWK (*Accipiter atricapillus*).

A permanent resident. The boldest dashing brigand of our land birds, darting swiftly and straight on his prey ; be it even a hen near the farmer, he has been known to rush in and try to carry it away, and instances are known where the birds have pursued their prey into barns and been themselves caught. A day or two ago I had an experience with one of this species. Having heard an unknown avian voice and taking a gun, I was not long in locating the Goshawk, for such it proved to be. His call was a series of fierce kacks repeated about ten times at intervals of from two to thirty minutes. He would take short flights after Arctic Woodpeckers, but was unable to obtain one ; then he would alight on a high tree and kack forth his rage. I would call in imitation of the Barred Owl, to which he paid some attention and twice came within range but was hidden by thick limbs. Then he flew to an open knoll of hard wood, and seated on a horizontal beech limb he sauced me in hawk language, while I returned it in many fierce and modulated words of Owl dialect. Being unable

to approach near him in the open, the attempt at procuring him was postponed. A nest of some hawk (supposed to be this species) was found in March, containing eggs, but the young are first found flying in June.

RED-TAILED HAWK (*Buteo borealis*).

Only an occasional one is now seen here. The birds arrive from the south in April and stay until November. Set of 3 eggs, incubation begun May 23.

RED-SHOULDERED HAWK (*Buteo lineatus*).

Only one has been secured by the writer and only one more has been identified. One was found May 24th in a muskrat trap on the shore of Scotch Lake ; another was near it. The trapped bird is mounted in Crown Land Department office at Fredericton.

BROAD-WINGED HAWK (*Buteo latissimus*).

Our most common Hawk, generally distributed during the breeding season. Coming north in the middle of April. The nest is nearly always built on a hardwood ridge near a brook ; it is placed about 30 feet up, and 3 eggs are laid. One set taken, nearly incubated, May 24. This hawk sometimes takes poultry.

AMERICAN ROUGH-LEGGED HAWK (*Archibuteo lagopus sancti-johannis*).

Have only known of one specimen here, taken in October, 1881.

GOLDEN EAGLE (*Aquila chrysaetos*).

One is possessed by a man near Fredericton taken in that neighbourhood. Very rare.

BALD EAGLE (*Haliœetus leucocephalus*).

This species visits Scotch Lake every summer, and is quite common in the vicinity of Grand Lake. No account of any breeding.

PIGEON HAWK (*Falco columbarius*).

Occasionally seen ; no account of breeding.

SPARROW HAWK (*Falco sparverius*).

Breeds sparingly about islands in St. John River and on large burnt areas. For a number of years a pair nested in a spire of a church, entering at a hole made by *Colaptes auratus*. No exact data about nesting.

Nothing is known regarding breeding of the species until we come to the Saw-whet Owl.

RICHARDSON'S OWL has been taken here.

SAW-WHET OWL (*Nyctala acadica*).

I have a set of eggs of this Owl, taken May 23, 5 eggs from fresh to incubation well begun, showing that incubation begins when the first egg is laid. The eggs are white, fairly well polished, roundish oval, about 1.25 x 1.05 inches. The nest was in an old nest of *Colaptes auratus* 20 feet up in a spruce stub about 40 feet from a highway.

GREAT HORNED OWL (*Buteo virginianus*).

A young of this species was seen this last summer, July 26. At that time it was the size of a Barred Owl and lacked the ear tufts.

BLACK-BILLED CUCKOO (*Coccyzus erythrophthalmus*).

A set of 3 eggs taken July 18, fresh. The nest was placed in small hazel bushes, and was merely a loosely constructed platform. I have known this bird to desert its young when the nest was molested, and after the young died they were covered with leaves by the adults. It is common about copses along rivers.

KINGFISHER (*Ceryle alcyon.*)

Breeds in vicinity of streams and rivers. The nest is composed of a few blades of dried grasses and placed in a tunnel about 4 feet long in a sand bank. The eggs are laid by the last week in May, and by July 1st the young are nearly ready to leave the nest.

HAIRY WOODPECKER (*Dryobates villosus*).

Breeds early in May. In my collection is one egg of this species, which was laid in with a set of nine eggs of *Colaptes auratus*. Perhaps *villosus* was driven from its home by the larger bird.

DOWNY WOODPECKER (*Dryobates pubescens*).

A set of fresh eggs taken May 27th, was found in a poplar stub 25 feet up on shore of lake. This species is about as plentiful in winter as in summer.

ARCTIC THREE-TOED WOODPECKER (*Picoides arcticus*).

Breeds in northern counties of New Brunswick. A bird was taken in June, 46° N., that was without doubt a breeding individual. Its back was besmeared with balsam. I have a set of 4 fresh eggs taken in June, near Nictor Lake, Restigouche county, from a nest excavated in a live fir tree, four feet from the ground. The eggs are 1 x .75 inches, with well polished surface. Entering the cavity in a live fir-tree would account for the balsam on the back of the bird secured.

AMERICAN THREE-TOED WOODPECKER (*Picoides americanus*).

I have observed this bird in region of Nictor Lake, Restigouche county, in the months of November and December. They were tolerably common. I have been unable to discover a trace of them in New Brunswick during the breeding period.

YELLOW-BELLIED SAPSUCKER (*Sphyrapicus varius*).

Arrives from the south during the middle of April, and soon becomes fairly common. The birds sometimes work for weeks, making an excavation for a nest, which is most often in an ash-tree with a decayed top. The eggs are laid in June. The young are very noisy, and may be heard calling in the nest, from a distance of 100 yards. I have observed the adults feeding the young, when a trip would be made every two minutes. The time was about sundown, and they were probably fixing up for the night.

PILEATED WOODPECKER (*Ceophlœus pileatus*).

The young are known to leave the nest late in June.

FLICKER (*Colaptes auratus*).

This species comes north during April, and stays until October; yet the bulk of the birds go south the last ten days in September. They sometimes nest for several successive years in the same nest, in which 9 and 10 eggs are laid in June. A pair nested for two summers in a limb of a birch-tree within 100 yards

of my house, and they were unknown to be there until seen feeding the young. They were never seen near the tree going through their love performance. They evidently thought such antics might betray their treasures. The second year special attention was paid them and only very early in the mornings (about sunrise) would they be seen on the tree.

NIGHT HAWK. (*Chordeiles virginianus*).

Comes north in May, beginning about the 10th. The birds breed abundantly on flat-roofed houses in Fredericton. The eggs are laid in June and early in July. Vast flocks migrate south in August and early in September; they seem to follow the river courses.

CHIMNEY SWIFT (*Chætura pelagica*).

Comes north in May in fairly good numbers, and may be seen at evening, fluttering into some tall unused chimney shaft to roost. The birds build their nests both in chimneys and against walls inside buildings, if there is an opening for their passage. The general time for egg-laying is late in June and early in July. The same nest is used for successive years if it is not destroyed. Having been favoured by seeing the Swifts collecting nesting material, I can say that, contrary to general belief, they break off the twigs with their bills and not with the feet as is reported in some writings. They do not alight but take the dead twig in the bill as they fly past, and if not successful in getting one they wheel about and try again.

RUBY-THROATED HUMMINGBIRD (*Trochilus colubris*).

One nest found here was built on a small limb of a beech-tree, and was composed of lichen fastened with cobweb or cocoon silk to a lining of soft plant-down. It was found July 18th, and contained eggs which were by accident destroyed before the nest was found. The nest is now in the Provincial Normal School. Last summer a Hummer was seen to be driven from pea vines in our garden by three bumble-bees which followed it.

REPORT OF THE ZOOLOGICAL BRANCH, 1901.

As has been frequently pointed out in previous reports of the Zoological Branch of the Club, it is difficult to present new matter annually in the field of local Zoology. Indeed it is hardly to be expected that many additions to the Vertebrate fauna, excepting in the lower orders, such as fishes, reptiles, &c., can be recorded in the Ottawa district. During the year, however, some most interesting facts have been placed on record by various members of the club, which are worthy of special notice.

These notes have been published in the OTTAWA NATURALIST, and include the following papers among others more particularly referred to below. "Rattlesnakes and Scorpions," by J. R. Anderson; "On the Oviposition of the Mud Turtle," by Mailes Cowley; and "Alligators and Turtles as Pets," by W. S. Odell. Mr. Odell has for some time been studying Rhizopods and will contribute a paper on them to an early number of THE NATURALIST.

Mr. Andrew Halkett has continued his diligent researches in various interesting directions. The most important study he has made, perhaps being observations on the remarkable Dipnoid *Protopterus annectens*, of which two specimens were received at the Fisheries Museum by the kindness of Prof. H. O. Forbes, of Liverpool, England, with whom Mr. Halkett had interesting interviews early last year. One of the specimens was consigned to Prof. Ramsay Wright, Toronto University, and both were in a state of hibernation inclosed in their curious clay capsules. Unfortunately, both proved to have not survived when the capsules were carefully dissolved in Ottawa and Toronto. Mr. Halkett published a detailed account of the specimen in the November number of the OTTAWA NATURALIST. Mr. Halkett has also recently secured quite a number of Bow-fin (*Amia calva*) and Gar-pike (*Lepidosteus*) from the Bay of Quinte, and preserved them in formaline, which prevents the disappearance of the natural colours of fishes. Both species present under these conditions a very marked colour pattern. Few naturalists, familiar only with museum specimens of these fishes preserved in alcohol, have any idea of their really striking coloration. A Sturgeon (*Accipenser*) 5 feet long was also

obtained by Mr. Halkett in the Detroit River, near Sandwich, Ont., as well as a curiously marked young specimen which shows many interesting features. In the drag seines used when these specimens were obtained, quite a fine series of Teleosteans was also obtained, including a small Channel Cat-fish (*Ictalurus punctatus*), Moon-eye (*Hiodon tergisus*), Doré (*Stizostedion vitreum*), Yellow Perch (*Perca flavescens*), Pike (*Esox lucius*), Cisco (*Coregonus artedi*), White-fish (*Coregonus clupeiformis*), Rock Bass (*Ambloplites rupestris*), and others. Two fine Blanding's Tortoises (*Emys meleagris*) from Belleville, and a Snapping Turtle (*Chelydra serpentina*), from Combermere, which measured 2 feet 3 inches in length, were obtained and exhibited by Mr. Halkett at the opening Conversazione of the Club. After being placed in the tanks at the Fisheries' Museum, Ottawa, the Turtle deposited a number of dull white spherical eggs resembling in many respects the eggs of a bird. They were almost perfectly globular, and the limy shell was of a yellowish white colour. Some were prepared for exhibition in the cases of the Museum. The turtle on examination was found to be infested externally with leeches (*Hirudo*) ; some of these on being placed in a vessel of fresh water, lived for many weeks, and a few were preserved in formaldehyde.

Recently Prof. Prince secured an interesting specimen of the Rat-fish or Chimæra (*Chimæra colliei*) from the Straits of Georgia, B. C., a full account of which species and of the peculiar egg produced by the fish, appeared in the OTTAWA NATURALIST some time ago. On the same occasion a quantity of Pacific Herring was obtained for the purpose of investigating a remarkable case of mortality in these fish near Nanaimo at the end of January. It is stated that the waters of the Straits off Nanaimo were covered for an extent of hundreds of acres with dead herring, lying 2 or 3 feet thick at the surface of the sea. Various theories have been advanced for this strange phenomenon, and no doubt a minute anatomical examination may afford light upon this problem.

It is appropriate in this place to refer to the appearance of a fasciculus of 62 pages, forming the first Biological Report from the Marine Scientific Station, founded by the Dominion Government upon the Atlantic coast. It embraces a series of seven papers all of scientific or practical interest ; but, as a review is to

appear shortly in the pages of the OTTAWA NATURALIST, it is not necessary to say more than express satisfaction at the issue of the first part (as a supplement to the Marine and Fisheries Department's Report) of Contributions to Canadian Biology. Dr. Whiteaves's invaluable Faunistic List for the Atlantic Waters of Canada formed an appropriate prelude to the appearance of the Biological papers referred to.

JOHN MACOUN.
W. S. ODELL.
E. E. PRINCE.
ANDREW HALKETT.

BOTANICAL NOTES.

A DAY AT NORWAY BAY, P.Q.

On August 19th, Mr. R. B. Whyte and the writer spent a very enjoyable day at Norway Bay, Bristol, P.Q., some fifty miles up the Ottawa river on the Quebec side. Many interesting plants were observed, some of which were rare, or as yet unrecorded, in the Ottawa district.

At Norway Bay there is a fine sandy beach which must be over a mile in length ; as the water deepens very gradually, it is an excellent place for children for playing and bathing, and parents are beginning to find this out. The trees, which grow well down to the beach, are principally red and white pine, though Banksian pine, balsam, white spruce, red maple, mossy-cup oak, and paper birch are common species. A large number of species of shrubs were observed growing in the vicinity, among the most interesting being *Hypericum kalmianum*, *Ceanothus americanus*, *Rhus aromatica* and *Comptonia asplenifolia*. The trailing arbutus was found in great abundance, and was growing in much deeper soil than at Chelsea or Aylmer. Lovers of this beautiful flower would find Norway Bay well worth a visit if only to procure this charming plant in quantities sufficient to satisfy everyone. Among herbaceous plants some of the most interesting growing near or along the beach were *Lobelia Kalmii*, *Desmodium pauciflorum*, *Helenium autumnale* and *Lobelia cardinalis*.

The shrubby St. John's Wort (*Hypericum kalmianum* had not been recorded in the Ottawa district, as far as can be learned, until about two years ago. In Macoun's Catalogue of plants and in Britton and Brown's Botany the range is given as "From Niagara Falls to the Sault Ste. Marie, along Lakes Erie and Huron; abundant Muskoka, Ont." Hence, Norway Bay would be considerably out of its range. This shrub was found just west of the ferry landing, near the beach.

About a mile further west a small stream enters the Ottawa, and a large number of species of plants grow along its low banks. Near the mouth of this stream (Mill Stream, Lot 6, Range 1, Bristol), on the east bank, a very rare plant, a pure white-flowered variety of *Lobelia cardinalis*, was discovered by Mrs. John Macara, of Ottawa, who, with several others, was with us during the afternoon. The cardinal flower is quite common near this stream, and one strong plant of the white variety having three good flower spikes was found growing near the ordinary form. As far as can be learned, a white-flowered variety was never before found as near Ottawa as this one. The plant was carefully removed, brought to Ottawa, and planted at the Experimental Farm, where it is hoped it will become established, as its flower is beautiful.

Mr. Whyte gave an address on the flowers which he had collected during the morning, and the writer gave a talk on tree planting, with a practical demonstration of it, and on the way to dry, mount and preserve plants.

The object of our visit to Norway Bay was to assist the Rev. J. A. Macfarlane, who has established a summer school there, his intention being to devote considerable time to Nature Study. Mr. Macfarlane's work is very praiseworthy, and we trust he will meet with a large measure of success.

W. T. MACOUN.

ERRATUM.—On page 91, line 8 from the bottom, of Dr. Whiteaves's paper in the July number of this journal, for *Lampsilis luteola*, var. *ochracea*, Dekay,—read *Lampsilis luteola*, var. *rosacea*, Dekay.

THE OTTAWA NATURALIST.

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ON THE GENUS *TRIMERELLA*, WITH DESCRIPTIONS OF TWO SUPPOSED NEW SPECIES OF THAT GENUS FROM THE SILURIAN ROCKS OF KEEWATIN.

(With two plates.)

By J. F. WHITEAVES.*

In the summer season of 1901, Mr. D. B. Dowling, of the Geological Survey, made an interesting and somewhat large collection of fossils from limestone exposures at five different localities on the Equan River, and at Sutton Lake. The Equan River, it may be mentioned, is the first river north of the Attawapishkat, with which it flows, almost parallel, into the west side of James Bay; and Sutton Lake is the source of Trout River, which empties into the southern portion of Hudson Bay, as does also the Severn River. These fossils have not yet been exhaustively studied, but enough is known about them to show that the rocks from which they were collected belong to the Silurian, as distinguished from the Cambro-Silurian or Ordovician system, and that they are probably of about the same age as the Guelph formation and Niagara limestone of Ontario. They show, moreover, that the limestones and dolomites of the Attawapishkat River and of the Fawn Branch of the Severn River, that were formerly thought to be Devonian on the evidence of a few fossils collected by Dr. R. Bell and Mr. A. P. Low in 1886, belong also to the Silurian system, and that they are of precisely the same age geologically as the Equan River limestones. They include some species that are found also in the Silurian limestones, etc., of Port Daniel and

*Communicated by permission of the Acting Director of the Geologica Survey of Canada.

L'Anse à la Barbe, in the Baie des Chaleurs, and in Division 4 of the Anticosti group of Anticosti.

Among these fossils from the Equan River there are seven specimens that obviously belong to the genus *Trimerella*. This genus was constituted by E. Billings in 1862 for the reception of two remarkable species of fossil brachiopoda from the Guelph formation of Ontario. The specimens upon which it was based are a few imperfect casts of the interior of one or both valves, from Galt, Hespeler and Elora, and even now specimens with any considerable portion of the test preserved are quite rare in Canada. The genus was recognized in the Silurian rocks of Gothland by Lindström in 1867, also in those of Ohio by Meek in 1871, and it has been closely studied by many palæontologists. In 1872 Davidson and King made it the type of a new family, which they called the Trimerellidæ, and in 1874 published a comprehensive illustrated memoir thereon in the Quarterly Journal of the Geological Society of London. This family belongs to that large section or Order of the brachiopoda known as the Inarticulata, in which the hinge line has no interlocking teeth, and is believed to be most nearly related to the Lingulidæ on the one hand and to the Obolidæ on the other. The latest detailed information in regard to the Trimerellidæ is contained on pages 30 to 46 of Volume VIII, Part 1, of the Palæontology of the State of New York, by Professor James Hall and Dr. John M. Clarke, published in 1892.

As now understood, the family consists of four genera, viz., *Trimerella*, *Monomorella*, *Rhinobolus* and *Dinobolus*. In Canada *Dinobolus* has been found only in the Black River limestone, and the other three genera only in the Guelph formation. Up to the present date seven species of *Trimerella* have been described, five from the Silurian rocks of North America, and two from rocks of similar age in the islands of Gothland and Faro in Sweden. Specimens of each of the five North American species have been found in the Guelph formation of Ontario, and the types of four of them are from that formation and province. The seven specimens from the Equan River that are referable to this genus seem to indicate or represent two species that are distinct from any of

those that have previously been described, and that may be provisionally named and characterized as follows :

TRIMERELLA EQUANENSIS (Sp. nov.).

Plate II, figs. 1 & 2, and Plate III, fig. 1.

Shell rather large, attaining to a length of upwards of three inches. Pedicle valve flattened somewhat obliquely, most convex and deepest at a short distance from the beak, nearly as wide as long, broadly rounded in front, more narrowly rounded at the sides, and obtusely pointed behind, the umbo and beak being moderately produced, their lateral margins meeting at an angle of about 98°, and the beak gently incurved. Characters of the interior of this valve unknown.

Brachial valve regularly but moderately convex, most prominent externally at or about the midlength, a little wider than long, broadly rounded in front and less so at the sides, as in the pedicle valve, but abruptly contracted at the umbo, which is narrowly rounded and but slightly produced, while its beak is strongly incurved and recurved. Casts of the interior of this valve are marked with a longitudinal, linear, median groove, that represents the median plate and that extends from the umbo almost to the front margin, also with a lateral and slightly divergent linear groove, on each side, that extends from the umbo to a little beyond the midlength.

Surface of both valves marked only with a few distant concentric lines of growth.

Falls of the Equan River ; one imperfect and badly preserved specimen with both valves *in situ*, a nearly perfect pedicle valve, three imperfect brachial valves with most of the test preserved, and a cast of the interior of a large brachial valve.

Judging by these specimens, this species would appear to belong to the group of *T. acuminata* rather than to that of *T. grandis*, though it seems to be always much shorter and wider than *T. acuminata*, *T. Ohioensis*, or *T. Lindstrœmii*. The marginal contour of its brachial valve is not very unlike that of *T. Lindstrœmii*, but in the latter this valve is represented as flattened anteriorly to the umbo, and its pedicle valve has quite a different

outline, the umbo being proportionately broader laterally, and the beak straight rather than incurved.

TRIMERELLA BOREALIS, (Sp. nov.).

Plate III, figs. 2 and 3.

Shell unknown ; cast of the interior of both of the closed valves small, compressed, not far from circular in marginal outline, but a little wider than long.

Supposed pedicle valve (Fig. 3). On the cast of the interior of this valve there are five linear grooves, of unequal length, that radiate forward and outward from the umbo. The middle one, that corresponds to the median plate, extends as far forward as a little past the midlength, the two next to it, on either side, are a little shorter, and the two outer ones shorter still.

Supposed brachial valve (Fig. 2). On the cast of the interior of this valve there are two flattened conical casts of the platform vaults in the umbonal region, and between them there is a median, longitudinal linear groove, that is, however, widest posteriorly and that represents the median plate. Each of these casts of the platform vaults is bounded externally by a short but deeply impressed linear groove, and the groove that represents the median plate extends from the umbo to within a very short distance from the front margin.

The only specimen collected is not sufficiently perfect to admit of exact measurements, but the two figures are of the natural size.

Equan River, first rapid ; one imperfect and slightly distorted cast of the interior of both valves.

The specimen would seem to indicate a much smaller species that the preceding, with different markings on the interior of at least one of its valves, and a much less produced umbo on the brachial valve. It can scarcely be mistaken for any other American species of *Trimerella*.

EXPLANATION OF THE PLATES.

Plate II.

Fig. 1. *Trimerella Equanensis.* Outline of a brachial valve with part of the test preserved, partially restored and slightly reduced in size. The vertical line to the left shows the actual length.

Fig. 2. *Trimerella Equanensis.* Outline of a cast of the interior of a large brachial valve, slightly restored and reduced a little in size. The vertical line on the right shows the actual length.

Plate III.

Fig. 1. *Trimerella Equanensis.* Outline of a nearly perfect pedicle valve, slightly restored and reduced in size The vertical line on the left shows the actual size.

Fig. 2. *Trimerella borealis.* Outline of the supposed dorsal side of a cast of the interior of both valves, showing the impress of the brachial valve. Of the natural size and slightly restored.

Fig. 3. *Trimerella borealis.* Outline of the presumably ventral side of the same specimen, showing the markings on the pedicle valve.

Ottawa, Aug. 22, 1902.

NESTING OF SOME CANADIAN WARBLERS.

By WM. L. KELLS, Listowell, Ont.

THE MYRTLE WARBLER (*Dendroica coronata*).

The myrtle warbler—known also as the yellow-rump warbler—is among the first members of its family to return to Canada when the winter is over, and the advancing spring-time is renewing the vegetation and insect life in our fields and the remnant of our forest lands. And, again, in the autumn, when the harvest season is over and the chilly western winds and night-frosts herald the approach of winter, it is noted to be, with the palm-warbler, among the last of its family to affect the orchard, the garden and the margins of the woods with its presence and its notes; and not until some pretty severe frosts have occurred does it take its final departure for the year towards its tropical winter home, and we note it no more till the early days of the following May, and these facts, with others in its life-history, show it to be among the members of its family that advance the furthest towards the north to find a summer-home and a nesting place. In the early period after its arrival, it is sometimes quite abundant in our locality and may then be noted gleaning in the tallest trees of our woods, sometimes in isolated groves, and again in the thickest forest, and as the season advances and the buds and blossoms of the fruit trees expand into leaves and flowers, it occasionally visits the environs of human habitation both in the rural districts and the vicinity of villages and towns, and a few remain and nest in suitable locations, but the majority wing their way further to the north where they find more congenial breeding-places and perhaps more suitable and abundant food; and from here they begin their southward departure on the first signs of approaching winter. Those few of the myrtle warblers that remain in south-central Ontario through the summer season retire to the thickest parts of low swampy woods, where there is an intermingling of soft-wood timber and conifers, and here, amid the gloom of brush wood and dense foliage, where there is seldom any intrusion of human kind, and where its presence and nesting site is not suspected, unless the song notes of the male bird betray the secret to some student

of bird life and avifaunian melody, its nest may be looked for. It is well known to every field ornithologist that each species of the warblers has its peculiar haunts, that only a few of them intermingle in the same society, and when they come in contact they evince such jealous rivalry towards each other as soon causes the different species to understand that their ways are not in harmony, and that there can be no special love between them. Sometimes, however, in a small circuit, where the conditions are favourable, a number of species may be heard, in the early summer season, intermingling their melodies. In the same thick underwood, of but a few acres in extent, may be found the nesting homes of the chestnut-sided warbler, the redstart, the black-and-white warbler, the black-throated blue warbler, the oven-bird, the Canadian warbler, and the mourning warbler, as well as other members of the family; but while the nests of some of these will be found placed in the low underwood, in trees at various elevations from the ground, or among the thick vines, others will be found sunk in the earth or in the cavities of low banks or among the roots of fallen trees. So in the same swampy woodland may be found the nests of the bay-breasted warbler, the water-thrush and the myrtle bird, and the former and the latter meet on common ground and may often be observed gleaning their insect food in the tops of the same trees, and at similar elevation, but the latter species appears to select a more lowly and considerably different situation for a nesting-place than that of the bay-breasted species. In all my wildwood rambles and oological researches, I have found but few nests of the myrtle warbler and collected but one set of its eggs, and I believe that the pleasure of finding the nest and adding its eggs to their collection, has been the experience of but few.

On the 18th of June, 1882, I discovered, for the first time in my experience, a nest of the myrtle warbler. It was in a low, black ash timbered swamp, where there was an intermingling of other soft-woods and conifers, near where I had found the nest of a bay-breasted warbler the year before, and of whose nest I was again in search, when I espied in a low balsam, about four feet from the ground, a nest with the mother bird seated upon it. At first sight this avifaunian cradle, in situation, material and construction,

appeared like that of a chipping sparrow, but when the bird flushed off on my near approach, and from a position on a branch near by watched my movements, shifting uneasily and uttering a few "chip"-like notes, I carefully noted her plumage and became certain of her identity as a female myrtle warbler.

This nest contained four eggs, quite fresh, though the bird had begun to incubate, and these, with the nest, are still (1902) in my collection. The ground colour of these eggs is a clear white clouded with a wreath of reddish-brown on the larger end, but there is scarcely a dot on the rest of the surface. The nest itself was composed of stalks of dry weeds, fibres of bark, rootlets and hair from the tails of horses or cattle. Near by, in another low balsam, was an old nest of the same species which had doubtless been occupied the previous year. The next summer I saw another complete nest of this species, but it contained no eggs. This was placed in the top of a small bushy blue-beech underwood, five or six feet high, and situated in a piece of swampy bush land. Since then I have noted this species only as a spring and autumn migrant, though I believe that some of them still nest in the swampy woods of this vicinity. Some of the species are occasionally noted here as late as the last week of October. The myrtle warbler is found to be an abundant summer resident of British Columbia, but as yet has been found chiefly to the west of the Cascade range of mountains. Like all the other species of the warblers it has its particular haunts and home, especially in the nesting period, and the student of avifaunian life who desires to examine the nest and eggs of this species in a state of nature, will be much assisted in the accomplishment of that object by a previous knowledge of the habits of the bird. Deep, high-timbered forests, rolling prairies, open woods, and the surroundings of human habitations, though occasionally visited, are not selected by this bird for a summer home or a nesting-place; but where the muddy brook wends its slow course through a brushwood dell, in swampy thickets, near stagnant pools, where there is an intermingling of various species of soft woods with evergreens, are the places most likely to be affected in the nesting period by the presence of this bird, and many such places exist in the valleys and among the foothills of the southwestern portion of

this land of the evening sunshine, and in some low, thick, leafy underwood or dwarf conifer its nests will be found. The fact that this species is observed to feed much on the fruit of the myrtle tree, especially at the period of the autumn migration, appears to be the reason why it has received the name of the myrtle warbler. The particular kinds of insects on which it feeds are no doubt partial to the vegetation in the localities that it usually frequents, and the fact that certain kinds of insect infest the foliage and bark of certain species of trees that grow only in certain soils, is no doubt the reason why certain varieties of birds that feed specially on those certain kinds of insects, are found only in those locations where such parti ular woods and their insect parasites abound.

The myrtle warbler was among the few species of the warblers noted by Audubon when he visited the coast of Labrador in the summer of 1833, and it has been traced across the continent, south of Hudson Bay, to the foothills of the Rocky Mountains, and among these to the wave-washed shores of the Pacific Ocean; and we note it on the list of the warblers in the new territory of Yukon. Nelson, in his report of the birds of Alaska, says, regarding this species: "It is a woodland species, and makes but very short stops along the inhospitable coast, but hastens to more congenial localities in the interior, where it rears its young. In the autumn migrations it hastily seeks its more southerly haunts and rarely lingers along the bare coasts of the north, as do some of its relatives."

Turner also speaks of this bird as being found at Fort Yukon, where it breeds, but they inhabit only the wooded portions of the district. It was also found to be quite abundant among the willow thickets on the river banks at Bristol Bay.

Some notes on the nesting of this warbler from my pen were published in the *Canadian Sportsman and Naturalist*, 1882, and some years afterwards a more ample account was contributed to *The Ornithologist and Oologist*, published in Boston. From this article Prof. Davie, in his fourth edition of "The Nests and Eggs of North Americal Birds," makes quotations, and from this work Mr. Thomas McIlwraith makes extracts in his second edition of "The Birds of Ontario." In his recently published articles on "Birds of the Garden," and "The Birds of Ontario in Relation to

Agriculture," Mr. C. W. Nash, of Toronto, gives some interesting notes on the myrtle warbler, and to these we refer the reader.

The myrtle warbler is between five and six inches in length, and, in his spring plumage, the colours of the male bird are, on the upper parts, of a slaty blue streaked with black, and having some bar-blotches on the wings and tail white, the throat and under parts being pure white, with some yellow on the crown, sides and rump. The plumage of the female is much similar, but of rather a duller hue.

ZOOLOGY.

A Canadian Two-headed Snake.

In the thirteenth volume of Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Mr. Roswell Hill Johnson has recently published an interesting paper entitled "Axial Bifurcation in Snakes." This paper, it is stated, "contains descriptions and skiagraphs of thirteen two-headed snakes, a recapitulation of others previously described, and a concluding general treatment of this abnormality." Of the thirteen specimens described and figured therein, only one, a small double-headed snake from South America, was "found to have scales impermeable to the Roentgen rays." The specimen referred to in Mr. Johnson's paper as "Case V," and represented on Plate VIII thereof, belongs to the Geological Survey of Canada, and was lent by the present writer. It is a small two-headed garter snake, a little over seven inches in length, that was found on the shore of Moira Lake, near Madoc, Ont., by Mr. Eugene Coste, in August, 1866, and is now preserved in alcohol. In regard to this specimen Mr. Johnson makes the following remarks: "It is a *Eutainia sirtalis sirtalis*, Linn." (or, in other words, an otherwise typical garter snake). "The light dorsal stripe divides caudad to the point of division of the vertebral column. "The angle presented by the frontal planes of the two heads is nearly a right angle, that of the sagittal planes is about 70°. "The right head is slightly longer and broader than the left one."

This Canadian double-headed snake, which would seem to be the first and only one that has yet been recorded, is now and has long been on exhibition in one of the cases in the Museum.

J. F. WHITEAVES.

Ottawa, Sept. 20th, 1902.

FIELD NOTES ON THE GEOLOGY OF THE COUNTRY ABOUT CHELSEA, QUEBEC.

O. F. N. CLUB EXCURSION, CHELSEA, SEPT. 5TH, 1902.

Several interesting geological phenomena were examined along the valley of the Gatineau River on Saturday afternoon September 6th, 1902.

Along the western side of the falls and rapids at the Island east of Chelsea Station on the C. P. R., the Archæan crystalline rocks consist for the most part of irregularly broken and shredded bands of rusty gneiss, whose strike was almost directly east and west, and at right angles to the course of the river, through which were injected several dykes of coarsely crystalline granite affording excellent examples of graphic granite, microperthite and pegmatite. These are evidently of later date and origin than the foliated gray shredded gneisses. The water of the falls and rapids tumbles from a hard ledge of finely twisted and banded hornblendic gneiss on a softer band of pyroxenite with numerous crystals of mica, mostly biotite, in which are segregated veins of quartz with fibrous hornblende and hematite. Molybdenite crystals were elsewhere observed in masses of rock from this latter band and collected by members of the Club and of the Normal School.

Several pot-holes occur in the softer pyroxene rock of the bottom of the falls showing the erosive action of streams carrying detrital matter in their rushing waters. One of these was fully four feet in depth. The river bed is for the most part rocky at this point. At different levels, however, below high-water mark the geological party observed recent accumulations of sand, gravel and boulders along the shores and on the rocky surfaces of the river bed, which, at this time of the year, are exposed on account of the low water. Accumulations of sands arranged concentrically to the shore line are found in the bays of a semicircular shape and usually at the foot of a prominent ridge which extends into the river and on the lower side of the ledge forms an eddy by the rapid and suddenly arrested flowing waters. The sorting power of water was well exemplified in the different accumulations of sand observed. Not less than five zones or series of sand bands were seen at different levels above low water mark, in which the materials

which composed the sands were clearly seen to be arranged in order of specific gravity, the heaviest at the bottom of the series and the lightest at the top. Thus it was ascertained upon examination of a small bay about 200 yards above the last fall and rapids of the Gatineau at the Island, that the upper sand consisted almost exclusively of fine rounded grains of pure quartz, well sorted and free from impurities, whilst the lowest consisted of numerous grains of magnetite or other ores of iron in the shape of minute crystals, besides other impurities, hornblende, mica, garnet. The intermediate series of sand materials was of a decided gray colour, the lowest being dark in colour, whilst the uppermost sands were of a light yellowish colour, and the grains almost exclusively quartz.

In the band of hornblendic gneiss above the falls were noticed aggregations of the jet black variety of hornblende. This is the rock which has often been collected from the Gatineau valley and brought to Ottawa for examination as coal. It might, from its brilliant black lustre and general appearance, be termed the "Gatineau coal."

Several pot holes were also observed in the harder rocks of the upper portion of the falls, but these were comparatively shallow. In the bottom of one, eleven inches deep, was a mass of gravel and rusty sand five inches deep; the largest pebble was about three inches and a-half in length and two inches in its greatest thickness. Many of the rock surfaces of the river bed now exposed at low water were polished quite smooth by the rushing waters charged with sand, gravel or similarly hard, gritty and rocky detrital matter.

Near the head of the island were seen partially dissolved crystals of light pink coloured orthoclase felspar, held in a paste of somewhat darker coloured pink pegmatite, which appeared as rounded masses resembling plums in a pudding, and giving the whole the appearance of a conglomerate. These crystals vary in shape and size from a few milimetres to four centimetres in diameter. The rock has also a spotted appearance.

Among other phenomena observed and discussed on the spot, in the course of an examination of the rocks of the district about Chelsea, there were noted the well-marked raised beaches and

terraces across the Gatineau river, on the east bank opposite Ironsides. These are conspicuous features in the landscape and are seen to great advantage at the present railway flag station. Four of these terraces are clearly discernible from the station. These terraces correspond to other terraces at practically the same elevations on the west side of the Gatineau River valley, forming the raised beaches which of late years have been subjected to such great denudation. Numerous valleys have recently been formed, and were carved out of the soft marine clays of the Green's Creek formation. This process is still going on, and the young streams are cutting out their beds to a lower level. The growth of the young forest of pines, maples and poplars which has taken place since the great forest fires of 1874, is doing much to preserve the land from erosion and denudation, which would level it down and carve it out even more conspicuously during present times. The bare and denuded aspect which the clay hills presented years after the great forest fire, without sign of plant life upon them, has been replaced by a vigorous growth of trees not very dissimilar from those which the old marine terraces supported fifty or a hundred years ago If not destroyed by fire this young pine forest will be of great value in the future.

No fossil organic remains were found at any point during the afternoon's outing, but the marine clays and sands of the railway cutting about a mile north of Chelsea station afford fine examples of marine fossil shells of the Pleistocene age, among which may be noted:—*Saxicava rugosa*, *Macoma balthica*, *Leda* (*Portlandia*) *arctica*.

H M. AMI.

Ottawa, Sept. 7th, 1902.

REPORT OF THE ORNITHOLOGICAL BRANCH OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR 1901-1902.

The report of the Ornithological Branch is comparatively brief, as the notes taken and records made during the year have been to a large extent published in THE NATURALIST and are thus already known to the members of this society. Although it is a matter of regret that more active work is not done by our local members, it cannot be said that less has been done than in previous years ; but while those living at or near Ottawa have done little more than in previous years, outside members by their work and writings have done much more than in the past to make ornithology a prominent feature of THE OTTAWA NATURALIST. The valuable papers contributed by Mr. W. E. Saunders, London, Ont., are deserving of special mention, and the thanks of this committee are tendered to him and others for the stimulus they have given to the delightful study of bird life. Mr. Saunders' lecture on "Native Birds ; their characteristics and habits," will also, we believe, do much towards awakening that love for the "Pretty feathered poets of the grove," which everyone must have, did he only know it. Others outside this city who have contributed ornithological papers during the year are : Mr. W. L. Kells, Listowel, Ont.; Mr. H. Gould, London, Ont.; Dr. G. A. McCallum, Dunnville, Ont.; Mr. L. H. Smith, Toronto, Ont.; Mr. Allan Brookes, Penticton, B.C.; Mr. R. C. Scott, Aylmer, Ont.; Mr. W. H. Moore, Scotch Lake, N.B ; Mr. R. Elliott, Bryanston, Ont.; Mr. R. Boutelier, Sable Island, N.S. As the titles of the papers contributed by the above may be found in the index of THE NATURALIST, it is unnecessary to mention them here.

Last year, as in previous years, all the local members who made bird notes were asked to send them to the ornithological editor for compilation and publication in THE NATURALIST, as by this means the earliest records (in the case of the arrival of birds) could best be obtained. This was done, and as a result the dates of arrival of 107 species were published and notes on about 20 more species were received which have not yet been published. A large

proportion of these notes were furnished by Mr. Geo. R. White, who continues to do excellent and systematic field work.

During the spring, Mr. W. E. Saunders and Dr. J. Fletcher arranged with several observers in different parts of Canada and one in Michigan, to have them send in their notes to the ornithological editor of THE NATURALIST for compilation; the object being to have a table in which could be shown the comparative dates of arrival of birds in different parts of the country. This was done and the tables were published. Those who contributed notes were; Mr. Alex. Gow, Windsor, Ont.; Mr. W. E. Saunders, London, Ont.; Mr. J. Hughes Samuel, Toronto, Ont.; Mr. W. P. Mellville, Sault Ste. Marie, Mich.; and Mr. L. McI. Terrill, Robinson Bury, P.Q., and Ottawa members. Unfortunately some of the observers were evidently not very regular in their observations, and the dates of arrivals of some birds may be misleading in some cases. It has not yet been decided whether this co-operative work will be carried on again this year or not.

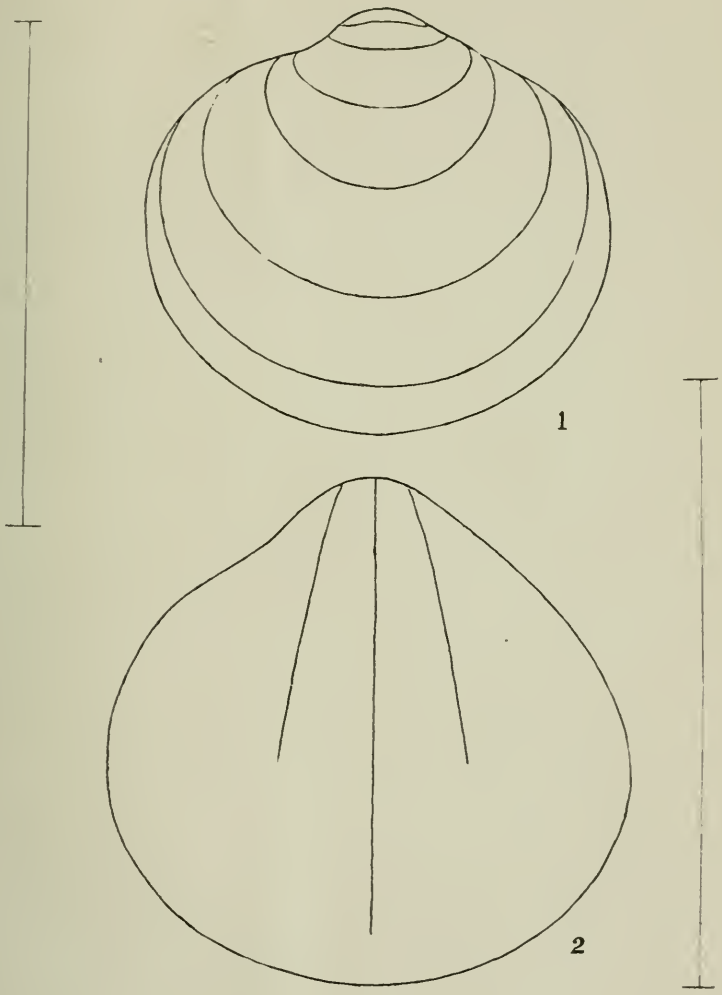
W. T. MACOUN.
A. G. KINGSTON.
MISS HARMER.
C. GUILLET.

EDIBLE FUNGI.—The dry weather previous to the last week was not favorable to fungi growth and before the end of September few edible fungi of any kind could be procured. The true mushroom, *Agaricus campestris*, is not yet very abundant, and *Coprinus comatus*, usually so plentiful in many places about Ottawa, is seldom met with. The only species which can be collected in large quantities at the present time is *Marasmius oreades*. The golf links and the lawns at the Experimental Farm are the best places to look for this delicious fungus. At both places the dark-colored rings that denote its presence can be seen at many yards distance. Broiled or fried with butter its flavour is more delicate than that of the common mushroom.

Oct. 4th. J. M. M.

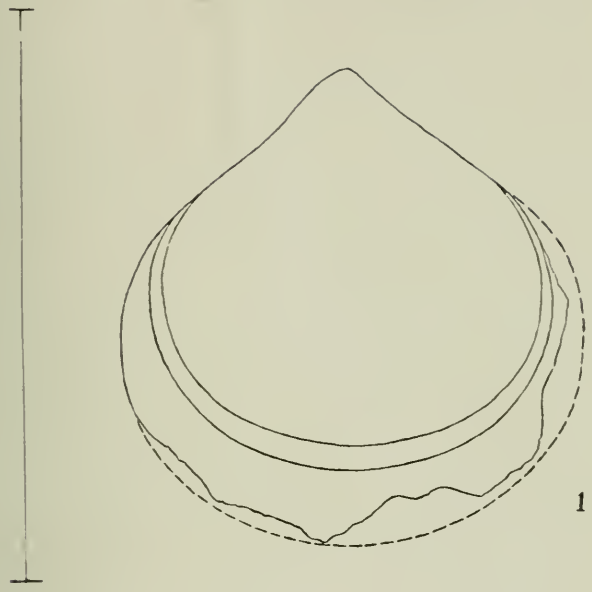
EXCURSION TO CHELSEA.

A successful general excursion of the Club was held on Saturday afternoon, September 6th, when a party of about 150 consisting of the members of the Club, and of students attending the Normal School under the leadership of Dr. Sinclair, went to Gilmour's grove, at Chelsea Rapids and spent a most enjoyable and profitable day. On arriving at the Chelsea station Dr. Fletcher announced what the arrangements for the day were and the whole party then walked down to the island where unnecessary impediments were disposed of and the collecting parties made up. Dr. H. M. Ami took a number of enthusiasts off to examine the rocks and other geological features of the locality. Mr. J. B. Halkett had a numerous following of attentive listeners during the whole afternoon while he pointed out and described the interesting features of the many and various specimens of insects, reptiles, crustaceans, mollusca, and other animals met with. Dr. Fletcher had a large party of botanists and lovers of plants who made large collections and asked many questions which were answered in the field and illustrated by living specimens of plants. At 6 o'clock the addresses were delivered in the open space in the grove near the station and were of much interest. The first address was by Dr. Sinclair who kindly undertook the arrangements for the day and discharged his duties in a gracious and most acceptable manner. Every contingency was provided for and by reason of his forethought it is safe to say that every person who attended this outing enjoyed to the utmost their visit to this beautiful and most interesting spot. Following Dr. Sinclair, and speaking on the most important finds of the day in the different branches of natural history, short addresses were delivered by Messrs Halkett and Fletcher. Dr. Ami had to leave before the lectures, but those who accompanied him during his afternoon ramble were so much pleased with his explanations of the various outcrops that we have followed the suggestion made and asked Dr. Ami to prepare a short note on his observations which is published elsewhere in this issue.



C. Frank King *del.*

Trimerellæ from Keewatin.



C. Frank King *del.*

Trimerellæ from Keewatin.

THE OTTAWA NATURALIST.

VOL. XVI. OTTAWA, NOVEMBER, 1902. No. 8.

OBSERVATIONS OF ANIMALS NATIVE IN THE ALGONQUIN NATIONAL PARK.

By ANDREW HALKETT.

Some account of how animal life in general is being preserved, under the protective restrictions of the Algonquin National Park of Ontario, cannot fail to be of interest to the readers of THE OTTAWA NATURALIST.

The Park is situated in the District of Nipissing, and covers an area of about 45 miles square.

On alighting one afternoon at the station at Câche Lake, where Mr. Bartlett, the genial Superintendent of the Park, resides, I was pleased to see a collection of wild animals, quite at home in enclosures, such as red-deer, a caribou, and a few racoons. It is remarkable what kindness and care will do. The deer have sometimes got away, but after wandering have returned, to receive at the hands of their keepers their accustomed supply of raspberry leaves and the foliage of various trees.

The very atmosphere of the Park awakens the attention of a lover of nature. In many parts of our country there is a marked destitution of life; but here in manifold forms it continues in plenty. The early morning hours are enlivened with the warblings of different kinds of small birds; and so regardless are our feathered friends of the presence of man that a chipping sparrow had built her nest, only some two feet from the ground, in a small spruce bush, right within arm's length of a daily frequented path; and at the time of my visit was, unmolested, rearing her young.

The day following my arrival I was kindly escorted by Dr. Bell, the assistant superintendent, to Cranberry Lake, a reputed

resort of the salmon trout ; and indeed, in this respect, I found the spot all that was claimed for it.

The Salmon Trout (*Salvelinus namaycush*) is an inhabitant of the Great Lake region, and other bodies of fresh water. Its colour is gray, with spots of a lighter gray : the dorsal and caudal fins being marked with spots of a darker hue. It is, however, subject to great variation, and although all the varieties bear the specific name of *namaycush*, there is considerable reason for the popular distinctions such as gray-trout, salmon-trout, Great Lake-trout, and Mackinaw-trout. But structurally it has not appeared to icthyologists that there are sufficient distinctions to warrant the separation of varieties into different species. As to size, individuals of three feet or more long are recorded, but such fish are very exceptional, and one of about two feet or less is a large specimen. The salmon trout prefers the deeper parts of the lake : approaching the shoals, in the fall of the year, for the purpose of spawning. It is carnivorous, preying largely upon other fishes.

We had not been long on Cranberry Lake before two red-deer were seen. First a beautiful doe, which was standing in a bay, having come down to drink; and afterwards a buck, standing conspicuous, with his imposing horns, in an open space of the forest, at the margin of the lake.

The Red Deer (*Cariacus virginianus*) is coloured chestnut-red in the summer time, and is gray in the winter. The horns are proportionately small, curved forwards, having the antlers placed at the hinder edges. As in other deer, the horns are solid, not hollow as in the *Bovidæ*, and are periodically shed. The female has no horns. The young, or fawn, is spotted white.

Next morning we started from Câche Lake on a tour through a part of the Park, made by alternately canoeing the lakes and portaging our canoe and camping outfit over the intervening stretches of forest. At Beaver Pond (where, by the way, we saw a beaver dam), and Little Island Lake, we had the good fortune to see an occasional porcupine—three of those interesting rodents in all, and separately—moving about on fallen trees which overhung the water's edge.

The Canada Porcupine or Urson (*Erethizon dorsatum*) belongs to a family of the *Rodentia* which has the body, in addition to the

ordinary fur or hair, covered with defensive spines. It is blamed for being injurious to dogs, which are said to get its quills into their feet; and for approaching farm buildings in order to suck the eggs of hens; and I am sorry to say in various places in the country I have found these inoffensive creatures wantonly slaughtered. On examining the stomach of one which had been shot in the Gatineau district, I found it to be literally packed with spruce leaves.

The first day's journey took us to the head of Smoke Lake, where we put up for the night in an empty hut. Next morning a merganser with her brood of ducklings was seen in the distance, near the margin of the lake on the opposite side. The mergansers differ conspicuously from other ducks in having the bill cylindrical and serrated, instead of being flattened and laminate. The sexes are unlike. In this species, the Red-breasted Merganser (*Merganser serrator*), the male has the head and neck dark green, and there is a white ring around the neck; the back is black, turning grayish lower down, the breast is tinted salmon colour on a white ground, the feet are red, and the bill and iris carmine; whilst the female has the head of a chestnut colour, the back grayish, the breast white, and the feet and bill duller coloured than in the male. Both sexes in this species have crests; whereas in the Sheldrake or Goosander (*Merganser americanus*) only the female is properly crested. The merganser constructs a downy nest concealed upon the ground, in which are deposited her buff, or yellowish drab, coloured eggs, which may vary in number from six to twelve.

In the same direction where the merganser was seen, a heron kept hovering about, and judging from its actions it is possible that it had a nest in the vicinity, for this bird although usually gregarious in its breeding habits, having extensive heronries, sometimes builds singly.

The Great Blue Heron (*Ardea herodias*) is our typical representative of the *Ardeidæ*, and is often erroneously called the crane.[1] This bird has its own especial way of attracting notice; noiselessly and suddenly it is seen on the wing, flying somewhat clumsily, with its neck folded in, and its long legs stuck out be-

[1] The herons are the true allies of the bitterns, storks and ibises, HERODIONES; the cranes of the rails, gallinules and coots, ALECTORIDES.

hind : heavily it flaps along, finally alighting at the edge of the lake, or upon the branch of a tree, where it remains so motionless as to resemble a piece of water-worn wood, and this deceptive appearance is doubtless of benefit to the bird in procuring its piscivorous food.

In the afternoon of this day we visited Ragged and Porcupine lakes, the latter of these being immediately in the outskirts of the Park ; and the former is connected with it by a rapid and picturesque stream, continued by a long water course plenteously studded with lilies.

In Ragged Lake, in deep water, we found a Ling or Burbot (*Lota maculosa*), which species of fish is the sole fresh water representative of the *Gadidæ*, or the fishes of the cod family, in our Dominion.[2] The ling is elongated in shape, having two small barbels at the nostrils, and a longer one at the edge of the lower jaw. There are two dorsal fins, the first very short and the second very long ; and one anal fin which corresponds with the second dorsal in structure and plan. The caudal fin is barely attached to the second dorsal and anal, and is rounded at the extremity. The ventral fins, as in the cod and haddock, are jugular, or placed before the pectorals. The ling has scales but they are very minute and embedded in the skin, so that casually it might be mistaken for a scaleless fish.

As we were returning to the hut, we saw a skunk at the top of a timber-slide, which connects Ragged and Smoke lakes ; and the pleasure of seeing this beautiful creature in its native haunts was not accompanied with any pestiferous odour, the way, usually, in which most persons are made aware that that unpopular member of the *Mustelidæ* is in the neighborhood. The Skunk (*Mephitis mephetica*) is coloured black, and diversified with white down its sides, behind the head, and at the tip of the tail. It is subject, however, to variation, and this individual was very beautiful, because a great portion of the tail was waved with white. It was not in a hurry to get out of the way, as the porcupines were : the well known reason of this leisurely habit being on account of the

[2] The tomcod (*Microgadus*) might be considered an exception, but it is anadromous (or merely ascends rivers to spawn), its environment, ordinarily, being in salt or brackish water.

confidence the skunk places in its power to eject its strong malodorous secretion for defense against its would-be foes.

Next day we proceeded from Smoke Lake to South Tea Lake, until we reached the head of the Muskoka River, where we pitched our tent.

The Muskoka River is frequented by the Speckled or Brook Trout (*Salvelinus fontinalis*), which species of fish differs markedly from the salmon-trout in the absence of a toothed crest, or bony projection, on the vomer ; and in the lack of a band of teeth on the hyoid bone ; each of which characters is possessed by the latter. The speckled trout manifests great variability of size and colour, purely regulated, it would seem, by environment, for it inhabits streams, lakes, and even the sea. The sea run variety is known as *immaculatus*, specimens of which were obtained by Dr. Wakeham, at Fort Churchill, when in charge of the "Diana" in her Hudson Bay Expedition. The speckled trout is generally of a dusky green colour, and is ornamented along the sides with bright red spots.

At a bridge, crossing a dam, from which the Muskoka River has its rise, I saw one of those singular rodents called the Ground-hog or Wood-chuck (*Arctomys monax*), which creature, although belonging to the *Sciuridæ*, or the family of the squirrels, is exceedingly unlike these latter, both in general appearance and in its habits. It is thick-set in form, having little of the slender squirrel's nimbleness ; and it makes great burrows in the ground, something like those of a fox, instead of spending its time among foliage and at the tree tops. Typically the ground-hog is one of the marmots.

Everywhere among the lakes of the Park the Great Northern Diver (*Urinator imber*), well known as the loon, has its home. This bird inhabits the round of the northern hemisphere, and frequents both fresh and salt water, never venturing, however, far out to sea. I have seen it in Northumberland Straits, and among lakes without number in the provinces of Ontario and Quebec. The more one studies the habits of the loon the more interesting it becomes. One may frequently hear its weird cry by night and suppose that to be the limit of its vocalism; the truth is the number of sounds it utters is very varied. Then although it is most

at home upon the lake, or in pursuit of fishes beneath its surface, it can, once it has succeeded in gaining the open atmosphere, for it is so shapen that to rise from the surface of the water requires an effort, fly at its ease, and is thus enabled to carry on its change of haunt from place to place. As loons are dotted about, singly or in pairs, all over the lakes it is interesting to hear their calls to each other, for in this way they keep track of one another's whereabouts. It is rare to see more than a pair together, but during my visit to the Park—in Ragged Lake—one day I saw four, and as two of them, in the distance, seemed somewhat smaller than the other two, I take it that the four represented the two parent birds and the two of the season's brood, then almost matured, Owing to the posterior position of the legs and feet, after the manner of the penguins, which formerly were classed with the divers by ornithologists, the loon is very awkward on land, and so the nest, often a mere depression, is built close to the water's edge. The plumage and general contour of the loon is beautiful, and the bird is dignified with a brilliant red iris. The head and neck are lustrous greenish black, the neck being marked with white streaks, presenting a ring-like appearance. The back and wings are black variegated with white spots and marks, and the tail is black. The breast is glossy white. The eggs are two in number, occasionally three, olive-brown in colour, and covered with darker brown spots.

Few batrachians were observed excepting Bull Frogs (*Rana catesbiana*), which were basking in numbers along the muddy sides of Potter's Creek, a zig-zag water-way, forming an inlet to Canoe Lake; and I was struck with the vividness of their colours.

Of reptiles I was surprised at the almost entire absence of snakes, and the only representative of the class *Reptilia* which I saw was a large female snapping-turtle : nevertheless Mr. Bartlett informs me that turtles are common in the Park.

The Snapping Turtle (*Chelydra serpentina*) has the shell, or carapace, proportionally small, so that it cannot entirely retract itself. The plastron, or under shell, is still smaller in proportion. The tail is long and beset at intervals with solid and pointed shields or crests. The feet are webbed. This turtle is furnished with strong claws and hooked jaws, wherewith to defend itself; and may

therefore prove, if touched, to be quite a formidable creature.

The most common butterfly at the time of my visit (it was July) was the White-banded Butterfly (*Limenitis arthemis*). Across a dark brown ground colour there is on each pair of wings of this beautiful species a band of white, which at intervals is interrupted by lines of the ground colour. Near the apex of the anterior wings are a few white spots. Beyond the white bands on all the wings are green coloured spots, some of which are crescent-shaped, and the posterior wings are further ornamented with bright red spots All four wings are bordered with white crescent-shaped spots.

AN INTERESTING CATERPILLAR

(*Macrurocampa marthesia*, Cram.)

Two mature specimens of the above caterpillar were found by the writer on the 24th September last, one on the under side of a beech leaf, the other resting on the trunk of another beech tree in the same locality. This caterpillar, which is the larva of a very handsome notodontian moth, is rare in Ottawa, only one specimen having been collected here before, as far as is known, and that by Dr. Fletcher two years ago, a moth emerging on the 22nd June, 1901. In colour the larvæ much resemble the under side of the leaf. The first specimen found was nesting along the midrib. This habit has been observed before, and in view of the fact that the caterpillar possesses a dorsal stripe, which corresponds closely with the color of the ribs, as well also as the general colour resembling that of the leaf, it is much protected from observation. The larva is a rather heavily bodied caterpillar measuring about an inch and a-half in length, with two slender appendages at the anal end. It is said that this caterpillar when disturbed has the power of throwing out, from near the head, a rather copious shower of spray, or vapour, but the above two specimens although irritated many times would not do this.

ARTHUR GIBSON.

OOLOGY.

THE ACADIAN SHARP-TAILED SPARROW.

(Ammodramus caudacutus subvirgatus.)

The Museum of the Geological Survey has recently acquired a set of four eggs of this sparrow or finch, with the female, from Mr. R. W. Tufts, who collected them at Wolfville, N. S., on the second of June last. The label accompanying these specimens states that the nest from which the eggs were taken was built "in long thick grass near a salt marsh," that it was "very bulky, raised three or four inches above the ground, and composed entirely of dead grass." The eggs, which average 21 mm. by 15, are very pale bluish green, profusely sprinkled all over with numerous, close set and very small draggled brownish markings, rather than spots.

The "Acadian" is a local variety of the Sharp-tailed Sparrow, described by Mr. Jonathan Dwight, junior, in the *Auk* for July, 1887, but its nest and eggs seem to have been previously unknown, or at least unrecorded.

In the Survey's collection of eggs the genus *Ammodramus* (literally *sand runner*,) as now understood, and inclusive of the Grasshopper Sparrows (*Coturniculus*), is now represented by the following sets. Two of the Ipswich Sparrow (*A. princeps*) from Sable Island; one of the Savanna Sparrow (*A sandwichensis savanna*) from Toronto Island; four of the Western Savanna Sparrow (*A. sandwichensis alaudinus*) from Assiniboia and Alberta; two of Leconte's Sparrow (*A. lecontei*) from Assiniboia; and one of the Acadian Sharp-tailed Sparrow, from Nova Scotia. But, in one of the sets of Leconte's Sparrow three of the four eggs are Cowbird's.

J. F. WHITEAVES.

A HYBRID OF SHEEP AND DEER.

Having heard of a hybrid born to a sheep owned by a farmer at New Limerick a town in Maine, U.S.A., I wrote for a description of it and received the following account :—

"It was dead when born and the nose was some decayed. Except that it had a tail, there was nothing like a sheep about

it. Its nose was long making a slim head instead of a round head like a lamb's and its ears were long. Its body was covered with hair, just straight deer hair. We did not notice any spots on it and it looked dark, probably on account of being wet. Its feet and legs were like deer's not sheep's. You know a sheep's dew-claws are closer down to its hoofs and we noticed that difference particularly. The neck was long and slim. What I thought it resembled most was a tiny horse. She must have gone a sheep's full time, or the hair and hoofs would not have been so well developed, but it was certaintly a very small lamb."

A similar hybrid was killed for mutton at. Fort Kent, Maine, in the fall of 1901. Have been unable to get any description of it.

WM. H. MOORE.

Scotch Lake, York Co., N. B.

CAPTURE OF THE WHITE-EYED VIREO NEAR WOODSTOCK, ONT.

By W. D. HOBSON, Woodstock, Ont.

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

About two miles from Woodstock, we have a piece of woodland composed of small cedars, with here and there a little grassy glade, and some patches of hawthorn and second growth maple. It was here on the 25th day of April, I stole up to a thick clump of cedars to listen to the marvellous song of a ruby crowned kinglet. As I sat down on the mossy trunk of an old decaying cedar, in whose branches perhaps the ruby crown sang five hundred years ago, I thought, if Nature had only made the ruby crown as large as the eagle and its voice in proportion would it not have converted its favorite spots into veritable temples of music. As I listened a bird came flitting from branch to branch which I took for a yellow-throated vireo. On securing it I was surprised to find the iris of its eyes white, and on looking it up I found it to be the white-eyed vireo. This identification has been confirmed by Mr. W. E. Saunders, of London, to whom I have sent the specimen. It appears to be the first one recorded for Canada.

THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.*

This Catalogue is an outcome of systematic efforts on the part of a committee of the Royal Society of London together with the co-operation of governments throughout the world to arrange scientific literature both as to subject matter and to authors' names. The first literature to be included is that of January, 1901.

The main purpose of this Catalogue is to furnish scientific investigators with a ready means of ascertaining "most easily what has been published concerning any particular subject of inquiry."

The Catalogue includes the following branches of science :—

A. Mathematics.
B. Mechanics.
C. Physics.
D. Chemistry.
E. Astronomy.
F. Meteorology (including terrestrial magnetism).
G. Mineralogy (including Petrology and Crystallography).
H. Geology.
J. Geography.
K. Palæontology.
L. General Biology.
M. Botany.
N. Zoölogy.
O. Human Anatomy.
P. Physical Anthropology.
Q. Physiology (including experimental psychology, pharmacology and experimental pathology).
R. Bacteriology.

The subject matter is grouped under a number of headings.

A Central Bureau edits and publishes the "Catalogue." Regional bureaus exist with a view of furnishing the Central

*The late Dr. G. M. Dawson, a director of the Geol. Survey Department, during his life-time, did much to assist the Canadian Government and the committee of the Royal Society of London in furthering the objects of the International Catalogue of Scientific Literature.

Bureau with the literature of each region covered by the International Convention. Prof. J. G. Adami, of McGill University Medical School, Montreal, is in charge of the Canadian Bureau.

The International Council meet in convention in 1905, and then every ten years, in London. So far, the following countries are represented on the Council, whilst twenty-nine Regional Bureaus have been established.

The United Kingdom.	Russia.	Germany.
India.	Denmark,	France.
Norway.	Greece.	Mexico.
Sweden.	United States.	Cape Colony.
Switzerland.	South Australia.	Austria.
Victoria.	Holland.	Japan.
Hungary.	Italy.	

An executive committee of seven has been named, with Dr. H. Forster Morley as Director. The price of each volume is twenty-one shillings.

H. M. AMI.

REVIEWS.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE. First annual issue. Two volumes, (D) Chemistry, and (M) Botany. Part I. of each.

D. CHEMISTRY. 468 pages. 1902.

Part I. This Catalogue, like all the others of the same series recently inaugurated by the International Council under the auspices of the Royal Society of London, consists of three parts, viz.:

(*a*) Schedules and Indexes in four languages.
(*b*) An Authors' Catalogue.
(*c*) A Subject Catalogue.

This Part contains records of work done in 1901 by various chemists the world over, and gives the most recent and approved methods of recording the same. The subjects treated include the following :—

Chemistry of the Elements ; Laboratory procedure ; Organic (Carbon) Chemistry ; Hydrocarbons ; Alcohols and ethers ; Acids ;

Aldehydes ; Ketones ; Amino compounds ; Azo-compounds ; Carbo-hydrates ; Glucosides ; Resins ; Mixed Cycloids ; Organo-metallic and allied compounds ; Alkaloids ; Protoids , Coloured compounds ; Operations in Organic Chemistry ; Analytical Chemistry ; Theoretical and Physical Chemistry, and Physiological Chemistry.

Notes on the manner in which the various entries are to be catalogued are given, and as in the case of "Theoretical and Physical Chemistry," the following sub-heads are given :—

General ; Conditions and laws of chemical change ; Mass properties ; Mechanical properties ; Thermal properties ; Electrical and Magnetic properties ; Optical properties ; Photo-Chemistry.

Such a volume is indispensable to the practical chemist of to-day in whatever department of that comprehensive science he happens to be interested. A list of the journals which publish chemical papers, etc., is appended at the end of the volume as well as a complete Index which adds greatly to its value and usefulness.

M. BOTANY. 378 pages. 1902.

Part I.—This Catalogue of the writings on Botany during the year 1901 contains 378 pages of text and includes, like all the catalogues of the International Catalogue of Scientific Literature, three distinct parts, namely : (*a.*) Schedules and Indexes in four languages. (*b.*) An authors' catalogue. (*c.*) A subject catalogue. The subject catalogue is divided into sections. As this is the first part of the first volume pulished by the Royal Society of London, a number of notes on the methods employed in cataloguing the Botanical works of the year and subsequent years are presented, and are of special value. It shows clearly how very complete the scheme of classificati n has been drawn.

The primary divisions adopted correspond to the recognised branches of the science of Botany. Both recent and fossil Botany is dealt with in this volume. The stratigraphical grouping of entries relating to fossils will, of course, be left exclusively to Palæontology. Besides works referring to the Philosophy of Botany, there are also those relating to History of that science and Bio-

graphy ; periodicals, reports of institutions, societies, congresses, etc. General treatises, text books, dictionaries, bibliographies, tables, addresses, lectures, pædagogy, institutions, museums, collections, economics and nomenclature. Then follow works on the various sub-divisions relating to External Morphology and Organography (including teratology). Anatomy, Development, and Cytology, Physiology, Evolution, Taxonomy, and Geographic Distribution. Besides general works on Taxonomy entries are made on the following lines, including Dicotyledons, Monocotyledons, Gymnosperms, Vascular cryptogams, Mosses and Hepaticae, Characeae, Algae and Schizophyceae, Lichens, Fungi, Bacteria and Mycetozoa Also plants of which the position is not ascertained by the slip-maker. No index accompanies this Part 1 of the Botanical Catalogue, but a long and useful list of Journals relating to Botany is added on pages 367-368.

H. M. AMI.

Geological Survey of Canada,

Ottawa, October 25th, 1902.

"A PETROGRAPHICAL CONTRIBUTION TO THE GEOLOGY OF THE EASTERN TOWNSHIPS OF THE PROVINCE OF QUEBEC," by John A. Dresser, M A., Principal of St. Francis College, Richmond, Que. Amer. Journ. Sc., 4th Series, Vol. XIII, No. 79, pp. 43-48, July, 1902. New Haven, Conn.

This interesting and timely contribution to the geology of the much disputed region of the Eastern Townships of the Province of Quebec, is accompanied by a sketch-map of that part of the Townships where the three belts of supposed Pre-Cambrian rocks occur. It is gratifying to see the excellent results obtained from the petrographical examination of the igneous rocks which make up these belts as given by Mr. Dresser. These rocks have been variously described as altered sedimentaries, or referred to Pre-Cambrian eruptives.

The Sutton Mountain and the Ascot or Stoke Mountain belts are the two more important of these, and the rocks which make up these hills are described by Dresser in a manner which shows conclusively that we have there well-defined altered igneous rocks. "Quartz-porphyry" and "granite-porphyry" are recorded from

the Stoke Mt. belt, whilst the Sutton Mt. belt reveal the presence of "altered greenstone of an amygdaloidal character." "In the microscopic section, a little primary plagioclase sometimes remains, but in many sections the whole field consists of a secondary aggregation of chlorite, epidote, iron ore and leucoxene. The amygdules usually consist of quartz and zeolitic minerals." Dresser correlates these belts with chains of volcanic rocks described from Pennsylvania by the late Dr. G. H. Williams. After describing the structure of the region, that author gives the summary of his results as follows:

1. That at least the greater portion of the Pre-Cambrian or crystalline belts of the Eastern Townships of Quebec is of igneous, not sedimentary origin, as has been hitherto supposed.

2. That these rocks are allied to the volcanoes of South Mountain, Pennsylvania, especially to the basic types, and indicate the continuance of this class of rocks throughout the Appalachians, as was suggested by Williams.

3. That the sediments of the region, which probably all belong to the Quebec Group, were deposited between and upon preexisting ridges of igneous material, which are now being uncovered by denudation, while the intervening valleys still remain deeply filled.

Principal Dresser confirms the anticline theory of the structure of these mountains, which view was first held by Dr. A. R. C. Selwyn, a former member of the Club. In the January number of the OTTAWA NATURALIST for 1901, Dresser advanced the view that a portion of the Pre-Cambrian belt which forms the Sutton Mountain belt was of igneous origin. Some of the rocks of the area examined by Dresser are important as copper-bearing deposits. This paper is one of the foremost contributions to the true interpretation of the geological structure and origin of the rock formations of the Eastern Townships.

H. M. AMI

NOTE TO MEMBERS.—The winter programme is now being got ready and the chairman of the Soirée Committee will be pleased to receive from members of the Club the titles of the papers they are prepared to read.

ON VERTEBRATA OF THE MID-CRETACEOUS OF THE NORTH-WEST TERRITORY.— (1) DISTINCTIVE CHARACTERS OF THE MID-CRETACEOUS FAUNA, by Henry Fairfield Osborn.—(2) NEW GENERA AND SPECIES FROM THE BELLY RIVER SERIES (MID-CRETACEOUS), by Lawrence M. Lambe.

This important memoir is the second part of the series issued by the Geological Survey of Canada, in quarto form, containing descriptions of Canadian fossil vertebrata. The first part, prepared by the late Professor Cope, contained descriptions of the Oligocene fauna from the Cypress Hills; the issue of a contemplated second part on the Vertebrata of the Laramie formation of the North-west Territory, by the same author, was prevented by his death in 1897. The present memoir contains Mr. Lambe's descriptions of the extensive collections of fossil vertebrata made by him in the Belly River formation in 1897, 1898 and 1901, and an introductory part by Professor Osborn, in which the relations of this fauna to that of the typical Laramie Cretaceous and of the so-called Laramie of Montana is discussed.

The Belly River series is of Mid-Cretaceous age, as is shown by the stratigraphy. It is overlain by marine strata of the Fort Pierre and Fox Hills groups, and these in turn by the Edmonton fresh-water series of true Laramie age.

The geological record gives rather scanty information about the inhabitants of the land areas of the Mesozoic. Considerable is known of the land animals of the Trias, and the Upper Jurassic land fauna is large and varied. Then we have a gap, lasting until the end of the Cretaceous, when the equally extensive and varied Laramie fauna appears. The Belly River fauna, of Middle Cretaceous age, reduces this gap very considerably, and assists greatly in tracing the relationships and lines of descent in the two widely separated faunas of the Upper Jurassic and the Upper Cretaceous. It is much nearer to the Laramie, but some Jurassic groups still survive in highly specialized types, while the groups which belong to the Upper Cretaceous show many archaic characters in this older horizon. It "is distinguished from that of the Upper Jurassic (Como Beds, Purbeckian) by the entire absence of Sauropoda and by the presence of Ceratopsia in great variety. It is affiliated with that of the Jurassic, and so far as we know

separated from that of the Laramie by the presence of highly specialized Stegosauria or plated Dinosaurs, by numerous turtles of the Jurassic family *Pleurosternidæ* and by numerous large Plesiosaurs."

Professor Osborn shows that the Belly River fauna is related to that from the so-called Laramie Cretaceous of the Judith River region in Montana, much more nearly than it is to the typical Laramie of Wyoming, and that there is stratigraphic evidence that a part of these Judith River beds may be considerably older than the true Laramie. He therefore considers that a part of the so-called Laramie vertebrates of Montana are probably of Mid-Cretaceous age. But no certain results can be reached on this point until the stratigraphy is better known.

The fauna described by Mr. Lambe is chiefly of land and fresh-water groups; some marine types, however, are present. There are thirty-four species represented, of which nearly half are new to science. Turtles, especially *Trionyx*, are very abundant. The Dinosaurs are the largest and most important part of the fauna. The slender, long-limbed and long-tailed, swift-running types are represented by a large species of *Ornithomimus* estimated at 22 feet in length. The most characteristic Dinosaurs are of the Iguanodont or duck-billed, and Ceratopsian or horned groups; these show various primitive features when compared with the corresponding forms in the true Laramie. *Stereocephalus* is a new genus of Stegosaur or Plated Dinosaur with very massive skull armour and protective bony rings around the neck, which very much suggest the tail armature of the Edentate *Glyptodon*. Two mammals are also described, a rare discovery in any Mesozoic formation.

Much credit is due Mr. Lambe for the twenty-one excellent plates with which the work is illustrated.

W. D. MATTHEW.

THE OTTAWA NATURALIST.

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DR. ALFRED R. C. SELWYN, C.M G., F.R.S., DIRECTOR GEOLOGICAL SURVEY OF CANADA, 1869-1894.

The subject of this brief notice, who for twenty-five years controlled or advised the undertaklng of all the official geological work performed by the Dominion of Canada, died of paralysis at his home in Vancouver, B.C., on Sunday, Oct. 19th, 1902.

Death doubtless came as a happy release to one who had passed the allotted age of man, and who, owing to weakness and the ever-growing infirmities of age, was deprived from taking that active part to which he had been so long accustomed, and which was so essential to his happiness and well-being. His passing away, however, though not unexpected, came as a shock to his family, and especially to his daughter who resided with him, and on whom devolved the care and attention during these declining years, of him who had been one of the world's greatest geologists. His former colleagues, especially the older members of the Geological Survey, grieved for the loss of one who had been a friend and old-time co-worker, at the same time feeling that science had sustained a distinct loss.

He was born at Kilmington, Somerset, Eng., July 28th, 1824, and was the son of the late Rev. Townshend Selwyn, Canon of Gloucester Cathedral, by his wife Charlotte Sophia, daughter of Lord George Murray, Bishop of St. David's, and granddaughter of John, fourth Duke of Athol. Instructed at home under private tutors, he was afterwards sent to Switzerland, where he completed his education. His early inclination towards the study of natural science, and especially of geology was soon

remarked, and to the end of his life he had abundant opportunity to gratify his desire in many widely separated areas. In 1845, at the age of 21, he was first employed as an assistant geologist on the survey of Great Britain, and received his earliest lessons in field geology, from no less a personage than Prof. A. C. Ramsay, who had the immediate supervision as local director of the work in England and Wales. Sir Henry de la Bèche, with the title of Director-General, had control of the whole organization of the Geological Survey. With Selwyn were associated as colleagues such well known men as W. T. Aveline, Edward Forbes, Sir W. W. Smyth, Sir Joseph Hooker, Dr. Lyon Playfair and others, while Oldham J. Phillips, Murchison, J. W. Salter, J. Beete Jukes and others, joined the Survey before Selwyn's retirement. Of Selwyn's work on the Survey, we find Ramsay saying, "His work there (on the Shropshire sheets) and here (North Wales) is the perfection of beauty," while Sir A. Geikie years afterwards states that "The geological structure is portrayed by Ramsay and Selwyn with a boldness and vigour, and at the same time with an artistic feeling which has hardly been equalled in geological section drawing." Towards the end of July, 1852, after seven years spent in the mountains of Wales, he was chosen by the Secretary of State for the Colonies, on the recommendation of his official chief, Sir Henry de la Bèche, as Director of the Geological Survey of the colony of Victoria, Australia. About the same time he was married to Matilda Charlotte, daughter of the Rev. Edward Selwyn, rector of Hemmingford Abbots, Hunts. To his new duties, Selwyn brought the wide experience gained in unravelling the intricate Lower Silurian rocks of North Wales, with their associated volcanic deposits which greatly assisted him in the mapping of the Silurian strata of Victoria. Under him were such able geological assistants as C. S. Wilkinson, H. Y. L. Brown, C. B. Brown, R. Etheridge, Jr., and others. He was almost continually in the field, and with the co-operation of his assistants, produced an admirable series of geologically coloured maps of the colony, accompanied by reports. At the time of Selwyn's appointment Victoria had just entered upon all the excitement attending the opening up of its wonderful gold-fields, so that almost his first work consisted in mapping out its

gold-bearing rocks and auriferous gravels of different ages, and tracing the relations of the latter to the Miocene of the colony and the older rocks. Two of the most important conclusions arrived at, and which were afterwards amply verified by experience, were the permanence and depth to which the auriferous veins of Australia could, and probably would, be profitably worked. The second was the extension of the auriferous deposits beneath the overlying Tertiary lavas of the plains. In addition to his regular work in Victoria he undertook special examinations of the Tasmanian and South Australian coal and gold fields. He was appointed one of the Victorian Commissioners of Mines in 1856; a member of the Board of Science and of the Prospecting Board in 1858; a commissioner for the Victorian International Exhibition in 1861; a commissioner for the London Exhibition in 1862; a commissioner for the Dublin Exhibition in 1865; and a commissioner for the Paris Exposition in 1866. For seventeen years (1852 to 1869) he was untiring in the discharge of his duties as Director, travelling over the colony and making detailed examinations of its geological structure. In the latter year, however, he retired from this position, the survey having been brought to an abrupt close by the Colonial Legislature refusing to vote the necessary supplies to carry on the work.

Selwyn, however, was not allowed to remain any length of time idle, for that same year (1869), on the retirement of Sir William Logan, he was chosen by the Canadian Government, on the latter's recommendation, to succeed him in the Directorate of the Geological Survey of Canada. He arrived in Canada in October, 1869, and took charge on the 1st of December following. On the 2nd of May, 1870, he issued his first "Summary Report of Progress on Geological Investigations," in which, after making mention of the work of the various geologists associated with him, he announces that "It has been decided to institute in connection with the Geological Survey a systematic collection of records of mines, and of statistics of the production and consumption of minerals in the Dominion." He invites the co-operation of all persons interested in mining to promote the object in view. A form was also printed for circulation amongst mine owners and managers, asking for prompt answers and returns to the Geologi-

cal Survey office. Professor R. Bell, now Acting-Director of the Survey, and Mr. Ed. Hartley, were requested to undertake their collection and arrangement ; Professor Bell in Ontario and Quebec and Mr. Hartley in Nova Scotia and New Brunswick. It will thus be seen that an effort at any rate was made to collect and tabulate mining geological information, which, if carried out on the scale originally intended, would have been of immense value to our country. In 1871, Mr. Selwyn was elected a Fellow of the Geological Society of London, and in 1874 a Fellow of the Royal Society. In 1876 he was awarded the "Murchison Medal" by the council of the Geological Society of London in recognition of his services to Silurian geology. In 1876, Mr. Selwyn was assistant to the Canadian Commissioners at the Centennial Exhibition held in Philadelphia, at the Paris Universal Exhibition in 1878, and at the Colonial and Indian Exhibition in London in 1886, and at the World's Fair, Chicago, 1893. All of these appointments involved an enormous amount of labour superintending the preparation of descriptive catalogues and notes of the minerals and rocks exhibited in the Canadian Court on each occasion. At Paris, in 1878, he was chairman of the Jury on Cartography (Chevalier of the Legion of Honour), while at Chicago he was one of the judges in the Department of Mines. In 1881 he received the honorary degree of LL.D. from McGill University in recognition of the eminent services he had rendered to geological science. On the organization of the Royal Society of Canada, he was chosen as one of the original Fellows by the Marquis of Lorne. Under his direction the offices of the Survey were removed from Montreal to Ottawa in 1881. In 1886 he was created a C. M. G. in appreciation of his geological work.

Dr. Selwyn remained in the active discharge of his duties until the 1st of January, 1895, when he was succeeded by the late Dr. Geo. M. Dawson, C. M. G. In 1896, as Director of the Geological Survey, he was elected president of the Royal Society of Canada, and on the evening of May the 19th of that year, delivered his address on "The Origin and Evolution of Archæan Rocks, with remarks and opinions on other geological subjects; being the result of personal work in both hemispheres from 1846 to 1895." This may likewise be called his farewell address, for in the few remaining

years of his life, he added little or nothing to geological literature. In this connection it may be stated that although he had a wonderful command of the English language, being a rapid and accurate writer, he continually affirmed his dislike of "rushing into print." Indeed, in the address above referred to he says: "being conscious of my lack of oratorical or scriptorial qualifications, I have rarely been induced either to talk or to write for publication, or I may have been like Werner, who we are told had an antipathy to the mechanical labour of writing. However this may be, the result was, that I had more time for observation by which I certainly gained, and probably no one lost anything; because whenever I made out, or thought I had made out a fact having a practical bearing, it was at once communicated to the persons who were immediately and directly interested, and could practically test the correctness or otherwise of the observation." This excuse however can scarcely be considered sufficient in itself to account for the fact that there are not more publications credited to him, while director of the Canadian Geological Survey. It must nevertheless be perfectly obvious to anyone who has the slightest acquaintance with the work of the Geological Survey, that the man who undertakes the very arduous duties incident to the administration of a department with functions necessarily so varied, and territory to be covered so vast, must be cheerfully content to live as a geologist through the labours of his staff. Notwithstanding these administrative duties, however, Selwyn generally found time each year to make some special investigation or by travel through wide stretches of territory to gain such an insight into the general geology of the country, as would enable him to supervise more intelligently the work of the other geologists under him. In Canada his influence was perhaps most directly felt in the fresh impulse he imparted to the recognition of the importance of stratigraphical geology. The emphasis he laid on the value of this, to him the most valuable criterion for the determination of the age of the various sedimentaries, may be gathered from his oft-repeated assertion: "If the fossils do not agree with the stratigraphy so much the the worse for the fossils." Another point on which still greater insistance was made, was the certainty of the frequent and

wide-spread occurrence of interstratified volcanic material in the Pre-Cambrian rocks. On this point on Feb. 19th, 1891, we find him writing to the late Prof. G. H. Williams: "I have read with much interest your excellent description of the Sudbury rocks. You will perhaps excuse if I make one criticism on the last paragraph, where you observe: 'The rarity of such rocks,' etc If by this you mean the rarity of what I should call ancient volcanic or eruptive ejectamenta, then I think you should rather say: 'The very recent recognition of such rocks by United States geologists.' It is now more than half a century since they were recognized in these ancient formations by British geologists.....Our Huronian is often largely made up of volcanic matter originally—like those of recent times--molten, muddy and fragmentary, but now unlike those of recent times—all more or less metamorphic."

The Logan Club, organized mainly for the purpose of discussing and criticizing results of field work before their presentation to the public in the shape of reports, always received his warmest sympathy and active support, and he was very rarely absent from any of these interesting and instructive fortnightly gatherings. On those nights especially when the subject of the origin of the Archæan rocks was in debate, he was particularly in his element, and although not a petrographer his wide experience in the field in two hemispheres, caused his opinions to be listened to with much attention and respect.

In this connection, it is a pleasure to state that his classification of the Archæan given in the Report of 1877-78 is, with very slight changes, substantially the same as that favoured by the more recent work.

His firm and always strongly expressed convictions frequently brought him into dispute and occasional antagonism with those with whom he came in contact, while a hasty temper served at times to accentuate and render difficult of adjustment many of these differences of opinion.

His friends and geological associates were, however, thoroughly convinced that those he held in highest esteem were those men with whom he had the most frequent and heated arguments. In one of his last publications, the address as President

of the Royal Society of Canada, he says: "If I have hurt anybody's feelings I must apologize to those who feel it so; my only excuse must be my conviction of its truth."

Some years have passed since he left Ottawa, for in the fall of 1896 he removed to Vancouver, British Columbia, where, after half a century of active service in the field, he enjoyed a few years of well-merited rest. Who can estimate the value of his services to our broad Dominion? The years that have passed have served not only to show the faults but also the general success of his administration.

In the course of his career as a geologist he was spontaneously elected to more than fourteen scientific societies in various parts of the world. The loss of his wife, in 1882, was certainly a cause for deep and lasting sorrow and regret for one who was pre eminently his adviser and help-meet through the various worries of administrative work.

He was the father of nine children, five of whom survive him, four sons and one daughter.

In closing this brief and hurried biographical sketch, the writer can best close with the quotation from Tennyson which Dr. Selwyn himself used at the end of his famous address:

> "But in my spirit will I dwell
> And dream my dream and hold it true;
> But though my lips will breathe adieu,
> I cannot think the thing farewell."

A. E. B.

December 1st, 1902.

NESTING OF SOME CANADIAN WARBLERS.

SECOND PAPER.

By W. L. KELLS, Listowel, Ont.

NESTING OF THE BAY-BREASTED WARBLER.

It is now over twenty years since I began to form my cabinet collection of the oology of Listowel and vicinity. Having first taken specimens of what species I could find near home, I set out one June day into the forest that then existed on the northwest of the town, and soon found myself in a tract of swampy woods, composed mostly of black ash timber, with an intermingling of conifers and some hardwood. Here, a number of species of the warbler family, as well as other birds, some of which were yet unknown to me, were giving vent to their songs; some low down in the brush-wood, others more elevated among the denser foliage. Here the first nest that claimed my attention was one placed on the side of a small birch tree where a tuft of twigs grew out from the ground. I soon reached and secured this ; it contained three fresh eggs ; these were of a white hue, with dottings and patches of a brownish or flesh color, the nest itself being composed of fragments of bark, rootlets and hair. I did not then note the owner, nor could I, at that time, have identified the species, but I gave them a name, and placed them in my collection. Two years after—June, 1879—I was out in a piece of swampy woods south of the town, when my attention was arrested by the actions of a small bird which was constructing a nest among some leafy twigs growing on the small horizontal branch of a little water-elm, about three feet out from the trunk and ten feet off the ground. Some days after I viewed this nest again, it then contained one egg, and three days more, when I revisited it, I found the bird at home, sitting on three eggs, which I inferred were the full set, and that incubation had begun. When this bird flew off her nest and took a position on a branch near by, uttering a few chip-like notes, I identified her as a female bay-breasted warbler. This nest and eggs were exactly like those above described, and of course both belonged to the same species. Some days after this I found another nest of this bird in a

neighbouring *lowland* wood ; this was placed in the top of a small hemlock, about fourteen feet from the ground, constructed of similar materials, and contained four eggs. Since then, no nest of this species with eggs has come under my observations, but I have noted a few others in which young had apparently been raised. One of these was on the side of a small cedar, where a little branch grew out, and about four feet off the ground ; another, evidently a new nest, but after the breeding season when I found it, was placed among some leafy twigs on the side of a pretty large birch tree, five or six feet from the ground. This, with a set of the first eggs of the species that I took, are still in my collection, and a notable feature about the nest of this find is, that the beginning and outside of the nest is ornamented with pieces of birch bark, and usually also with insect cocoons. It much resembles the nest of a chipping sparrow, but there is less hair in the inside, and the foundation is less bulky. Inside it is about two inches across, by one and a half deep.

Of late years much change has been effected in the low grounds where was once the haunt and home of this species; during the summer season cleared fields, over which the binding-reaper is driven, now meets the eye in the harvest time, where twenty years ago the swampy forest stood, and with the disappearance of the soft-wood forest most of our woodland warblers take their departure, and have their summer homes in their ancient haunts no more. In my occasional woodland rambles late in May and early June, I still hear the melody of this warbler intermingling along with others of its family relations, and no doubt some of the species still nest in the remnant of our lowland woods, but into such places I do not now care to penetrate and explore. To reach these places long walks are necessary ; at the nesting time the ground is still wet, logs and brush impose hardships not pleasant to encounter, and the moment a person enters the deep shade he is assailed by swarms of mosquitoes, which, to say the least, is very trying to weak nerves. Then, though the birds whose nest is sought for, may be both heard and seen, there are ten chances to one that no nest is discovered, even though such might exist within a few yards of the searcher's standpoint. Again should a nest be discovered, it may contain eggs well incubated,

which cannot be properly prepared for the cabinet, and it would be a crime to take them. Or it may be that a nest is found just ready for eggs, or containing only a partial set, in this case the collector desiring a full set of fresh eggs, leaves the premises, with the intention of returning after a certain number of days. But on the date intended, some other business, or a heavy rain may prevent the re-visit, or should the return be accomplished after a long and weary walk, it may be that an empty nest or a few bits of egg-shells meet the collector, and rewards his toil. Such has been some of my experiences. Prof Oliver Davie in the 4th edition of his "Nests and Eggs of North American Birds," says: "The Bay-breasted Warbler is known to breed from Northern New England and Northern Michigan northward. Mr. William L. Kells found it breeding in the vicinity of Listowel, Ontario, in low, swampy woods, where is a mixture of evergreens, ash, birch, elm, and other soft-wood trees. The nests are compact, cup-shaped structures, usually placed in coniferous trees from five to fifteen feet from the ground. Mr. Kells found a nest placed between a slender limb and the trunk of a small cedar about five feet up; another was found in a hemlock at an elevation of fourteen feet."

Mr. Thomas McIlwraith in his second edition of the "Birds of Ontario", writing on this subject, says: "Listowel seems a favorite locality with the warblers, and Mr. Kells evidently gives them some attention, for this is another species which he found breeding in a low, swampy mixed bush, not far from his home. Mr. Kells found a nest placed between a slender limb and the trunk of a small cedar, about five feet up. Another was found in a hemlock at an elevation of fourteen feet." An article of mine on the nesting of the bay-breasted warbler, published in The Ornithologist and Oologist, vol. ii, was the source from which Mr. Davie derived his information. Writing of this species H. G. Venner recorded the following paragraph: "This species is much rarer than the myrtle warbler. Very few individuals breed in our vicinity. It is rare all through the United States, and from all accounts must breed further north. Likely they breed in Newfoundland and Labrador. Low thickets and tangling shrubbery are favorite resorts of the species. Sometimes they may be seen running along fence-rails, searching in every

crevice and hole looking for their prey. As this species is not mentioned by any European naturalist, it must be foreign to that continent."

THE BLACK-THROATED BLUE WARBLER (*Dendroica cærulescens*).

The favorite habitat of this species is high hardwood timbered woods, where there is a thick growth of underbrush ; and while the male warbles his melody high among the branches, where also he loves to glean his insect food amid the green foliage, the female usually selects a lowland situation for the cradle of her progeny; and in common with other small birds that nest in similar positions she is often compelled to become the foster parent of one or more of the young of that feathered parasite, the cow-bird.

For some years previous to the summer of 1886, I had suspected that this species nested in different tracts of hardwood forest situated to the northwest of Listowel; and this idea rested on the fact that the song-notes of the male bird were often heard and frequently repeated in animating strains at a period when I thought the female should be nesting ; but from the elevation at which this melody was emitted, I supposed that the nesting site of the female would also be at a high elevation from the ground, and I therefore had no expectation of discovering its nest among the low brushwood, in any of my wildwood rambles. However, on the afternoon of June 5th, 1886, when out in a tract of low, thick underwood, about a mile to the west of Wildwood, I found a nest with one egg, which at first I took to be one of a chestnut-sided warbler, so much did it resemble the nest of that species in form, size, materials of composition, and situation. The egg also had a much similar appearance ; but the different notes of the female owner of this nest soon attracted my attention, and I waited a short time till she came out of the thick foliage where she was concealed and approached the more open space where I was standing. Then I saw that she was quite a different species, and a more close examination of the nest showed that it was a more compactly formed structure than is usually made by the chestnut-sided bird, though the eggs of both species are much similar. The scolding notes of this bird soon brought her mate upon the scene, but he seemed more disposed to sport with her

than assist to drive off the intruder. Both birds, however, came quite close, and I identified them as a pair of the black-throated blue warbler species. Being anxious to secure this nest and a full set of eggs, I remarked the place, and returned four days after. Then the female was seated on the nest, and when she flushed off I found that it contained three of her own eggs and one of a cow-bird's. These I collected and prepared for my cabinet, but they have since passed to the collection of a gentleman in Philadelphia.

After I had secured the nest and eggs above described, on my homeward way I found another nest of the same species. This was also placed in the fork of a small maple twig, about two feet off the ground, and on the outskirts of a thick patch of low underwood, and then contained three young of the bird's own, two or three days old, and also a young of the cow-bird. I noted in both cases that the old birds on leaving the nests dropped to the ground and made quite a commotion among the dry leaves, evidently with the intention of diverting from the nests.

On the 24th of May, 1889, I took my usual holiday ramble to the high-woods west of Wildwood, where three years before I had first discovered the nests of the black-throated blue warblers. Two weeks before I had first noted the male birds for the season, and on this occasion, as I advanced into the woods, their melodies, intermingled with those of other species of woodland birds greeted my ears, and although the newly acquired foliage of the underwood rendered the view—in some places—quite limited, yet I had not gone far when a rather bulky nest of some small bird attracted my attention and led me to the spot. This was placed in the fork of a small hemlock shrub, about eighteen inches off the ground : the bottom was composed of a quantity of dry leaves, but this interior was formed of various woody fibers, lined with rootlets and a little cattle-hair. At first I thought that this belonged to some new species, but a closer examination of this nest, and the one egg that it contained, caused me to conclude that it was another nest of the black-throated-blue-warbler, and in this opinion I was afterwards confirmed, for on re-visiting it three days after, I found the mother-bird seated on the nest, where she remained till I almost touched her with my hand, and

then as she flushed off, making a rustling noise among the dry leaves on the ground, I fully identified her as a female of this species. To my disappointment this nest contained only two of the bird's own eggs, and one of a cowbird, but as incubation had evidently begun, I removed this nest and its contents, and these have since been in my cabinet. The eggs are of a clear white hue, irregularly dotted on the surface—especially on the larger end—with light reddish-brown spots, and average in size, 68x48 of an inch.

In later years some rather surprising circumstances in regard to the nodification of this species have come under my observations, for a number of seasons previous to the summer of 1895 ; I had noted some pairs of these birds to be summer residents in a tract of hard-wood timbered land on the northern part of Wildwood, and almost daily—if I happened to be in these woods—from the middle of May to the end of June, I was sure to hear their song notes, or see some of the birds themselves : and on several occasions : after the leaves had fallen. I saw some of their nests of the past season, but for a few years I failed to see any, either in the nesting period, or after the leaves had departed from the underwood ; so I came to the conclusion that the species had ceased to nest here, or nested higher off the ground, among the boughs of the hemlocks, a species of evergreen, with which this woodland was intermingled, and this opinion was confirmed by the finding of several nests that had been blown from their summer sites by the violence of the autumn winds. But the finding of a nest placed in the branches of a fal en hemlock, and another in a small brush-pile, gave me to understand that the species choose other nesting sites than either low bushes, or the more elevated boughs of the spreading hemlock, and in confirmation of this conjecture, I was still more surprised by the following cases : In the latter end of May, 1895, I became pretty sure that a pair of these warblers had a nesting site in a small patch of low, thick underwood, in the woodland, above referred to, but for this I searched several times in vain, so as the weather was damp and cold, thought that though the nesting site had been selected, that the nest was not made : but every time I visited that place the birds were not there. At last, after the

middle of June, I determined to make a final effort to find the nest if it was in that vicinity. Soon after I had entered the thicket, both birds greeted my intrusion by notes of disapproval. I then felt certain that a nest was near, and probably contained young : but again though every leafy bush and clump of dry leaves, even of those on the ground was examined, but no nest could be discovered, still the birds continued their excited scold, and came quite near. On one side of the thicket stood the turn up root of a large fallen tree, and when every other spot likely to contain a nest had been examined in vain, I turned my attention to this, and glancing upwards from my position on the ground, I caught sight of a nest. This was partly suspended, and partly supported among the rootlets of the "turn-up," but quite concealed from the observation of a person standing on the ground—even when close by—by a portion of soil which still adhering to some of the longer rootlets hung downwards, and over the site of the nest. On looking close at this nest I found that it contained four young, almost ready to fly.

In the early days of June, 1896, I found another nest of this species in the same woodland : but in a situation that I would never have supposed this bird would have nested in. In the deepest part of the wood, but near its eastern edge, a large red-maple tree had blown down, and in its fall it took down a smaller hemlock tree that stood in its way, the "turn-up" which was elevated only about two feet above the hollow out of which it had been torn, and beneath this was a small cave-like chamber, such as a winter-wren or a phœbe would chose to nest in. Looking into this one day, I discovered a nest placed on some rootlets, which at first sight I took to be that of the latter-named fly-catcher, but a little examination showed that this nest, and the two eggs which it contained, were those of a black-throated blue warbler. Two days after I revisited this nesting site, but no more eggs had been deposited, and no bird was there, it had evidently been forsaken, but the situation was a very strange one for a member of this genus to select for a nesting place. Up to the close of the season of 1902, no other nests of this species have been noted, and the bird is now quite rarely observed in this vicinity.

Pin this up for Reference.

THE OTTAWA FIELD-NATURALISTS' CLUB.

UNDER THE DISTINGUISHED PATRONAGE OF THE RIGHT HONOURABLE THE EARL OF MINTO, GOVERNOR-GENERAL OF CANADA.

PROGRAMME OF WINTER SOIRÉES, 1902-1903.

	1902.	
In the Assembly Hall of the Normal School.	Dec. 16.	—President's Address: "The Functions of a Geological Survey," by Robt. Bell, M.D., LL.D., Sc.D. (Cantab.), F.R.S.
		Address of Welcome, by the Principal of the Normal School.
		"*Some Ottawa Butterflies and Moths*," by Dr. James Fletcher, illustrated by coloured lantern slides.
		Conversazione, with exhibition of Natural History objects and microscopic slides.
	1903.	
In St. John's Hall.	Jan. 13.	—"*The Scenery of the Rocky Mountain Region*," illustrated by lantern slides, by Dr. R. A. Daly, of the Geological Survey.
		Report of the Geological Branch.
In the Assembly Hall of the Normal School.	Jan 27.	—"*The Wood-pulp Industry of Canada*," by Professor D. P. Penhallow, McGill College, Montreal, illustrated by lantern slides.
In the Assembly Hall of the Normal School.	Feb. 10.	—"*Nature Study in American Universities*," by Dr. S. B. Sinclair, of the Normal School, Ottawa.
		Report of the Entomological Branch.
In St. John's Hall.	Feb. 24.	—"*The Summer Climate of the Yukon and its Effects on Vegetation*," by Professor John Macoun, of the Geological Survey.
		Report of the Botanical Branch.
In St. John's Hall.	Mar. 10.	—"*Whales and Whale Hunting*," illustrated by lantern slides, by Professor E. E. Prince, Commissioner of Fisheries.
		Report of the Zoological Branch.
In St. John's Hall.	Mar. 17,	—(*a*) ANNUAL MEETING. Reports of Council, Election of Officers, etc.
		(*b*) "*Additional Notes on the Geology and Palæontology of Ottawa*," illustrated by lantern slides and specimens, by Dr. H. M. Ami, of the Geological Survey.

The meetings will be held at 8 p.m. on the *second* and *fourth* **Tuesdays** of the month, except in the case of the Annual Meeting.

President: Dr. ROBERT BELL, F.R.S.

Secretary: W. J. WILSON (Geol. Surv. Dept.)

Treasurer: ARTHUR GIBSON. (Central Experimental Farm.)

Membership Fee, O. F. N. C., with OTTAWA NATURALIST, $1.00 per annum.

Admission to Lecture Course Free.

In an article on the "Wood Warblers of the Vicinity of Montreal," by H. Venner, that writer speaking of this species, says: "This delightful little warbler is exceedingly rare in Lower Canada. Although nothing of a songster, its colors are very bright and rich, and its plumage in general neat. A small chirup is all that is heard from him as he flies from bush to bush. This warbler is seldom met with in our vicinity; one was shot there about four years ago, and I have not heard of one been seen since. Our museum has a very good specimen of this rare bird. Certainly it does not breed here regularly, if at all. A stray individual may sometimes remain to rear its brood on our mountain, but not often. Audubon traced this warbler through the upper part of New York, into Maine, the British provinces, and the Magdalen Islands in the Gulf of St. Lawrence. According to his account the nest is usually placed on the horizontal branch of a fir tree, seven or eight feet from the ground, and is composed of strips of bark, mosses, and fiberous roots, lined with fine grass and an inner lining of feathers. When this warbler is feeding among the branches of a tree, one can hear quite distinctly the snapping of its bill, as it pursues the insects from twig to twig. It is very active, but as we mentioned before, has no real song. Not even the pairing season does its notes become more musical. Before dismissing this interesting bird, I may be allowed to quote a few lines that Wilson has written respecting it. He says: "It is very probable that they breed in Canada, but the summer residents among the feathered race are little known, or attended to. The habits of the bear, the deer, or the beaver, are are much more interesting to those people; and for a good substantial reason, because more lucrative; and unless there should arrive an order from England for a cargo of the skins of warblers and fly-catchers, sufficient to make them an object worth speculation, we are likely to know as little hereafter as at present.

After reading the above article in the light of more recent discoveries; and scientific facts, the field ornithologist is likely to be considerably surprised at the limited amount of knowledge possessed by "the fathers" of American ornithology regarding many of our woodland birds. The nesting habits of the black-

throated blue warbler has probably not altered much since the days of Audubon, but our knowledge of its habits in this respect become more extensive and varied ; Audubon probably never saw more than one or two nests of this species, and these were probably placed in the situations he describes. Now, it is well known that it nests in various situations ; and from my earliest recollections of this species, I have noted it as a songster, and as warbling its not unpleasing melody as constantly then, as it is now known to do—on an early summer day—in the particular woodland, where it has its haunts and home. And in contradistinction to the time when Alex. Wilson wandered and wrote, there are now many persons in the Canadian provinces devoting the keenest attention—without mercenary motives—to the appearance and life-history of the feathered race : and the results of their observations is considerably effecting the ornithological literature both of Canada and the United States ; and when Venner wrote the article from which we have quoted ; he confessedly knew little of either the habits or the vocal acquirements of this species, or he would not have characterized it as a songless bird.

But though this little wildwood musician emits its song with clearness and animation, especially for the first few weeks after its arrival from the sunny south, yet it must be admitted that its song notes are not remarkable for the sweetness of their melody, for in its refrain there seems a melancholy plaintiveness, as though the little performer was complaining that it was seeking in vain for something that it had loved but lost. Yet, as adding a varying strain to the great orchestra of the wildwood wilderness, it must ever be interesting to the lovers of bird music, and the students of animated nature.

The male of this species is about five inches in length, and in his spring plumage of a uniform slaty blue color on the upper parts, the throat is black and the lower parts white, the plumage of the female is of a duller hue.

BRIEF DESCRIPTION OF THE MAP OF THE "OTTAWA DISTRICT."

By H. M. AMI.

An uncoloured copy of the "Geological Map of the City of Ottawa and Vicinity," prepared by the Geological Survey of Canada, and recently issued by that department of the Government service to illustrate Dr. Ells's report, has been sent to every Canadian member of the Ottawa Field-Naturalists' Club. The scale of the map is one mile to the inch. It comprises an area of some 450 square miles with Ottawa as centre. The Ottawa River divides the district into two practically equal parts, the northern half of which is intersected by the Gatineau and Blanche Rivers, whilst the southern half is divided into two sub-equal portions by the Rideau River and Canal of the same name.

The map was prepared from surveys made specially for the purpose by Messrs. Scott Barlow, James White, R. W. Ells, W. J. Wilson, and other members of the Geological Survey staff, also from plans of the Department of Railways and Canals, and of Crown Lands of Ontario and Quebec. The geological boundaries were laid down from geological and palæontological surveys by Dr. Ells and the writer. The different lines of railways coming into the city from the north, south, east and west are all indicated, likewise the various electric roads, and all the roads surveyed up to the date of issue.

The various islands, light-houses, points, and other features along the channel of the Ottawa from Eardley township to L'Ange-Gardien in Buckingham township are also indicated.

On the Ontario side of the Ottawa, the map includes portions of the townships of March, Goulburn, Nepean, Gloucester, Osgoode and Cumberland, and the Ontario shores represented on the map extend from a point three miles northwest of Shirley Bay to a point two miles east of Danniston post office in the township of Cumberland.

The geological boundaries are indicated by more or less sinuous and finely dotted lines, and any scale of colours could be adopted by the possessor of the map, were it his or her wish to

colour the same as a geological map. Besides indicating the outcrop of the Archæan crystallines to the north of Ottawa, the geological map gives the latest and most accurate information regarding the extent and distribution of the following Palæozoic formations in ascending order : Potsdam, Calciferous (or Beekmantown formation of the New York geologists), Chazy, (both the lower shales and upper limestones), the Black River, Trenton, Utica, Lorraine and Medina. Single copies of the geologically coloured map, however, can be obtained from the leading booksellers at Ottawa : Hope & Sons, Ogilvy, and Thorburn, or from the Librarian of the Geological Survey of Canada, for the nominal sum of ten cents.

Among the principal features indicated are the location of the iron, apatite (phosphate of lime), mica, barytes and other mines of the Ottawa district, besides quarries and brick-yards. The heights or elevation of a number of points, above sea-level, is also indicated. The bore-holes put down for water, oil, gas, salt, etc., at different times in the district, together with the depth reached are likewise inserted.

The leading post offices and railroad stations indicated on the map, and the roads leading to them include the following :

In Ontario :—Billings's Bridge, Merrivale, Chaudière Junction, Bowesville, Gloucester Station, Rideau View, South Gloucester, Leitrim, Hurdman's Bridge, Hawthorn, Ramsay's Corners, Piperville, Edwards's Station, Eastman's Springs, Borromée, Blackburn Station, Blackburn P. O., Cyrville, Robillard, Orléans, Danniston, Notre Dame de Lourdes, Janeville, Cummings's Bridge, Clarkstown, Gateville, Harbord P. O., Bayswater, Hintonburgh, Mechanicsville, McLeanville, Skeads, Westboro', Britannia Station and Village, Bell's Corners, City View, Hazeldean, South March Station and post office.

In Quebec :—Hull, Tétreauville, Aylmer, Kingsmere, Old Chelsea, Chelsea, Kirk's Ferry, Gatineau Station and Village, Ironsides, Wrightville, Ste. Rose de Lima, East Templeton Station, Quinville, Cantley, Cousineau, L'Ange-Gardien Station and Village of Angers.

The Mer Bleue or Peat Bog to the east of the city is also indicated, whilst Meach's Lake, Kingsmere and other smalle

bodies of water, besides the numerous small streams intersecting the plain to the south of the Ottawa, and the hilly country to the north are also given. Such geological phenomena as faults, strikes, dips, glacial *striæ*, and localities where *fossils* have been collected to advantage have also been added.

Such a map is of incalculable value to the Club. It is with pleasure that we learn that the Council has secured copies upon which much of interest can be indicated and accurately located. A forest tree-map of the Ottawa district might well be prepared by the members of the botanical section of the Club, whose observations have led them to take notes on the trees of the Ottawa district whilst faunal maps giving the distribution of certain species or groups of animals of the district could well be prepared by members of the zoological section. A map indicating the distribution of the Pleistocene formations might also be prepared, for besides the notes already published by various members of the Club on the Pleistocene formations of the Ottawa district in THE OTTAWA NATURALIST, there must be a large amount of material awaiting publication. There is no better mode of recording phenomena of nature than upon a map, and when the late Dr. Selwyn devised the scheme of preparing geological maps of the leading cities of Canada, he knew full well the value of such, and to-day, he deserves well of the members of this Club as do his successors, Dr. George M. Dawson and Dr. R. Bell.

The map just issued fills a want long felt by every member of the Club, and whilst it does not profess to be accurate in every detail, still claims to be the latest and best map of the Ottawa district, upon which are indicated all the principal features and occurrences such as would strike the thoughtful observer.

It is hoped that at no distant date a contour-map of Ottawa and its vicinity will be prepared. Its need is greatly felt, and would serve to indicate the topographic forms prevalent within the area covered by the Ottawa district.

Geological Survey of Canada,

Ottawa, November 21st, 1902.

NOTE.—Extra copies of the accompanying uncoloured map of "the Ottawa District" may be obtained from the Treasurer of the Club at the nominal price fixed, ten cents per copy.—EDITOR.

REVIEW.

MACOUN, JOHN. CATALOGUE OF CANADIAN PLANTS, Part VII. LICHENES AND HEPATICÆ, pp. 318. Geological Survey of Canada. 1902.

Since the publication of Part VI of this Catalogue ten years ago there has been no more important contribution to Canadian Botany than the volume recently published by the Geological Survey Department. The author has succeeded in compiling and tabulating all our available knowledge of Canadian Bryophytes and Thallogens, and Parts VI and VII taken together constitute a work upon which all future study of these great classes in Canada must be based. In Part VII, Prof. Macoun enumerates 53 genera and 196 species of Hepatics and 59 genera and 410 species of Lichens, with of course many varieties. In the addendum 243 species of Mosses are added to those enumerated in Part VI.

The greater part of the material examined by Prof. Macoun is included in the Herbarium of the Geological Survey where Canadian cryptogams of the above classes are represented by over 16,000 sheets of specimens, the chief part of which were collected by the author himself. Botanists from all parts of Canada have, however, assisted in making the list complete, and few, if any, printed lists of species have been overlooked. As in Part VI, descriptions of recently described new species have been reprinted, and though called a catalogue the volume really contains an immense amount of information regarding habitat and distribution, and the author's unrivalled personal knowledge of Canada has enabled him to so arrange his matter that the geographical and descriptive parts of the Catalogue contain none of the errors so common in publications of this kind.

THE OTTAWA NATURALIST.

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THE EDUCATIONAL VALUE OF NATURE STUDY.

A. E. ATTWOOD, M.A., Ottawa.

"All things are artificial; for Nature is the art of God."

—*Sir Thomas Browne.*

"New occasions teach new duties;
Time makes ancient good uncouth;
They must upward still and onward
Who would keep abreast of Truth."

—*James Russell Lowell.*

Nature Study is the *natural study*. Children are naturally naturalists. The earliest educational instrumentalities for both the individual and the race are the objects in their natural environment. When a reason is demanded for introducing another subject into an already crowded school programme, a pertinent question to ask would be: Why stop Nature Study when the child enters our schools? The onus of proof rests on those who would cease teaching nature when school-life begins. The Kindergarten is intended as a continuation of the natural method into school life, and is now an established feature of our educational system. Again, we might ask, Why stop Nature Study when the child leaves the Kindergarten?

In our High Schools natural science has passed the experimental stage, and now no serious student can claim to have a liberal education who is ignorant of the great principles revealed by scientific research. The most important part of a student's course, that of the Public School, does not yet officially recognize the educational value of first-hand knowledge. Should we not

assume that a subject suitable for very young children and for mature students is an appropriate one for the intermediate age?

Herbert Spencer defines Life as "the power of continuous adjustment of internal relations to external relations." Just as physical life depends upon continuous adjustment to environmental variations, so does the life of a system of education depend upon its constant adaptation to the Spirit of the Times Let us briefly consider the chief characteristics of the Twentieth Century educational *Zeit Geist* which has been called "The New Education." We shall then inquire whether Nature Study is a subject in harmony with the ideals of the New Education.

The following are four of the chief requirements of the New Education.

I. With special reference to the student:

a. Study things rather than books, the actual rather than the representative, first-hand rather than second-hand knowledge.

b. Study causes rather than effects, general principles rather than mere facts, the *why* rather than the *what.*

II. With special reference to the teacher:

c. Attract rather than compel the learner, remembering that the most favorable results are obtained when the child is in sympathy with the teacher and the subject.

d. Develop the child rather than teach the book, remembering that education is now *pædocentric* and no longer *biblio-centric.*

a. Things rather than books.

"Education is the cultivation of a just and legitimate familiarity betwixt the mind and things." The introduction of manual training is evidence that we are recognizing the fact that in the education of the young, *things* should be used as instruments of training. In Nature Study, the physical, the tangible, is emp'oyed with the object of leading the pupils to discover truth there objectified. "The world is the thought of God." True Nature Study is an effort of interpretation, of trying "to think God's thoughts after Him." It is teaching through things instead of through signs of things.

"Things rather than books," must not be construed, things and not books. In nature, the development of the individual epitomizes the development of the race. The individual does not pass through *all* the stages through which the race has passed but short cuts are employed when advantageous. Here we have a hint as to the true function of books in education. The work of the young student should epitomize the work of investigators in general but it would be a ruinous waste of time and energy to perform all their researches. The spirit of Nature Study can be cultivated by first-hand investigation of a few facts. Such experience will enable the student to interpret and appreciate what can be more economically obtained from books. Books should be used to direct research, to obtain otherwise inaccessible information, to economize effort by utilizing the labors of others, and to correct or corroborate conclusions deduced from personal experience. A wise man learns through the experience of others. The student should do sufficient original work to enable him to interpret and in a measure appreciate, the results of the greater work performed by greater students. Books are the equivalents of Nature's short cuts.

b. Causes rather than effects.

The causal idea in education is slowly coming into prominence. Geography, for example, is being taught as *earth-study*, not as a study of a description of the earth. Formerly we studied merely the present form of the earth; now an effort is made to ascertain the relationship between the life history of the earth and its present form. Physical facts have significance and it is the business of the student to interpret a given condition and not to rest satisfied with the mere knowledge that such a condition exists. "Mere facts are dead, but the meaning of the facts is life. The getting of information is but the beginning of education... Not the fact, but the significance of the fact." In Nature Study children are encouraged to investigate the cause of a given occurrence. Varying conditions are introduced to modify natural causes and varying results are the consequence. The method of Nature Study is the method of practical life where events do not always happen logically and where varying circumstances must be constantly considered.

c. Attraction rather than compulsion of learner.

A child with a healthy appetite craves wholesome food. The appetite is a guide in the determination of the kind of nourishment required, because foods desired and relished are generally needed by the child. Curiosity and interest are the psychological equivalents of appetite and relish and they likewise indicate the subjects that promote mental development. The time of interest is the time of opportunity.

That children are attracted by the "natural subject" needs no proof. Nature Study requires direction and encouragement, but never compulsion, as it contains its own propelling power. It is interesting because of its unceasing novelty, because it affords a means for the exercise of the self activities of the student, and because of the sympathy generated by intimacy with living things.

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

d. The child rather than the book.

Previous to the time of Copernicus it was believed that the universe was geocentric; the Copernican theory teaches us that our system is heliocentric. As great a change will take place in our methods of teaching when we practically realize that it is the child rather than the book that is to be considered; that our educational system is no longer bibliocentric, but pædocentric. In the past we have prepared the subject that we wished to teach; in future, the child also must be prepared to receive the instruction. A person whose duty it is to attend to the purely physical welfare of a child does not say: Here is a certain amount of food to be eaten; how can I so prepare it that it can be devoured in the shortest possible time and with the least possible effort? She rather says: Here is a child to be nourished. Whence can I obtain food that will best promote healthy development?

Now what is the connection between this characteristic of the New Education and Nature Study? Study the child rather than the subject. Child study should precede subject study. The child being a natural product is an integral part of nature. Thus,

child study is a department of Nature Study. If life is the adjustment to environment, it is evident that the life and the development of the child are promoted by causing it to be in harmonious relationship with its environment, in other words, by directing it in Nature Study.

The aim of Nature Study is to unite the inner intellectual world of the child with its outer physical world, for only through this unity can the highest good be attained. The effort which the young student of nature makes to relate, to group, to unify, is the same in kind, differing only in degree, as that of the highest scientific and philosophical research. "The better the child realizes that school is out-of-doors as well as in the schoolroom, in plant and animal and stone, in cloud and sunset and waterfall, as well as in book, the more complete will be the unity between his physical and intellectual world. The more his nature study is correlated with, and made a basis for, his language work, drawing, reading and literature, the more will the unifying tendency of the mind be satisfied."

In the foregoing paragraph an effort has been made to show that Nature Study is in harmony with the ideals of the New Education (1) in its efforts to lead to the acquisition of first-hand knowledge by an intimacy with things, (2) in its emphasis of the causal as contrasted with the fact idea, (3) in its endeavor to present a subject congenial to the learner, and (4) in its regarding the child as the all-important fact in education.

Before proceeding further it may be well to give in the form of definitions the conception which some educationists have of this subject.

L. H. Bailey calls it "nature sympathy." It is "teaching the youth to see and to know the nearest thing at hand to the end that his life may be fuller and richer" Clifton F. Hodge defines it as, "Learning those things in nature that are best worth knowing, to the end of doing those things that make life most worth living." It is "a new element in education which has for its object the cultivation of the child's intelligent interest in his out-of-door environment," writes Anna B. Comstock. Longfellow

speaks of "the manuscripts of God" as "a storybook thy Father has written for thee,"

> "'T is elder Scripture, writ by God's own hand;
> Scripture authentic! uncorrupt by man."

"Nature is the incarnation of a thought and turns to thought again as ice becomes water and gas. The world is mind precipitated and the volatile essence is forever escaping again into the state of free thought. Hence the virtue and pungency of the influence on the mind of natural objects, whether inorganic or organized. Man imprisoned, man crystallized, man vegetative, speaks to man impersonated."—*Emerson.*

In harmony with Emerson's conception, Nature Study may be defined as: Active, earnest, and reverent attention to our physical environment with the object of endeavoring to interpret the thoughts there objectified thereby bringing ourselves into unity with the Source of All.

It may be contended that the foregoing is too transcendental a definition for a subject that deals with what is material. But is the ideal too high? The greatest thought of the nineteenth century is nothing more than a philosophical principle based on careful Nature Study: the theory of Evolution is a sublime interpretation of observed facts of nature.

Educationists have grouped the various subjects in a perfect course of study into four classes, the aims of which are respectively:

a. The acquisition of Knowledge.

b. The development of Skill.

c. The acquirement of Discipline.

d. The attainment of Culture.

If a subject is instrumental in furthering any one of these aims it has a claim to be represented on an educational curriculum. If, however, it secures all four it should unquestionably be employed as an instrument of education. Let us briefly consider the efficiency of Nature Study from these standpoints.

a. The first in time, but from an educationist standpoints, the last in importance are the Guidance studies, the particular purpose of which is to furnish the mind with facts, information,

Knowledge The acquisition of knowledge satisfies our curiosity or mental appetite, the mind is nourished, and intellectual growth becomes possible. As a subject taught purely as fact-lore, science ranks as high as any other. The fund of information which a scientist possesses is of itself a source of great pleasure and profit to the owner. A few years ago a person was not regarded as educated who could not interpret the writings of the ancient Greeks and Romans; a few years hence a person will not be regarded as educated who cannot interpret the "manuscripts of God," the open book of Nature. Important as scientific knowledge is, its acquisition by the sudent of nature is merely incidental, it is a by-product, a side-issue. We do not advocate a course in Nature Study for the purpose of merely storing the mind with useful information.

b. From an educationist's standpoint, Skill or executive power is an instrument for higher acquisitions. A large amount of mechanical skill is developed in raising and training plants and animals, in mounting botanical and entomological specimens, and in manipulating apparatus employed in various experiments. Moreover, Nature Study forms an excellent basis for much expressive school work which is largely a matter of skill: the oral and written expression of facts observed and truths ascertained, the drawing of the natural objects considered, and the general impulse to tell what is seen, develop power in all forms of expression.

Though the constant manipulation of natural objects will develop a high degree of practical efficiency, we do not advocate that Nature Study should be taught merely with the object of acquiring Skill. Why should we content ourselves with a high ideal when there is a higher?

"We needs must love the highest when we see it."

c. The subjects of Discipline or training are those whose aim is to develop mental power, that is, power to think logically, to reason consecutively, to generalize broadly. While scholarship, capacity, is the aim of knowledge subjects, potentiality, capability, is the aim of educational discipline. The mind is treated, not as a tank to be filled, but as an organism to be quickened or as a faculty to be developed.

Nature Study is the Public School equivalent of the natural science of secondary schools. In Baldwin's "Applied Psychology" science is placed highest, in his estimate of the relative value of different studies. The method of science is to ascertain unknown truths by experimental observation. The end of scientific investigation is to arrive at great fundamental principles. Though the genius does not necessarily observe the following progressive steps, they may be regarded as indicating the scientific method.

1. Observation of phenomena and accumulation of facts.
2. Classification of facts.
3. Induction or inference based on observed facts.
4. Deduction from inference. Is the hypothesis workable?
5. Modification, correction, or verification of hypothesis.
6. Enunciation of a theory.
7. Application of theory in subsequent investigations.
8. Unification of the theory with some Law of Nature.

"When Nature becomes the subject of study, the love of Nature its stimulus, and the order of Nature its guide, then will results in education rival the achievements of Science in the fields of its noblest triumphs." Some of the benefits to be derived are:

Independence.—The constant exercise of the power of individual investigation is the best possible preparation for practical life where success depends largely upon personal effort. School should be an integral, harmonious and indispensable part of life.

Liberality.—The habitual hesitancy to generalize on what may be insufficient data, and the consciousness of one's liability to err, tends to develop liberality in dealing with the opinions of others.

Truth.—Reality is attained not so much by learning the the dogma of another, but by continued personal investigation. Truth is not the peculiar property of the teacher, but is revealed to him who diligently seeks it. The truth seeker does not combat recently ascertained knowledge but accepts it gladly.

Unity.—The continued effort to discover unity amid apparent diversity results in mental exhilaration and intellectual satisfaction and security. One realizes that the universe is not governed by caprice, but by

"That God, which ever lives and loves,
One God, one law, one element,
And one far-off divine event,
To which the whole creation moves."

4. Culture is the expanding, the mellowing, and the purifying of the soul by constant contact with the true, the beautiful and the good.

"To him who in the love of nature, holds
Communion with her visible forms, she speaks
A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty, and she glides
Into his darker musings, with a mild
And healing sympathy, that steals away
Their sharpness, ere he is aware."

"Culture is the slowly maturing fruit of a silent feeding of the soul upon nourishing ideas. While discipline looks to the volume of mental power, culture looks to its kind. Culture is the tone of power, rather than its amount or intensity. It is a qualitative rather than a quantative word"—*Hinsdale*.

"Culture is the study of perfection." It is the endeavor to *see* and *learn* the will of God and make it *prevail*. "It is in making endless additions to itself, in the endless expansion of its powers, in endless growth in wisdom and beauty, that the spirit of the human race finds its ideal. To reach this ideal culture is an indispensable aid, and that is the true value of culture." "Not a having and a resting, but a growing and a becoming, is the character of perfection as culture conceives it."

Nature is a slowly-evolving, ever-attaining but never-ending process by which the divine ideal is being realized. It is a panoramic unfolding of God's way of doing things. It is "not a having and a resting but a growing and a becoming."

"Every clod feels a stir of might,
An instinct within it that reaches and towers,
And, groping blindly above it for light,
Climbs to a soul in grass and flowers."

A characteristic of both Nature and Culture is the unceasing striving onward and upward. Nature is universal and physical. Culture is individual and spiritual. A harmonious alliance results

when the individual Culture is united with universal Nature: "My Father worketh hitherto and I work." Our minds are enlarged in the ratio in which our conception of our environment is enlarged. What we get from Nature depends upon our attitude towards her. The character of our interpretations will be in proportion to our power of interpretation. The amount we take from Nature cannot exceed the amount we take to her.

"Is Nature all so beautiful?
The human feeling makes it so.
The sounds we love, the flowers we cull
Are hallowed with man's joy or woe."

A child who has been trained to care for plants and animals will develop a generous sympathy for all living things. Harmony and good-fellowship will characterize his intercourse with his playmates while he is young and with his fellow-citizens when he becomes older. A student of Nature becomes one of Nature's gentlemen.

"The slowly maturing fruit of a silent feeding of the soul upon nourishing ideas" will be evidenced in the character of him who has an intelligent appreciation of the true, the beautiful, and the good in Nature. Who better than he can feel sentiments such as that expressed by Adelaide Proctor?

"My God, I thank Thee, who hast made
The earth so bright,—
So full of splendor and of joy,
Beauty and light,—
So many glorious things are here
Noble and right."

NOTES ON THE SIZE OF HAWKS' EGGS.

By J. E. KEAYS.

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

A measurement and comparison of the cubic contents of the eggs of the red-shouldered and red-tailed hawks, with the addition of the measurements of a small series of broad-winged and Swainson's hawk. In making the following measurements, I am indebted to Mr. W. E. Saunders for the use of his collection and for notes on the same.

In all, eighty-five eggs of red-shouldered, seventeen of red-tailed, three of broad-winged, and six of Swainson's hawk, have been measured, and although no large sets of red-tailed were available, the measurements go to show, that presuming that every two sets of red-tailed hawk contained five eggs unitedly (which in this locality is far above the average), still the average set of red-shouldered would exceed that of the red-tailed by nearly 15 cc., and six of the twenty-five sets of red-shouldered measured, are greater than an average set of three red-tailed, while two others are almost equal.

Of the eighty-five red-shouldered eggs, only one exceeds the average red-tailed in size, although four others are within a small fraction of a cc. of being equal to it.

An article published in "The Ornithologist and Oologist," 1886, page 118, entitled: "The Relative Size of Eggs of the Red-tailed Hawk to the Parent Bird," proves with but little doubt, that the larger the female of a species, the larger the egg deposited by her. Accepting this as a fact, it would now be of interest to compare the female birds of this species, not by measurement but by weight, for although the red-tailed hawk is apparently a much larger bird, its feathers are longer and looser, and there is a doubt in my mind whether it weighs as much more as it appears to.

It would also be of interest to compare the relative weights of both these birds with the cubic contents of sets deposited by

them, and I hope to see other investigations in this line. The table below giving the measurement of each egg in cubic centimeters, with total contents of set, average, etc., is followed by notes on several of the sets by Mr. Saunders, showing the relative sizes of eggs deposited from year to year by the same bird.

RED-SHOULDERED HAWK.

Set No.	No. 1.	No. 2.	No. 3.	No. 4.	Total contents of Set.	Average contents of each Egg.	
3349	52	51	53	.	156	52	1885
4040	58	57	58	..	173	57 2/3	1898
4165	52	57	57	..	166	55 1/3	1899
3777	51	52	50	53	206	51 1/2	1901
3882	50	52	55	..	157	52 1/3	1902
3784	46	46	45	..	137	45 2/3	1901
3883	49	45	46	..	140	46 2/3	1902
4061	56	59	57	.	172	57 1/3	1898
4224	63	63	67	60	253	63 1/4	1900
3780	60	63	63	59	245	61 1/4	1901
3887	40	43	43	40	166	41 1/2	
4225	48	51	51	..	150	50	1900
3782	46	46	46	..	138	46	1901
3888	56	60	55	..	171	57	
3886	60	58	60	59	237	59 1/4	
3884	48	46	45	49	188	47	
3891	48	46	46	..	140	46 2/3	
3889	50	50	46	..	146	48 2/3	
3548	54	55	53	50	212	53	
4222	48	48	49	..	145	48 1/3	
222	47	44	44	..	135	45	
221	45	50	52	48	195	48 3/4	
293	48	46	50	44	188	47	
291	45	43	45	..	133	44 1/3	
220	45	43	44	42	174	43 1/2	

Largest egg, 67 cc. ; smallest, 40 cc.

Largest set, 253 cc. ; smallest, 133 cc.

Largest egg to set, 63 1/4 cc. ; smallest average egg to set, 41 1/2 cc.

Average of 85 eggs measured 50 3/5 cc.

Average contents per set, 172 3/5 cc.

Leaving out the three sets, 4061, 4224, 3780, supposed to be from same bird, the average is $49\frac{1}{3}\frac{3}{7}$ cc. per egg, and $166\frac{1}{2}\frac{1}{2}$ per set.

RED-TAILED HAWK.

Set No.	No. 1.	No. 2.	No. 3.	Total contents of Set.	Average contents of each Egg.
223	66	67	..	133	66½
292	62	57	..	119	59½
306	62	..	..	62	62
361	61	66	.	127	63½
4227	68	69	..	137	68½
3864	59	61	..	120	60
4226	69	69	.	138	69
4058	61	60	..	121	60½
4220	60	57	..	117	58½

Largest egg, 69 cc. ; smallest, 57 cc.

Largest set, 138 cc. ; smallest, 117 cc. of two eggs, 62 cc. of one egg.

Largest average egg to set, 69 cc. ; smallest, $58\frac{1}{2}$.

Average of 17 eggs measured, $93\frac{3}{17}$.

BROAD-WINGED HAWK.

3621	41	..	..	..	41
4020	35	37	..	72	36

SWAINSON'S HAWK.

218	54	57	57	168	56
300	56	50	50	156	53

In this list of eggs there are 4 series of eggs, taken from the same woods in different years, all being first sets only, the birds having been allowed to raise their second set in each case.

No. 3784, 4 miles from London, were taken in 1901, and average $45\frac{2}{3}$ cc. In 1902, from a new nest, about 50 yards from that of 1901, the set 3883 was taken which average $46\frac{2}{3}$ cc.

Both markings and size accord well, and the two sets were doubtless laid by the same bird.

Sets 4061 and 4224, measuring respectively 57⅓ and 63¼ cc. were taken in 1898 and 1900 from a nest near Mount Brydges. Their extraordinary size, as well as the markings, and the fact that they were in the same nest, testify to their being the product of the same hen. In 1901 she not only moved from the old nest, but removed every vestige of it from the tree. That nest had existed for at least twelve years, and was occupied by a red-shouldered hawk each year that the locality was visited. She built a new nest about one quarter mile east of the old one in the same woods, and laid set No. 3780, averaging 61¼ cc., which in size and colors agree with the former ones. This hen must have been of extraordinary size to lay such large eggs, and as the female hawk is usually larger than the male, it is probable that this one was much larger than her mate, and she may have been entirely too authoritative in her manner to suit him ; at any rate, when she vanished from the scene (between the springs of 1901 and 1902), he proceeded to get for himself a mate as near the other extreme as possible, and the new occupant laid in 1902, the 4 eggs No. 3887, which measure from 40 cc. to 43 cc., and average 41½ cc., being the smallest average by 2 cc. of any set of red-shoulders to which I have had access. These eggs were laid near the original site, in an oak tree, and it is interesting to note that the original site in a gnarly beach, is occupied this year by a crow, and may probably be again used by a bird of prey in the near future.

Set No 4225, in 1900, averaging 50 cc., and No. 3782, in 1901, averaging 46 cc., were taken in Komoka swamp from trees about 50 yards apart and size and shape as well as locality proclaim them to be from the same bird. She, too, has evidently perished, as in 1902 the pair here used a nest in a pine tree near-by, probably the same one that was used by them in 1901 for their second set, which was placed in just such a position, and the set of eggs No. 3888, averaging 57 cc., are in every respect different from those of the previous years.

The last series to be considered begins with set No. 3349, averaging 52 cc., and laid in 1885. From the same corner of the same woods was taken set No. 4040, in 1898, and while their colour is very similar to the set of 1885, the measurements, aver-

aging 57⅔ cc., point to the probability of a new female, and indeed it is not likely that any red-shouldered hawk lives as long as 13 years in a country so thoroughly hunted as that about London. In 1899, this pair provided a surprise, for, from the same nest in the same beech tree was taken set No. 4165 which, while averaging 55⅓ cc., only 2⅓ cc. different from those of 1898, differ remarkably in shape, being long like a hen's egg; yet the colors approximate closely to those of the 1899 eggs, and they were probably laid by the same hen. In 1900 a sugar camp was located beneath this tree and the nest of these hawks was not found. In 1901, however, a pair was on the scene once more with a nest in a maple less than 100 yards from the old nest, and this time set No. 3777 was taken, consisting of 4 normally shaped eggs averaging 51½ cc. and resembling less closely those of the former years. In 1902, from another maple near the last, was taken set No 3882, averaging 52⅓ cc., which bear no resemblance to those of former years either in color or shape.

CONCHOLOGY.

NIAGARA RIVER SHELLS.

Dr. James Fletcher was recently at Niagara Falls, and taking advantage of the conditions resulting from the construction of a wing-dam above the Dufferin Islands, by which a large portion of the river bed above the falls has been laid bare, he collected quite an interesting series of shells.

The following species have been noted:

Linnæa catascopium, Say.
Goniobasis livescens, Menke.
Pleurocera subulare, Lea.
Unio luteolus, Lamarck.
U. ellipsis, Lea.
U. gibbosus, Barnes.
Margaritana marginata, Say.
Sphærium striatinum, Lamarck.

The specimens of *U. luteolus* are not of so decided a green in color as those found in the Rideau Canal and River near Ottawa, and are much more inflated.

The *U. gibbosus* are small and differ materially in form from the shell as usually found in the Ottawa River, where it occurs sparingly at the outlet of Brigham's Creek and at the lower end of Duck Island. They are, however, identical with a single specimen found many years ago in the "chenal" at the Little Chaudiere. This peculiar little shell is the only specimen of *U. gibbosus* known to have been collected in the Ottawa River above the Chaudiere Falls.

With the shells obtained by Dr. Fletcher was a specimen of the remarkable spiral caddis-case, which the late Isaac Lea,--in his time the most prolific writer on Conchology,—regarded as a true mollusk, and named *Valvata arenifera*. Dr. Fletcher, of course, as an experienced entomologist, placed the so-called shell in its proper place.

L.

A NATURAL HISTORY MUSEUM, AT BETSIAMIS, QUEBEC, CANADA.

The Reverend Père C. A. Arnaud, of Betsiamis, has established and encouraged the development of a Natural History collection at this trading post.

In the year 1868, Alfred Lechevalier, a French Naturalist, visited the post and spent that year and the following winter in mounting the specimens of the fur-bearing animals which he had obtained in that region, and of birds which he had shot the season previous, in different portions of the Great North-East.

Birds, mammals, reptiles, etc., make up the materials of the Natural History portion of the collection of that Museum, whilst various other kinds of specimens have been added and obtained chiefly from the aborigines who come to the post from time to time. The value of the collection is estimated by Abbé Huard at $4,000.00.

Grosjean, another naturalist, from old France, came later and added many specimens, chiefly birds, and displayed much skill as a taxidermist.

For the above statements, I am indebted to Abbé V. A. Huard, the enthusiastic editor of "Le Naturaliste Canadien," who records them in his interesting book of travels entitled "Labrador and Anticosti," published in 1897, in Montreal, by C. O. Beauchemin & Fils, and in Paris, by A. Roger & F. Chernoviz.

H. M. A.

RUSKIN'S DEFINITION OF THE WORD MUSEUM.

"A museum," 'is, be it first observed, primarily not at all a place of entertainment, but a place of education, and a museum is, be it secondly observed, not a place for elementary education, but for that of already far advanced scholars, and it is by no means the same thing as a parish school, or a Sunday school, or a day school, or even—the Brighton Aquarium.'

"Be it observed, in the third place," "that the word 'School' means 'Leisure,' and the word 'Museum' means 'Belonging to the Muses;' and that all schools and museums whatsoever can only be what they claim to be, and ought to be—places of noble instruction, where the persons who have a mind to use them can obtain so much relief from the work, or exert so much abstinence from the disipation of the outside world as may enable them to devote a certain portion of secluded, laborious, and reverent life to the attainment of Wisdom."—Fors Clavigera, vol. v.

CORRESPONDENCE.

ON THE UPPER CRETACEOUS AGE OF THE BELLY RIVER SERIES OR FORMATION IN CANADA.

Editor, OTTAWA NATURALIST :—

The recent work "On the Vertebrata of the Mid-Cretaceous of the North West Territory," by Henry Fairfield Osborn and Lawrence M. Lambe, as well as the "Review" of the same by

W. D. Matthew[1] call for a few comments as regards the geological position of the Belly River series or formation.

In defining the series, Dr. G. M. Dawson,[2] and R. McConnell write: "Briefly stated, it would appear from investigations now reported on that considerable area of the beds, which in 1874 I called 'Lignite Tertiary,'—here and in previous announcements designated as Belly River series—must be relegated to a position below the Pierre shales," and further adds: "The beds thus separated as the Belly River series were, in 1875, by me correlated with the Judith River series of the Missouri."

Later, in 1886, R. G. McConnell[3] gave the succession of the "Cretaceous formation' inhis "Report on the Cypress Hills, Wood Mountain and adjacent country," in descending order as follows:

Cretaceous { Laramie. / Fox Hill. / Pierre. / Belly River series.

and in p. 65C, he unites the Pierre and Fox Hill deposits together under the same head, and lists the marine invertebrate fauna determined by Dr. Whiteaves (pp. 66C & 67C.).

In 1887, J. B. Tyrrell[4] gives the following succession in descending order:

Laramie—
- Paskapoo series.
- Edmonton series.

Fox Hill and Pierre.

Belly River series.

Of these, Tyrrell placed the "Paskapoo" beds in the Eocene Tertiary and the remainder below (as cited) in the Cretaceous.

In his "Cretaceous System in Canada," Dr. Whiteaves gives the following succession of the Cretaceous of Manitoba and the North West Territories:

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[1] Ottawa Nat., vol. XVI, No. 8, p. 169. Nov., Ottawa, 1902.

[2] Geol. & Nat. Hist. Surv. Can., Rep. of Progress, 1882-85-84, p. 119C. Montreal, Can.

[3] Geol. & Nat. Hist Surv. Can., Ann. Rep., vol. I, page 63C. Montreal, 1886.

[4] Geol. & Nat. Hist. Surv. Can., Ann. Rep., n. s., vol. II, p. 127E. Montreal, 1887.

V. Laramie
IV. Pierre-Fox Hills.
III. Belly River series.
II. Niobrara-Benton.
I. Dakota.

There is now no reason to doubt the position of the Belly River series in the succession of sediments in the region of the Great Plains; nor its position above the Niobrara-Benton, which in turn is underlaid by the Dakota formation, which latter is recognized by all to be of Upper Cretaceous age. The only conclusion, therefore, that one can reach is that the Belly River series is high up in the Upper Cretaceous. This is the place where it has stood for years, and the large percentage of Tertiary invertebrates, found within its upper and lower limits, which have a close affinity and remarkable resemblance to Eocene Tertiary forms (many forms being identical) must lead one to conclude that it cannot be in the interest of chronological geology to place the Belly River series in the Middle Cretaceous as we would be led to believe from the recent writings above referred to. It may well be that many forms of the vertebrata occurring in the Belly River series are primitive in their character, *i.e.*, show traits which are older than are exhibited by their successors or descendants in later times; nevertheless, when the age of a geological horizon or series of strata has to be determined, the whole biologic assemblage must be taken into consideration. When such is taken, it is impossible to arrive at any other conclusion either on stratigraphical or palæontological grounds than that the Belly River series is not Middle Cretaceous but UPPER CRETACEOUS, and well up in that portion of the Time-scale. As to its occurrence as an intercalated or "mid-Cretaceous" formation I have no doubt. However, the term "Mid-Cretaceous" appears to be an ambiguous one and may lead to further confusion.

To anyone who has considered the flora and fauna of the Belly River series as a whole, as well as the flora of the Dakota, and compared them with European equivalents it is easy to see their Senonian or Upper Cretaceous age clearly.

H. M. A.

PROGRAMME OF WINTER SOIRÉES, 1902-1903.

	1902.	
In the Assembly Hall of the Normal School.	Dec.	16.—President's Address: "The Functions of a Geological Survey," by Robt. Bell, M.D., LL.D., Sc.D. (Cantab.), F.R.S.
		Address of Welcome, by the Principal of the Normal School.
		"*Some Ottawa Butterflies and Moths*," by Dr. James Fletcher, illustrated by coloured lantern slides.
		Conversazione, with exhibition of Natural History objects and microscopic slides.
	1903.	
In St. John's Hall.	Jan.	13.—"*The Scenery of the Rocky Mountain Region*," illustrated by lantern slides, by Dr. R. A. Daly, of the Geological Survey.
		Report of the Geological Branch.
In the Assembly Hall of the Normal School.	Jan	27.—"*The Wood-pulp Industry of Canada*," by Professor D. P. Penhallow, McGill College, Montreal, illustrated by lantern slides.
In the Assembly Hall of the Normal School.	Feb.	10.—"*Nature Study in American Universities*," by Dr. S. B. Sinclair, of the Normal School, Ottawa.
		Report of the Entomological Branch.
In St. John's Hall.	Feb.	24.—"*The Summer Climate of the Yukon and its Effects on Vegetation*," by Professor John Macoun, of the Geological Survey.
		Report of the Botanical Branch.
In St. John's Hall.	Mar.	10.—"*Whales and Whale Hunting*," illustrated by lantern slides, by Professor E. E. Prince, Commissioner of Fisheries.
		Report of the Zoological Branch.
In St. John's Hall.	Mar.	17,—(*a*) ANNUAL MEETING. Reports of Council, Election of Officers, etc.
		(*b*) "*Additional Notes on the Geology and Palæontology of Ottawa*," illustrated by lantern slides and specimens, by Dr. H. M. Ami, of the Geological Survey.

The meetings will be held at 8 p.m. on the *second* and *fourth* **Tuesdays** of the month, except in the case of the Annual Meeting.

President: Dr. ROBERT BELL, F.R.S.

Secretary: W. J. WILSON (Geol. Surv. Dept.)

Treasurer: ARTHUR GIBSON. (Central Experimental Farm.)

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Admission to Lecture Course Free

THE OTTAWA NATURALIST.

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CONTRIBUTIONS TO CANADIAN BOTANY.[1]

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

XVI.

ANEMONE RIPARIA, Fernald.

In maple woods, Tilsonburg, Ont. 1901. No. 33,561[2]; at Nepean Point, Ottawa, Ont., and Aylmer, Que., June, 1902. (*John Macoun*) First Ontario records.

RANUNCULUS INTERTEXTUS, Greene, Ott. Nat., vol. XVI, p. 33.

A common Rocky Mountain species until recently referred to *R. natans*.

RANUNCULUS HIRTIPES, Greene, Ott. Nat., vol. XVI, p. 32.

Near Sandwich, Ont., 5th June, 1901. No. 33,582. (*John Macoun.*) The type station.

RANUNCULUS CARDIOPETALUS, Greene, Ott. Nat., vol. XVI, p. 32.

At the Whirlpool Rapids, Niagara, Ont., 21st May, 1901. No. 33,581. (*John Macoun*) The type station.

ERYSIMUM ORIENTALE, R. Br.

Greenwood, B.C. (*Miss Mary L. Wilson.*) Not recorded from British Columbia.

SOPHIA INTERMEDIA, Rydb.

Sandy soil at the end of Pelee Point, Lake Erie, 1901. No. 33,857. (*John Macoun.*) Eastern limit.[3]

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[1] Published by permission of the Acting 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.

[3] The Geological limits given in these papers refer to Canada only.

DRABA VERNA, L.

Along the railway at St. David's, Niagara, Ont., 1901. No. 33,832. (*Macoun.*) New to Ontario.

CAMELINA MICROCARPA, Andrz.

Of much the same range in Canada as *C. sativa*, from which it is separated by its shorter and generally smaller pods. *C. microcarpa* is pubescent, at least below, while *C. sativa* is glabrous or nearly so.

SMELOWSKIA CALYCINA, C. A. Meyer.

Mt. Cheam, north of Chilliwack River, B.C., alt. 7000 ft. (*J. R. Anderson, Dr. Jas. Fletcher, J. M. Macoun.*) Not recorded west of Rocky Mountains south of Alaska.

LUNARIA ANNUA, L.

On "the island" (1891) and at Queen Victoria Park, Niagara Falls, Ont., 1901. (*John Macoun.*)

VIOLA SAGITTATA, Ait.

Abundant in woods at Sandwich, Ont., 1901. No. 33,915. (*John Macoun.*) The only Canadian specimens we have seen, all the others so named proving to be *V. dentata*. See note in Part XIII of these contributions.

STELLARIA GRAMINEA, L.

On an island in the Chilliwack River, B.C., 1901. (*J. M. Macoun.*) Not before recorded from the west

STELLARIA NEGLECTA, Whe.

In woods at Queenston Heights, Ont. No. 34,055 (*John Macoun*) Not recorded from Ontario.

ALTHÆA ROSEUS, Cav.

Very abundant and well established along roadsides near Niagara and at Tilsonburg, Ont., 1901. (*John Macoun.*)

MALVA ALCEA, L.

Roadside between Southampton and Owen Sound, Ont., 1901 (*John Macoun.*) Probably common in Ontario but confounded with *M. moschata*.

LINUM MEDIUM, L.

Queenston Heights, Ont., 1901. (*John Macoun.*)

OXALIS CYMOSA, Small.

At Amherstburgh and Windsor, Ont., 1901. (*John Macoun.*) Recorded from Ontario in Britton's Manual.

ILEX BRONXENSIS, Britton.

I. verticellata var. *tenuifolia*, Torr.; Macoun Cat. Can. Plants, vol. II, p. 315.

London, Ont. (*Thos. Burgess.*) Sandwich, Ont., 1890; Beech Ridge, 4 miles east of Leamington, Ont., 1901. No. 34,128. (*John Macoun.*)

CEANOTHUS OVATUS, Desf., var. PUBESCENS, T. & G.

Pelee Point, Lake Erie. (*John Macoun.*) Very common around Sarnia and Point Edward, Lake Huron, where it has been collected by J. Dearness, 1889; C. K. Dodge, 1894; and Prof. Macoun, 1901. The ferrugineus pubescence of the leaf veins very conspicuous, especially in mature specimens, is omitted from the description in Britton's Manual. Probably a good species.

PARTHENOCISSUS QUINQUEFOLIA, (L.) Planch, var. LACINIATA, Planch.

In thickets at Winnipeg and Morden, Man. (*John Macoun.*) All western references to *Ampelopsis quinquefolia* are probably this species.

MEIBOMIA SESSILIFOLIA, (Torr.) Kuntze.

In woods at Sandwich, Ont., 1901. No 34,204. (*John Macoun.*) New to Canada.

ERVUM LENS, L.

Fruiting in the Grand Trunk Railway yard at Niagara Falls, Ont., 1901. (*John Macoun.*)

RUBUS PACIFICUS.

R. nivalis, How II, Flora N. W. America, p. 184.

This plant was collected by Mr. W. B. Anderson at Comox, Vancouver Island, in 1899. The description in Hooker's Flora can not possibly apply to the species described in Howell's Flora, and the name *Rubus Pacificus* is

proposed as a substitute. Again collected in 1901 in the same place by Dr. James Fletcher and J. R. Anderson.

POTENTILLA PUMILA, Poir.

Sandy woods, Tilsonburg, Ont. No. 34,428. (*John Macoun.*) New to Canada.

MALUS RIVULARIS, Rœm.

From Sumas Lake up the Chilliwack Valley to the east end of Chilliwack Lake. Nos. 34,368-72. 1901. (*J. M. Macoun.*) Eastern limit.

PYRUS COMMUNIS, L.

Common in thickets and woods around Queenston Heights and Niagara, Ont., 1901. (*John Macoun.*)

SORBUS OCCIDENTALIS, Greene.

A common species on the mountains bordering the Chilliwack Valley, east to the Skagit Range. Generally at between 5,000 and 6,000 feet altitude, but found as low as 3,500 and as high as 6,500. Its favorite habitat is on the tops of ridges, and it was found in no other situation in 1901 no matter what the altitude. (*J. M. Macoun.*) New to Canada.

CRATÆGUS DOUGLASII, Lindl.

Along the Abitibi River between the outlet of Lake Abitibi and the mouth of Black River, N. E. Ontario in 1901, and in 1902 at Birch Bark Portage, about 100 miles below Black River. (*W. J. Wilson.*) Eastern limit.

CRATÆGUS OCCIDENTALIS, Britt.

The common *Cratægus* in the province of Assiniboia. Our specimens are from Wood Mountain, Old Wives' Creek, Medicine Hat and Milk River.

SAXIFRAGA HYPNOIDES, L.

S. cæspitosa, Macoun, Cat. Can. Plants, vol. 1, p. 150 in part.

Rocky cliffs along the sea-shore above Albour Brook, between the Madeline River and St. Anne des Monts, Gaspé, Que., 1882. (*Macoun.*) New to America.

SAXIFRAGA TOLMÆI, T. & G.

The range of this species in Canada is extended by the following references: Mountain summits opposite Vancouver, B.C. (*T Henry.*) North of Chilliwack River, south slope of Cheam Range, B.C. alt. 7,000 feet. No. 34,948; Tami Hy Mountain, Chilliwack Valley, B.C. No. 34,949. (*J. M. Macoun.*)

HEMIEVA VIOLACEA, Wheelock.

Near Kaslo, B.C., 1901. (*Miss Ethel Blackman.*) New to Canada.

MITELLA TRIFIDA, Graham.

Alpine slopes, Mount Arrowsmith, Vancouver Island, 1887. (*John Macoun.*) Same locality, 1901. (*J. R. Anderson* and *Dr. James Fletcher.*) Common between 4,500 and 5,500 feet altitude in the Chilliwack Valley, B.C. Nos. 34,864 and 34,865. (*J. M. Macoun.*)

MITELLA BREWERI, Gray.

Mountains at Chilliwack Lake, B.C. No. 34,866. (*J. M. Macoun.*) Western limit.

MITELLA OVALIS, Greene.

Damp places, Goldstream, Vancouver Island, 1887. No. 8,497. (*John Macoun.*) Our only Canadian specimen.

MITELLA CAULESCENS, Nutt.

A common plant in woods throughout the Chilliwack Valley, B.C. Nos. 34,860, 34,861 and 34,863. (*J. M. Macoun.*) Our first Canadian specimens.

MITELLA PENTANDRA, Hook.

Alpine woods, Mt. Arrowsmith, Vancouver Island, 1887. (*John Macoun.*) Same locality, 1901. (*J. R. Anderson* and *Dr. James Fletcher.*)

ONAGRA OAKESIANA, Britton.

Gaspé, Gulf of St. Lawrence; near London, Ont.; Port Colborne, Ont., No. 44,465; Southampton, Ont., No. 44 464. (*John Macoun.*) Seldom separated from *O. biennis.*

EPILOBIUM LUTEUM, Pursh.

Collected by Cowley in the Cariboo District, B.C., in 1870 but not recorded. This was the first time it was collected in Canada. Common on mountains in the Chilliwack Valley, B.C. (*J. M. Macoun.*)

TILLÆA VAILLANTII, Willd.

Tracadie Beach, Prince Edward Island, 1901. (*J. R. Churchill.*) Collected at Mt. Stewart, P.E.I., by Prof. Macoun in 1888 and recorded in Part v. of these papers as *Tillæa simplex*, Nutt.

SEDUM FRIGIDUM, Rydb., Bull. Torr Bot. Club, vol. 28, p. 282.

All the western references to *Sedum Rhodiola* in Macoun's Catalogue of Canadian plants go here. Dr. Rydberg is hardly correct in describing this species as "an arctic-alpine" plant as it is abundantly represented in our herbarium by specimens from near sea level in British Columbia and the warmer parts of Alaska.

SAMBUCUS MELANOCARPA, A. Gray.

Crow Nest Pass, Rocky Mts. No. 20,591. (*John Macoun.*) Eastern limit.

EUPATORIUM RYDBERGII, Britt.

Near Brandon, Man. No. 13,934. (*John Macoun.*) Along ditches near Chilliwack, B.C. No. 26,486. (*J. M. Macoun.*) Not before recorded from Canada.

ASTER POLYPHYLLUS, Willd.

On Birch Island, Lake Huron, Aug. 26th, 1901. No. 26,359. (*John Macoun.*) New to Canada Determined by Mr. M. L. Fernald.

ERIGERON GORMANI, Greene.

Rocky ledges on Tami Hy Mountain, Chilliwack Valley, B.C. No. 26,461. (*J. M. Macoun*) Not recorded south of Yukon, but it is probable that much of the Rocky Mountain plant referred to *E. compositus* var. *glabratus* is this species.

ERIGERON ANGUSTIFOLIUS, Heller.

An abundant species on rocky banks of rivulets running into Chilliwack Lake, B.C., always at between 2,500 and 3,500 feet altitude. No. 26,468. (*J. M. Macoun.*)

GALINSOGA PARVIFLORA, Cav.

Roadsides in the northern part of London, Ont., 1902. (*J. Dearness.*) New to Canada.

ARTEMISIA SUKSDORFII, Piper, Bull. Torr. Bot. Club, vol. 28, p. 42.

A. vulgaris var. *Californica*, Macoun, Cat. Can. Plants, vol. I, p. 258, and No. X of these contributions, p. 275.

A coast species but collected on a gravel bar 12 miles up the Chilliwack Valley, B.C., in 1901 by J. M. Macoun. This point is between 40 and 50 miles from the coast.

ARNICA LANCEOLATA, Nutt.

A. Chamissonis, Macoun, Cat. Can. Plants, vol. I, p. 261 in part.

From New Brunswick, (*Fowler*, *Hay*, *Wetmore*), and Quebec, (*Macoun*) to Lake Superior, (*Dr. R. Bell.*)

ARNICA COLUMBIANA, Greene, Pittonia, vol. IV, p. 160.

Maclennan River, Lat. 53°, B.C., July 27th, 1898. No. 19,646. (*W. Spreadborough.*) Among the many specimens of *Arnica* in our herbarium we find none but Spreadborough's to be this species.

ARNICA MACOUNII, Greene, Pittonia, vol. IV, p. 160.

The type of this species was collected by Prof. John Macoun at Comox, Vancouver Island, July 1st, 1893. It is represented in our herbarium by specimens collected by Prof. Macoun at Chinaman's Creek, Alberni Canal, Vancouver Island, August 4th, 1887. The type is in Dr. Greene's herbarium.

ARNICA LONCHOPHYLLA, Greene, Pittonia, vol. IV, p. 164.

Athabasca River, Lat. 53° 30′, Alta. June 25th, 1898. No. 19,647. (*W. Spreadborough.*)

ARNICA SUBCORDATA, Greene, Pittonia, vol. IV, p. 173.

Athabasca River and Pembina River, Alta. No. 19,644. (*W. Spreadborough.*)

SENECIO PSEUDOAUREUS, Rydb.

In a marsh, east of Chilliwack Lake, B.C. No. 16,682. (*J. M. Macoun.*)

SENECIO IDAHOENSIS, Rydb.

Shady banks, mouth of Silese Creek, Chilliwack River, B.C. No. 26,685. (*J. M. Macoun.*)

SILPHIUM TEREBINTHINACEUM, L.

The reference in Part XV of these contributions should have been credited to J. Dearness instead of to C. K. Dodge.

AGROSERUS GREENII, (A. Gr.). Rydb.

On snow slides, Chilliwack Lake, B.C. No. 26,810. (*J. M. Macoun.*)

GAYLUSSACIA FRONDOSA, T. & G.

Edmonton, Ont. (*Jas. White*), Lincoln Co., Ont. (*W. C. McCalla.*) Sarnia, Ont., No. 54,163. (*John Macoun.*) Not before recorded from Canada. Confounded with *G. resinosa.*

CASSIOPE STELLERIANA, DC.

Near the summit of Mt. Cheam, north of Chilliwack River, B.C. No. 54,160. (*J. M. Macoun.*) Recorded from but one other locality in British Columbia.

PTEROSPORA ANDROMEDA, Nutt.

One specimen of this widely distributed but very local species was collected near the Chilliwack River, B.C., in 1901 by J. M. Macoun.

ALLOTROPA VIRGATA, T. & G.

Very abundant in deep woods at Chilliwack Lake, B.C., at between 3,000 and 4,000 feet altitude. No. 54,149. (*J. M. Macoun.*) Our first specimens from the B. C. mainland.

HYPOPITYS FIMBRIATA, (Gray.)

Woods at about 1,500 ft. altitude, Chilliwack River, B.C. No. 54,173. (*J. M. Macoun.*) Recorded in Canada from Vancouver Island only.

PRIMULA AMERICANA, Rydb., Bull. Torr. Bot. Club, vol. 28, p. 500,

P. farinosa is apparently confined to northeast America if it occurs on this continent at all. All the western references to *P. farinosa* in previous Canadian publications should be placed here.

VINCA MINOR, L.

Roadsides at "the whirlpool," Niagara, Ont. (*John Macoun.*)

PHLOX PANICULATA, L.

Railway embankment near Chatham, Ont. (*John Macoun.*) Well naturalized. Not recorded from Canada.

HYDROPHLLUM OCCIDENTALE, Gr. var. FENDLERI, Gr.

In woods near Chilliwack Lake, at 4,000 ft. altitude. No. 54,325. (*J. M. Macoun.*)

NEMOPHILA PUSTULATA, Eastwood, Bull. Torr. Bot. Club, vol. 28, p. 145.

Described from specimens collected by Prof. John Macoun near Victoria, Vancouver Island, and distributed as *N. parviflora* Dougl. under the number 667. This is an abundant species near Victoria and has been distributed from the herbarium of the Geological Survey under the numbers 666. 667, 16,250 and 16,248.

ONOSMODIUM VIRGINIANUM, DC.

The specimens credited to Ontario in Macoun's catalogue of Canadian Plants, vol. 1, p. 343 prove to be *O. Carolinianum.* We have no authentic record of *O. Virginianum* being found in Canada.

ECHINOSPERMUM DEFLEXUM, Lehm.

Mr. M. L. Fernald writes that the only American specimens of true *E. deflexum* in the Gray herbarium are one from Wisconsin, and one collected in waste places at Campbellton, N.B., July 29th, 1876, by R. Chalmers. It was probably introduced from Europe in both places.

CASTILLLEIA OREOPALA, Greenman.

Mountain slopes, alt. 6,000 ft., south of Tulameen River, B.C., 1888, (*Dr. G. M. Dawson.*) Mount Cheam, Lower

Fraser River, B.C., 1898, (*J. R. Anderson.*) At an altitude of between 5,500 and 6,coo ft. on nearly all mountains north and south of Chilliwack River, B.C. Nos. 54,434, 54,435, 54,436. Growing generally with *Parnassia fimbriata* and *Leptarrhena pyrolæfolia*. When growing the flowe.s are bright plum color shading to pink and creamy white. (*J. M. Macoun.*)

CASTILLEIA RUPICOLA, Fernald.

First collected in Canada, by Dr. James Fletcher and Mr. J. R. Anderson on Mt. Cheam, Lower Fraser Valley, B.C. Not rare, generally on inaccessable cliffs, both north and south of the Chilliwack River. Nos. 54,437, 54,441 and 54,438. (*J. M. Macoun.*)

CASTILLEIA ANGUSTIFOLIA, Don. var. BRADBURII, Fernald.

Confounded with *C. miniata* in our herbarium. Parson's Farm and other places near Victoria, Vancouver Island, No. 714; Nanaimo, Vancouver Island, No. 715; Deer Park, Columbia River, B.C., No. 17,277 (*Macoun.*) Thompson River, B.C. (*A. J. Hill.*) North Arm, Burrard Inlet, B.C.; on gravel bars, Chilliwack River, B.C., No. 54,439; north of Chilliwack Lake, B.C., No. 54,440. (*J. M. Macoun.*)

DASYSTOMA FLAVA, Wood.

In woods at Queenston Heights, Ont. This species seems to be confined to the Niagara region where it has been found by several collectors in recent years.

ANYCHIA CANADENSIS, (L.) B. S. P.

Amherstburgh, Ont., 1901. (*John Macoun.*) The specimens referred to *A. dichotoma* in Part x of these contributions are this species.

SALIX PRINOIDES, Pursh.

Below Brock's monument, Queenston Heights, Niagara, Ont., 1901. (*John Macoun.*) New to Canada.

ARCEUTHOBIUM PUSILLUM, Peck.

On *Picea nigra*, in a bog at Tracadie Beach, Prince Edward Island, July 31st, 1901. (*J. R. Churchill.*) Also collected on P. E. I. by Mr. L. W. Watson.

CYPRIPEDIUM CANDIDUM, Willd.

About three miles from Port Elgin, Ont. (*A. R. Innis.*) Dr. James Fletcher found large numbers of this plant growing on hummocks on a damp prairie four miles south of Brandon, Man., in the beginning of July, 1899. Mr. Norman Criddle also collected the same plant at Aweme, Man., near the Douglas swamp about 50 miles east of Brandon.

SMILAX ROTUNDIFOLIA, L.

Collected at Lake Annis and at Brazil, Yarmouth Co., N.S., in 1898 and again in 1902 by Mr. J. E. Barteaux. Not before recorded east of Ontario.

STREPTOPUS BREVIPES, Baker.

In deep hemlock woods, Chilliwack River, B.C. No. 34,109. (*J. M. Macoun.*) New to Canada.

STREPTOPUS CURVIPES, Vail., Bull. Torr. Bot. Club, vol. 28, p. 267.

Apparently the commonest species in British Columbia. Easily separable from *S. roseus* by its simple habit and non-geniculate and much shorter peduncles. Our specimens are from Asulcan Glacier, Selkirk Mts, No. 27,646a; Revelstoke, B.C., No. 27,646. (*John Macoun.*) Port Simpson, B.C. (*Jas. McEvoy.*) Cascades on Skagit River, B C. (*Dr. G. M. Dawson.*) Common in the Chilliwack Valley, B.C. (*J. M. Macoun.*) Specimens of simple habit but with the long geniculate peduncles of *S. roseus* were collected on Queest Creek, Shuswap Lake, B.C., by J. M. Macoun July 27th, 1889.

VAGNERA BRACHYPETALA, Rydb., Bull. Torr. Bot. Club, vol. 28, p. 268.

Described from specimens collected near the Asulcan Glacier in 1897 by Mrs. Cornelius Van Brunt. A common species in British Columbia, especially on Vancouver Island. Distinguished by its short petals and purple fruit.

BRODIÆA LACTEA, Wat.

Rocky bank 5 miles from Chilliwack, B.C. No. 54,041. 1901. (*J. M Macoun.*)

CAMASSIA LEICHTLINII, Wat.

Fields and meadows at Chilliwack, B.C. No. 54,061. (*J. M. Macoun.*) Not recorded from mainland in B.C.

LILIUM UMBELLATUM, Pursh.

A common species from Winnipeg, Man., to the Rocky Mountains, seldom separated from *L. Philadelphicum*. Collected by Prof. Macoun in 1901 at Johnstone's Harbour, Lake Huron. No. 54,059 Eastern limit.

ERYTHRONIUM PROPULLANS, Gray.

This species is recorded in Part IV of Macoun's catalogue of Canadian Plants as having been found in Elgin Co. No specimens were collected and later investigations have forced us to the conclusion that the plant noted was *E. albidum*.

LLOYDIA SEROTINA, Reich.

Bare mountain tops, alt. 6,500 ft., Chilliwack Lake, B.C. No. 54,068, and at alt. 6,000 ft., Tami Hy. Mt., Chilliwack River, B.C. No. 54,070, 1901. (*J. M. Macoun.*) Not recorded from British Columbia.

JUNCUS DUDLEYI, Weigand.

The greater number of our specimens under *J. tenuis* prove to be this species. It ranges from Ontario to B.C.

SCLERIA VERTICILLATA, Muhl.

Abundant on Toronto Island, Ont. No. 34,588 (*John Macoun.*) Known before only from Presq'ile Pt., Lake Ontario.

SCLERIA TRIGLOMERATA, Michx.

Walpole Island, Lambton Co., Ont. (*C. K. Dodge.*) Sandwich, Ont. No. 34,590. (*John Macoun.*) Only other record, London, Ont.

ELECHARIS OLIVACEA, Torr.

Near Galt, Ont. 1902. (*W. Herriot.*) Our only Canadian specimens.

CAREX TYPHINOIDES, Schwein.

Collected in several localities in the vicinity of Ottawa, Ont., but always referred to *C. squarrosa*. Our specimens are

from Hull, Que., Buckingham, Que., and Duck Island near Ottawa.

CAREX LUPULIFORMIS, Sartwell.

Near Galt, Ont. 1902. (*W. Herriott.*) New to Canada.

SETARIA VERTICILLATA, Beauv.

On Carling street, London, Ont., 1902. (*J. Dearness.*) Other specimens in our herbarium which have been referred here prove to be not this species, which is probably not of so wide distribution in Canada as has been thought.

BROMUS ERECTUS, Huds.

Roadsides on the south side of 2nd concession, London township, Middlesex Co., Ont., 1902. (*J. Dearness.*) New to Canada.

MUD PUPPIES.

W. HAGUE HARRINGTON, OTTAWA.

It is generally supposed that only anti-prohibitionists see snakes and lizards in the flowing bowl, but yet it sometimes happens that an adherent to the Ottawa water system finds the genuine article in his, or at least a very closely connected relative. A few days ago (on Jan. 17th) there was on exhibition in the boiler-room of the Langevin Building a "critter" that had been taken that morning from one of the water-locks. It had been placed in a bottle and elicited from those who inspected it many opinions as to its habits and qualities which, though interesting, were not of sufficient scientific value to reproduce here. The species of animal in question is one regarding which I have been often questioned, and as it is common in the Ottawa River, and occasionally brings itself before the public by issuing from the water pipes, a few lines in our Club journal may satisfy the enquiring that, though not beautiful, it is at least a harmless visitor. Its scientific name is *Necturus maculatus*, of which *Menobranchus lateralis*, *punctatus*, etc., are synonyms. The common name

northward is Mud puppy, but in the south it is known as Water-dog or Dog-fish. It has a wide distribution in eastern America, including the great lakes system and those of the great rivers southward. When full grown it is said to vary from eight inches to two feet in length. In the Ottawa specimens of one foot in length may probably be considered as above the average size. The individual mentioned above was about five inches long, and, although alive when on exhibition, it had been so badly injured in its forcible removal from its place of exit, that its days seemed to be numbered. The mud-puppy is lizard-shaped, with four short legs, on each of which there are four toes, and its tail is almost as long as the body, and broad and flattened so as to form a powerful paddle for propelling the animal if it wants to leave the bottom. At the base of the head on each side it has three tufts of large bushy gills of a bright red colour, and two slits or branchial clefts. These are the structures for maintaining respiration in the water, but it has sufficient lung development to enable it to live for some time when removed from its proper element It is apparently largely nocturnal in its habits, lurking among stones and weeds on the river bed, but may also be active in daylight, as some years ago I saw several caught with hook and line by some boys who were fishing on the Aylmer wharf. Its food consists of worms, insects in their various stages, small crustaceans, tadpoles, small fishes, frogs and other small living forms upon which it can seize; probably it feeds upon dead animal substances as well. Its presence in the water mains cannot injure the water supply, except when one gets drawn into a service pipe and causes a blockade. The animal belongs to the batrachians, which occupy a position intermediate between the fishes and reptiles, and is placed in the family Proteidæ, the lowest group (of living forms) in the class Batrachia. The majority of the batrachians undergo metamorphoses, by which the gill-bearing young lose these organs and develop lungs, and on maturity leave an aquatic for a terrestial existence. The frog is a good example; its young, the familiar tadpole or pollywog, has external gills, or branchiæ, and a broad swimming tail, but gradually loses these appendages and develops legs, which are remarkably serviceable both for land and water. Our friend the mud-puppy, however, never outgrows the

larval form, and is content to remain in ignorance of the beauties and charms of the dry land. The family to which he belongs is a small, as well as a lowly one, as the Cambridge Natural History reduces the various described forms to three genera, each with only one species. The mud puppy's connections are, so far as known, confined to limited areas and are of a very retiring disposition. *Proteus anguinus* is found in Austria, and inhabits subterranean waters, especially those of the large caves of Adelsburg near Trieste. Its whole body is white, but is so susceptible to light, that when removed from its natural habitat and exposed to sunlight, it gradually becomes darker and finally entirely black. The remaining species is *Typhlomolge rathbuni*, an inhabitant of subterranean waters in Texas. The extent of its distribution is unknown, for all the specimens yet observed have been taken from an artesian well, 188 feet deep, near San Marcos. Like other inhabitants of such dark hidden waters it is colourless and sightless. Possibly the fondness shown by these two species of the Proteidæ for a subterranean existence may influence the young mud-puppies which find their way in to the darkness of our water mains. Passing through the screens of the intake pipe, as an egg or while still small, it is drawn onward until it takes the plunge into the vortex of city life, from which there is no return to the home of its kindred.

THE COW-BIRD IN WINTER.

In December, 1901, Mr. W. T. Macoun saw a cow-bird associating with the English sparrow around the barns at the Experimental Farm near the city. Afterwards, this bird, or another, was picked up dead near the barns. It proved to be a male, and is now in the Geological Survey Museum.

A little before Christmas a Museum assistant noticed what he called a black sparrow sitting on the maple tree in front of a window on George street. For over ten days it remained with the sparrows, fed with them and sat on the twigs with them, but never seemed intimate with them. It was not seen afterwards, and may have succumbed to the late severe weather.

In "The Auk" for April, 1895, I find the following: "I shot a cow-bird on January 18th, 1895, on one of the principal streets of the town (Lancaster, New Hampshire). It was in company with a flock of sparrows feeding in front of a grain store. The bird had been seen at odd times throughout the winter, usually in company with the sparrows."

These occurrences are very likely the result of the same cause, which I believe to be the habit of cow-birds laying their eggs in the nests of other birds and having them do the hatching. The sparrow being a non-migrating bird retains the aliens until all the migrating birds have left, and the few strays that are observed become grain-eaters and remain with the sparrows.

JOHN MACOUN.

January 1903.

PRAIRIE HORNED LARK NEST IN NEW BRUNSWICK.

BY WM H. MOORE.

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

It has been known for some years that prairie horned larks bred in New Brunswick as several times, the old birds had been observed feeding the young. Some years this species is common during the spring migration from March until the middle of May. Being of such retiring habits during the nesting period they are seldom seen, as they sit close to the ground and will not fly except when one is about to walk on them.

This spring (1902) a nest was found by a farmer while crossing a field about April 20, and contained 4 eggs. Through the kindness of Mr. Harry Frazer, a school teacher in the district where the nest was found, I was enabled to get the nest and eggs and give a description below. The nest was situated on the ground on a dry knoll in a field, and was composed of dry grass blades, rather loosely constructed. Later a sheep stepped on one side of the nest breaking one egg, after which the birds deserted it. The nest was of the following dimensions. Diameter inside 1¾ inches, outside

3½, depth inside 1 inch, outside 1⅜ inches. Mr. Frazer had seen the bird, previous to getting the nest and by comparison with a cut of the bird in an ornithology, was certain of the identity. The eggs measure ⅞ x ⅝ inches, are thickly and evenly speckled gray and yellowish gray on a light brownish ashy background. Two of the eggs have a decidedly plain band of slaty color about the large end The following note was taken May 26, 1898.

At Mouth Keswick a pair of larks were found on the road; two different times as the team neared the birds the female flew to the fence, while the male would lower its wings, erect its crests, spread its tail and with the middle feathers erected more than those of the sides which were at an angle of about twenty degrees, as if in an attitude of defiance, and if of sufficient size he would abolish horses and outfit. He would hold his position, then with quick flappings of the wings and jerky flight would move on ahead a short distance.

July 9, 1898, an adult lark was observed feeding two young.

CORRESPONDENCE.

On the Age of the Belly River Series or Formation in Canada.

Editor of the Ottawa Naturalist :—

The recent communication by Dr. H. M. Ami is very timely. In conference with Mr. J. B. Hatcher a somewhat similar point has been raised, that the Belly River and the older formations in Montana of somewhat similar age should be placed in the Upper Cretaceous rather than in Mid-Cretaceous. This is largely a question of the use of terms. In most geological text books the Cretaceous is divided broadly into Upper and Lower. In this sense the Belly River falls in the upper division; the Lower Cretaceous would embrace the Kootanie stage of the northern interior. In another sense, and according to the usage which is shortly to be adopted by the United States Geological Survey, the Cretaceous is to be divided into Lower, Middle and Upper; the Lower including the basal, the Upper including the superior members of the series, and

the Middle embracing those which lie between. It was in this sense that I used the term Mid-Cretaceous in our memoir. Recent conferences with Mr. J. B. Hatcher, who is familiar with Montana formations, confirm this usage.

In addition to the above statement, I am not clear as to the correlation of the Lower Cretaceous south of the Canadian border. The Dakota series immediately overlie the Sauropoda and Baptanodon beds, which in turn are correlated by one of the most eminent authorities, Professor Eberhard Fraas of Stuttgart, with the Purbeckien and Oxfordien of the European geologists.

We are so much in doubt as to the actual relations of these rocks to those of Europe that all notes and discussions of the question are very welcome.

HENRY F. OSBORN.

SOIRÉES.

There was a large attendance of members of the Club and their friends at the first of the winter soirées at the Normal School December 16th Dr. S. B. Sinclair, in his address of welcome, referred to the benefit derived from the Club's work by the Normal School students, to whom the spring and autumn excursions as well as the soirées held during the winter afforded an enjoyable means of supplementing their knowledge of the natural sciences.

The President's address on "The Functions of a Geological Survey" was delivered by Dr. Robert Bell, the Acting Director of the Geological Survey, and will appear in an early number of THE NATURALIST.

A short paper was then read by Dr. James Fletcher on "Some Ottawa Butterflies and Moths." This was illustrated by beautiful lantern slides, some of which had been kindly lent for the evening by Prof W. Lochhead, of Guelph, and Mr. A. E Norris, of Montreal. Those from the former were coloured by Mrs. Slingerland, of Cornell University, and those from Mr.

Norris were done by himself. These coloured slides added very much to the interesting statements made by Dr. Fletcher concerning the life-histories and habits of the various insects treated of. In introducing his subject he stated that he had chosen for exhibition some of the most beautiful or remarkable butterflies and moths in our fauna, and one point he wished to draw particular attention to was, that everyone of these was common and easily obtainable at Ottawa by any student with ordinary assiduity during the first year. Mention was made of the value and the great fascination of working out the life-histories of insects by procuring their eggs and watching the caterpillars during their various moults to the pupal state and then on to maturity. There were many facts which were still unknown even with regard to many of our common species. Some of the large silk worms, or Emperor moths, were shown on the screen and the habits of each kind discussed. The Luna moth, an object of great beauty, was much admired. One delightful scene showing an ideal spot for collecting insects, a limpid stream carrying on its surface water lilies in bloom, and flowing gently beneath over-arching branches, which made a grateful shade, carried the mind of the audience back to the sunny days of June when they visited the Beaver Meadow at Hull. In closing, Dr. Fletcher made a plea for a more general study of the life-histories of insects by the members of the Club, not only for the value of these studies as a source of constant pleasure but on account of the great economic value of a knowledge of insects, which are every year the cause of so much loss. He stated that the leaders in Entomology would always be pleased to help anyone wishing to take up the study of insects, and would gladly accompany them to the woods or show them their collections. The leaders each have private collections and there are also public collections in the Museum of the Geological Survey and at the Central Experimental Farm, all of which are accessible to students.

Many interesting microscopic slides were shown by Dr. H. M. Ami, W. S. Odell and W. J. Wilson, and a number or living turtles were exhibited by Mr. Odell.

REVIEW.

"PRELIMINARY REPORT ON A COLLECTION OF MEDUSÆ FROM THE COAST OF BRITISH COLUMBIA AND ALASKA," by Louis Murbach and Cresswell Shearer. Annals & Mag. Nat. Hist., 7th series, Vol. 9, No. 49, pp. 71-73. Jan., 1902.

In the summer of 1900 Cresswell Shearer, Esq., accompanied by Prof. MacBride of McGill University, in a trip along the coast of British Columbia, and collected a number of species of Medusæ, to which additions were made by Prof Kincaid of Seattle. The list of species identified include the following :—

1. Codonium apiculum, sp. n.
2. Turris breviconis, sp. n
3. Gonionemus Agassizii, sp. n.
4. ,, vertens, sp. n.
5. Polyorchis inuta, sp. n.
6. Mesonema victoria, sp. n.
7 Syndictyon angulatum.
8. Dipurena dolichogaster.
9. Hippocrene Mertensii.
10. Thaumantias cellularia.
11. Proboscidactyla brevicirata.
12. Phialidium languidum.
13. P. gregarium.
14. Muggiæa Kochii, one of the SIPHONOPHORA

Four additional species are recorded from the same coast but with some doubt as to identity owing to the imperfect mode of preservation of the material examined. These include :

a. Sarsia eximia.
b. S. rosaria.
c. Atollia Bairdii.
d. Obelia polystyla.

The descriptions of the five new species are then given. This paper opens up a most interesting field of research in the invertebrate fauna of the west coast.

H. M. A.

THE OTTAWA NATURALIST.

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DESCRIPTION OF A FOSSIL CYRENA FROM ALBERTA.

By J. F. WHITEAVES.*

(With one plate.)

In 1888, Mr. T. C. Weston, of the Geological Survey Department, made an interesting collection of fossils from the rocks exposed at Fossil Coulée, Milk River Ridge, in southern Alberta. According to Dr. G. M. Dawson, the plateau through which this coulée is cut is capped by the Pierre shales, and the section in the coulée itself "may be regarded as a representative one of the upper or pale portion of the Belly River series."† The species represented in this collection are apparently as follows: *Anodonta propatoris*, White, several good specimens; *Unio*, three undescribed species, one very large; *Cyrena* a large and previously undescribed species; *Physa Copei*, White, the short spired typical form; *Goniobasis*, two species; all purely fresh-water forms: and a land shell, like *Anchistoma parvulum*. The *Cyrena* in this collection may be thus named and described:

CYRENA ALBERTENSIS, sp. nov.

Shell quite large for the genus, moderately convex, ovately subtrigonal in marginal outline, a little longer than high, and very inequilateral.

Anterior side short, rounded; posterior side longer and more pointed, most produced in the postero-basal region, the posterior extremity being subtruncate rather obliquely above and narrowly

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

† Geological Survey of Canada, Report of Progress for 1882-83-84, pp. 50 and 51C.

rounded below. Ventral margin broadly rounded in front of the midlength and straighter behind it; superior border sloping rapidly, obliquely, and somewhat concavely downward in fro t of the beaks, and more gradually and convexly so behind them; umbones rather narrow and moderately prominent; beaks curved inward and forward, placed in advance of the midlength.

Surface marked with numerous concentric lines of growth; test thick and apparently not nacreous.

Hinge dentition and muscular impressions unknown.

Approximate dimensions of the specimen described and figured, which has both valves preserved though slightly displaced: maximum length, 72 mm.; height, 64 mm.; greatest thickness or convexity of the two valves when closed, about 41 mm.

Judging by its external characters and by analogy with other fossil and recent species, this specimen would seem to be referable to *Cyrena* rather than to *Corbicula*. If it is a true *Cyrena*, it is the first species of that genus that has been recognized in Canada. But according to Mr. Meek, "it is quite probable that a critical study of the numerous extinct species that have been described under the general name *Cyrena*, by those who are not very particular in regard to generic distinctions, would bring to light sufficient reasons for the separation from that genus and *Corbicula*, of several groups, either holding the rank of distinct genera or subgenera."* And, in reference to *Cyrena*, Mr. Meek had previously remarked that "Mr. Prime has called attention to the fact that, in the existing American species of this genus and *Corbicula*, the pallial line is always distinctly sinuous, the sinus being comparatively deep and sharply angular; while in foreign species it is but slightly, or sometimes not at all, sinuous." "So far as I have had an opportunity to determine," Mr. Meek adds, "all of our far-western fossil species, excepting *C. Dakotensis*, have a more or less distinctly sinuous pallial line; but, in no instance have I seen the sinus so deep and sharply angular in the latter, as represented by Mr. Prime in some of the recent species."† In a future re-

* Report of the U. S. Geological Survey of the Territories, vol. IX, p. 160.

† *Idem*, p. 157.

vision of the Cyrenidæ, *C. Albertensis* may have to be placed in a new genus, but at present it cannot be satisfactorily separated from *Cyrena*. Unfortunately, the pallial line is not visible in the only specimen of that species that the writer has seen.

The genus *Cyrena* was constituted by Lamarck in 1818 for the reception of a number of fresh or brackish water bivalves, with ovately subtrigonal or nearly circular shells and a greenish epidermis, which differ from *Unio* in their porcellanous or non-nacreous test, and comparatively short lateral hinge teeth. Dr. Paul Fischer, in his Manuel de Conchyliologie, says that there are about 80 recent species of *Cyrena*, which live in (the warmer parts of) Asia, America and Oceania. On this continent living Cyrenas are not found north of the Southern States.

In a fossil state, species of *Cyrena*, as that genus is now understood, are said to range from the Jurassic period up to the present time, and to culminate in the Eocene. The fossil species of Cyrenidæ, however, are found much farther to the northward than the living ones have been, the former occurring also in Northern Europe, including the British Islands, and in Canada. Including the one now described, four species of Cyrenidæ have so far been recognized as occurring in the Laramie and Belly River formations of Alberta and Assiniboia. These are *Corbicula occidentalis* and *C. cytheriformis* of Meek and Hayden, *Corbicula obliqua* (nobis), and *Cyrena Albertensis*.

Ottawa, Feb. 5, 1903.

EXPLANATION OF PLATE IV.

Fig. 1.—*Cyrena Albertensis*. Outline of left valve of the specimen described.

Fig. 1A.— ,, ,, Dorsal view of the same specimen, slightly restored, to show the amount of convexity of the two valves when closed.

OTTAWA SATYRINÆ.

By A. E. RICHARD, Ottawa.

During the warm days of summer, grayish and dark brown butterflies may be seen flying in a characteristic slow and uncertain way ; they are called Satyrs, and like their namesakes of old may be found in our fields and forests.

The Satyrinæ are medium-sized butterflies, their wings usually adorned with ocelli or round eye-like spots ; in their larval state they feed on grasses and sedges. Some genera occur only in the cold wilderness of polar regions or on the snow-capped summits of mountains in warmer latitudes ; these lonely insects are believed by naturalists to be the remnants of the large numbers which existed during the glacial period ; the climate of the valley has become too warm for them. All the Satyrs, however, are not inhabitants of the cold north ; the greatest number of species, in fact, and we may say the most beautiful, are found in tropical countries.

Six species occur in Ottawa and its surroundings, namely : *Neonympha Eurytus* (Fabr.), *Satyrodes Canthus* (Bd.-Lec.), *Satyrus Nephele* (Kirby), *Debis Portlandia* (Fabr.), *Chionobas Jutta* (Hbn.), and *Cœnonympha Inornata* (Edw.) ; of these, the first three are common, while the latter three are of rare occurrence.

Mention may also be made here of two other rare Satyrs which may possibly be taken in this vicinity; one of which, *Erebia Discoidalis* (Kirby), has been taken at Sudbury, Ont., by Mr. J. D. Evans, flying in May ; and the other, *Chionobas* (*Œneis*) *Macounii* (Edw.), perhaps the most remarkable species of the whole genus to which it belongs, was discovered at Nepigon by Prof. John Macoun, flying in July. The life history of this insect has been worked out from the egg by Dr. Fletcher ; this butterfly differs from all the other known species of the genus by the absence of the peculiar band of dark special scales or androconia which are such a conspicuous feature of the fore-wings of the males of the genus *Chionobas* (*Œneis*).

After the snow has melted, *Neonympha Eurytus* is the first species to appear ; this Satyr flies at the end of May and through-

out the month of June under the shade of quiet woods. It is of a soft brownish-gray colour with markings of a darker shade; there are two large ocelli on the fore-wings and one large and a few small ocelli on the hind-wings; there are two silvery spots in the centre of each large ocellus. *Neonympha Eurytus* measures about one inch and a half in expanse of wings.

The next to appear, *Satyrodes Canthus*, of a paler colour than the preceding species, is also larger in size, with four ocelli on the fore-wings, and about five on the hind-wings; it is our commonest Satyr and can be seen everywhere in low fields and on the weedy shores of rivers and lakes. Appearing on the wing at the beginning of July, it flies in large numbers for a month or so and may even be found in August, though in a crippled condition.

By this time a rarer butterfly has appeared, *Debis Portandia*; it is seldom seen on the wing owing perhaps to the secluded spots it prefers. I have found it in the vicinity of Ottawa City only in the shady parts of woods, resting on the bark of trees or on the nearby fence railings. Somewhat larger than *Satyrodes Canthus*, it resembles it somewhat in its markings but is of a darker colour; there are three ocelli on the fore-wings and five on the hind-wings; the underside is of a paler colour, shaded with delicate lilac and ornamented with beautiful marble streaks of a chocolate-brown shade. I have captured several specimens of this rare insect near Beechwood Cemetery, one being taken on July 10th, and another on August the 6th; this may give an approximate idea of the time the butterfly is on the wing at Ottawa. It has also been taken at Hull, P.Q.

Satyrus Nephele flies in the meadows in August; first comes the male, of a dark brown colour with two black ocelli on the fore-wings and one ocellus near the outer margin of the hind-wings; each ocellus is centred with a bluish-white dot. The female appears a few days later than the male; it is of a paler brown shade, the two large ocelli on the fore-wings are very conspicuous in a band of a paler color than the rest of the wing.

Satyrus Nephele is very common and may be captured in great numbers on thistle blossoms together with the large species of *Argynnis* and *Grapta*.

Chionobas (Œneis) *Jutta* reported from the Mer Bleue by Dr. Fletcher is a very delicate brownish-gray insect, with three ocelli on the anterior wings and two or three on the hind-wings the underside of the wings is marbled with grayish and brown markings. This boreal Satyr flies in swamps and wet meadows. I have captured a specimen in a wet wood at Langevin, Dorchester Co., P.Q., some fifty miles south of Quebec city.

While strolling in the fields east of Rockliffe Park on June the 14th, 1902, I observed a small butterfly which seemed strange to me. I succeeded in capturing it with my hat, and comparing it with the coloured plates of "Holland's Butterfly Book," I supposed this insect to be *Cœnonympha Inornata* (Edw.). but as I was not sure of its identity I submitted the specimen to Dr Fletcher, who kindly determined it as a true *Inornata*, and I understand it is the first time this butterfly has been seen in this vicinity.

Cœnonympha Inornata is a small species expanding about 1¼ inches ; the wings above are of a uniform warm ochreous yellow, the margin of both fore-wings and hind-wings is gray; on the under side the fore-wings are ochreous yellow from the base to the middle or end of the discal area, and then light, shading into gray towards the outer margin ; the hind-wings are gray with a whitish band transversely across the wing. This species is abundant on the western prairies, and has also been taken at Hudson Bay and in Newfoundland.

ENTOMOLOGICAL BRANCH.

By invitation of Dr. Fletcher, one of the leaders of this branch, a meeting was held at his residence on Thursday, Jan. 22, 1903, the following members being present :—W. H. Harrington, T. J. MacLaughlin, A. Halkett, W. Simpson, A. Gibson, C. H. Young, W. R. S. Metcalfe, A. E. Richard and J. D. Evans (Trenton). The convener stated that his object in calling them together was to discuss the work of the branch and to see if some steps might not be taken to stimulate and develop research, as the

number at present interested in entomology was small. He thought that periodical meetings of the members for discussion would result in benefit to all, and would advance the work of the Club. The papers which might be prepared for the meetings would be available for the Editor of THE NATURALIST. Those present were unanimous in the opinion that the suggested reunions would be of great value, and that regular sub-excursions should also be held during the collecting season. Mr. Harrington was elected secretary in order that records might be kept regularly, and it was resolved that each member should act as chairman in turn. By request, Mr. Harrington read a note, which had been prepared for THE NATURALIST, on *Necturus maculatus*, a batrachian not rare in the Ottawa and Rideau, and which lives partly on insects. Dr. Fletcher described the operations of a small scarabeid beetle, *Canthon simplex*, Lec , which he had taken at Fort McLeod, and pointed out that much that had been published relative to allied ball-rolling beetles was inaccurate or incomplete. Hardly anything had been written of the life-histories of American species. *Canthon lævis*, Drury, occurs in Western Ontario (London) and in the Northwest (Medicine Hat). An enquiry was made by Mr. Halkett as to the antennæ of *Belostoma americana*, the Giant Water Bug, or Electric Light Bug, which has these organs so concealed in ear-like pockets under the head as to be invisible except on close examination. Among the exhibits may be mentioned the following:—Mr. Gibson : an exhibition tablet of *Plusia bimaculata* ; with upper and lower glass, so as to show both sides of specimens ; also specimens of a fine Pieris from Burmah, white above, but very strikingly coloured beneath. Mr. Young : a series of bred noctuids beautifully mounted. Mr. Harrington : several American species of *Canthon*, *Phanæus* and *Copris* and a few from Europe and Japan. Dr. Fletcher : a pair of *Hylecœtus lugubris* from Rigaud, Que., and a plate of melanic forms of *Argynnis lais* painted by Mr. Criddle. Mr. Metcalfe : an interesting series of Arctians.

The second meeting was held on Thursday, Jan. 29, at Mr. Harrington's, who read a short paper on "Neatness in Collections," giving some hints as to pinning and setting insects of the

different orders so as to make an attractive collection, and at the same time to have the specimens best adapted for study. Dr. Fletcher and others discussed the points raised, and gave some valuable ideas as to the preservation of various forms. Mr. Richard read an excellent paper on "Ottawa Satyridæ" giving descriptions of the species found, and the localities where captured. He recorded a species new to Ottawa, viz., *Cenonympha inornata*, which he had taken on Rockliffe Rifle Range last summer. Dr. Fletcher spoke of the value of Mr. Richard's work, and of the distribution of *C. inornata* and of the western form *C. ochracea*. He also discussed *Chionobas jutta* and *C. Macounii*, the latter occurring only at Nepigon and the foot-hills of the Rocky Mountains. Mr. Gibson described the occurrence of *C. jutta* in the Mer Bleue and read a note on the occurrence in the same locality of a new moth, *Semiophora Youngii*, Smith, which had been first captured by Mr. Young. Two specimens were shown, and also inflated larvæ and pupa cases. A parasite reared from a pupa proved to be a new species of Anomalon. Mr. Metcalfe mentioned finding tachinid eggs upon potato beetles, but had not succeeded in obtaining flies. Three dipterous larvæ had emerged from a female Walking Stick (*Diapheromera femorata*) which lived for some time afterward and deposited her eggs. He exhibited a specimen of *Thecla Ontario* taken at Grimsby, the only previous records being Port Stanley and Toronto. A larva feeding upon table figs was shown by Mr. Harrington and identified by Dr. Fletcher as that of *Plodia interpunctella*, which infests dried fruits, nuts and other products. The following recent books were examined: Dr. Dyar's "List of N. A. Lepidoptera," a valuable work just published; "Caterpillars and their Moths," by Miss Soule and Miss Elliott; "A Nature Wooing," by Blatchley, and "Our Common Spiders," by Emerton.

W. H. H.

NOTE ON THE BLUE-TAILED LIZARD.

Several summers past, beginning with the summer of 1897, I have observed a very pretty little lizard on an island of Stony Lake in Peterboro' County, Ontario. As true lizards are not common in Ontario (though newts and salamanders, which are popularly called "lizards," are fairly common) and as this is the only Canadian lizard I have ever seen, I have been the more interested in it.

At noon on a bright, warm day in August, 1899, with the aid of a little boy, I secured a specimen in the shallow water on the flat rocky shore, made a sketch of it, and then let it go. I am loth to kill animals, even rare ones, or rather especially rare ones; for I regard such animals as the very ones to be most encouraged in the locality. This proved to be the Blue-tailed Lizard, *Eumeces fasciatus*, one of the skinks. It was very nearly four inches long, black, with five yellow stripes along the back, the middle one being forked at the head; and it had an irridescent blue-green tail. One summer I found one dead on the shore. Last year as I was clearing the shore of drift-wood, I saw one come out of an old stump. It was within arm's length of me, and we remained looking at each other for some time before I made an unsuccessful effort to catch it. I have at other times caught glimpses of them as they darted under a rock or log; and this summer my sister saw one under the corner of the house.

In all cases the animal was seen in the middle of the day; it must therefore be, to some extent at least, diurnal. It is no wonder that the lizards are rare and consequently little observed in Canada; for, being at once cold-blooded (or rather poikilotherm) and terrestrial, they like a warm climate, and are found in abundance only in tropical climes. Of the other reptiles we have, for the same reason, no alligators or crocodiles and but comparatively few species of snakes and turtles.

As Professor Macoun knows of no previous record of this lizard in Canada, I have thought it worth while to make this note of it.

CEPHAS GUILLET.

Nov., 1902.

PALÆONTOLOGY.

CRANIA OF EXTINCT BISONS FROM THE KLONDIKE CREEK GRAVELS.

During the last five years, four skulls, or portions of skulls, of extinct bisons from the auriferous gravels of the Klondike district, have been received at the Museum of the Geological Survey. It will be convenient to distinguish these specimens as Nos. 1, 2, 3 and 4.

Nos. 1 and 2 are skulls that are larger and much longer horned than those of the woodland or prairie race of the recent American Bison. Both of them are apparently referable to the form which Mr. Rhoads describes and figures as the "Great Alaskan Bison," *Bison Alaskensis*, Rhoads, in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1897. But, in a paper on "The Fossil Bison of North America," published in 1899, in volume XXI of the Proceedings of the U. S. National Museum, Mr. F. A. Lucas places *B. Alaskensis* among the synonyms of *B. crassicornis*, Richardson.

No. 1, like the type of *B. Alaskensis*, is a "large cranium of a long horned bison" ..."in which the frontal and occipital portions, with their horn cores, are intact." The margins of the orbits and the "basal suture of the nasals are also preserved." This specimen was collected by Mr. R. G. McConnell in 1900, fifteen feet below the surface, at Gold Run Creek, Claim 17.

No. 2 is a still finer skull than No. 1, with the whole of both horns remarkably well preserved, and the nasals, as well as the frontal and occipital portions. It was collected by Mr. W. G. Luker in 1902, thirty feet below the surface, at Dominion Creek, Claim No. 83, below Lower Discovery.

No. 3 is the basal portion of a skull, with most of the right horn core and half of the left preserved, collected by Mr. Luker in 1902, forty-five feet below the surface, at Bear Creek. This skull is much smaller than that of either race of the now nearly extinct American Bison, and has comparatively short and not very much curved horn cores. Still, it seems to correspond better with Lucas' recent descriptions and figures of the young or "spike-

horn" stage of *Bison crassicornis*, than it does with those of his *B. occidentalis*.

No. 4 is a portion of a horn, with its core, which is too imperfect to be determined specifically, collected by Mr. W. Ogilvie in 1898, eighteen feet and a half below the surface, at Bonanza Creek, Claim 39, above Discovery.

It would appear therefore that Nos. 1, 2, 3, and possibly No. 4, are referable to the *Bison crassicornis* of Richardson, as that species is understood by Mr. Lucas. They are all obviously of no very great antiquity, and show no traces of mineralization.

Mr. Ernest Thompson Seton has advanced the theory that the bison of the plains is a "degenerate modern offshoot of the woodland stock," and it may well be that both are degenerate descendants of the great extinct bison of Alaska and the Klondike.

J. F. W.

SOIRÉES.

At the second of the Club's Soirées in St. John's Hall, Jan. 13th, Dr. R. A. Daly lectured on "The Scenery of the Rocky Mountain Region." A brief summary will indicate the ground covered by the address.

The variety of form and colour in mountain scenery is practically infinite. But in the same way that a more or less complete understanding of plants and animals is possible through the recognition of the existence of species and of higher classes, notwithstanding the immense number of variations in individuals, so an intelligent view of scenic forms as seen in mountain ranges is possible because of the fact that those forms are reducible to types. A second valuable aid in appreciating the elements of mountain scenery is found in the fact that the types recur because they are the product of general laws in the formation of the actual mountains seen by the tourist. It was pointed out that the lantern-slide illustrations of the evening might thus have more value if they were regarded as so many examples of processes character-

istic of mountain formation and also examples of forms which are repeated over and over again in other mountain ranges of the world. As the foundation of the subject as treated in the lecture, the parallel was drawn between man in his artistic productions and Nature in her fashioning of existing mountains. The lecture thus fell into three divisions corresponding to Nature's activity as an architect, as a sculptor, and as a painter.

The raw material with which Nature works in mountain-building is derived from stratified rock-material originally deposited in thick and extensive layers on the sea-floor. The methods by which the once flat-lying submarine strata are elevated into a mountain-range, include the folding and faulting of those beds, due to great lateral pressure at right angles to the axis of the range. In the process of folding, the width of the belt of rock so engaged is diminished and the thickness is correspondingly increased. As one consequence the lower parts of the greater folds become so deeply buried as to feel the influence of subterranean heat and of hot water and gases circulating within the earth's crust. The folded marine strata are in this way subjected to alteration and crystallization: from them many kinds of crystalline schists, so characteristically developed in great ranges throughout the world, have been derived. Again, the mountain folds may be partially displaced by molten granite or allied rock-material rising from the earth's interior and invading the overlying formations. The importance of this kind of raw material used by Nature in producing her mountain architecture, is recognized by the tourist visiting, for example, the Yosemite Valley, perhaps for its area affording the grandest bit of scenery in the world. The "central granites" of most great mountain ranges usually furnish much of the scenic magnificence of those ranges. Finally, the fractures opened by folding and faulting in the rocks composing a range, may permit of the overflow of molten rock from subterranean sources; the result has been to form in the west, Mt. Baker, Mt. Rainier and other huge volcanoes, among the grandest units in the scenery of the Rocky Mountain Region. In summary, folding, faulting, metamorphism, granitic intrusion and volcanic eruption were briefly noted as the methods by which mountain architecture has been determined.

The lantern-views of the evening, selected from the Bickmore collection, kindly placed at the disposal of the lecturer by Professor Penhallow of McGill University, and from the likewise valuable (commercial) collection of E. R. Shepard of Minneapolis, were, for the most part, intended to illustrate the natural sculpturing of the rock-formations exposed to destructive forces so soon as those masses have become elevated to mountainous heights. The influence of running water in cutting out valleys, the importance of streams of rock débris or rock-waste in explaining the wearing away of the mountain massifs, the destructive activity of snow and ice, especially in the form, respectively, of avalanches and glaciers, were outlined and explained by reference to views from southern British Columbia and Montana. It was pointed out that the actual ridges, domes, peak and cliffs seen during a journey through the Canadian Cordillera, are more directly due to Nature's sculpture controlled chiefly by these agencies, than to upheaval of the earth's crust. The proximate cause of the individual mountains is, in reality, the excavation of the intervening valleys, sunk as these are in rock-piles once much higher than the mountains of to-day.

The colouring of mountain scenery is of course partly to be referred to the natural pigments characterizing the constituent rocks, but, in general, still more to the influence of the sky, of the clouds and of the atmosphere itself, and, again in important degree, to the forest and to the artificial changes incident to man's inhabiting, clearing and cultivating valleys and higher slopes. The coloured Bickmore slides served to illustrate this third part of the lecture. The special control of the subjective element in scenery exerted by the presence or absence of man and his works in mountain-landscape was touched upon by the lecturer, and a comparison drawn in that regard between Switzerland and the Cordillera of America.

After the lecture the Report of the Geological Branch was read.

Prof. Penhallow's lecture on "The Wood-pulp Industry in Canada," in the Normal School, Jan. 13th, attracted a large number of lumbermen and others interested in the manufacture of pulp and paper, and there was the usual large attendance of Normal School students and members of the Club. The lecture was illustrated by many beautiful lantern slides showing the many varieties of pulp that had been used in the manufacture of paper from the earliest times to the present. The manner in which the ancient papyrus and the felted Japanese papers are made was clearly explained. The greater part of the lecture was devoted to describing the various processes employed to-day in manufacturing pulp and paper from the products of the forest From the cutting of the trees in the forest to the turning out of the finest paper from the mills of the St. Maurice and Sault Ste. Marie rivers, every step of the process was illustrated by lantern slides specially prepared for this lecture.

The most timely lecture of the winter course was that delivered by Dr. S. B. Sinclair, Feb. 10th, on "Nature Study in American Universities." Nature Study will soon be one of the chief branches taught in our public schools, and the teachers who listened to Dr. Sinclair must have been impressed with its importance. Taking Chicago, Clark and Cornell Universities as typical he traced the development of the Nature Study movement during the last thirty years, and said that there was now an almost universal opinion in favour of a certain amount of such study in every grade from the Kindergarten forward. A detailed statement of the points covered by the lecturer will appear in the May number of THE NATURALIST. The lecture was discussed by Prof. Macoun and Dr. Fletcher, who endorsed all that was said by Dr. Sinclair.

The Report of the Entomological Branch was read at the close of the lecture.

On February 24th. Prof. Macoun lectured in St. John's Hall, on "The Summer Climate of the Yukon and its Effects on Vegetation." After briefly referring to the route from Vancouver to Skagway, and from Skagway to White Horse and so to Dawson,

the lecturer described the natural vegetation of the Yukon and Klondike River valleys. The abundance of fruit was especially note-worthy. Red and black currants, blue-berries and raspberries were everywhere abundant, and cultivated varieties of all these fruits will do well. Vegetables of all kinds, except corn, do well, and though potatoes are said not to mature, new varieties more suitable to the soil and climate will doubtless be planted. There is nothing unsuitable to the growth of potatoes in the climate itself. Cabbage, turnips, etc., grow to an extraordinary size.

Careful metereological reports have been kept for five years, and these indicate that there is an average temperatuerof 70° or higher on 46 days each summer, and of 80° or higher on 14 days. These temperatures with bright sunshine and no frost for three months, amply account for the successful growing of vegetables. Spring opens about the end of April, the usual date for the last frost being May 23rd, and the first about August 23rd. Oats, barley and wheat, were secured on the latter date, and though the wheat was not ripe it ripened afterwards, and of 100 grains planted at the Experimental Farm none failed to grow and all were vigorous. Prof. Macoun made it clear that though the reports about frozen ground were in a measure true, the causes to which this condition was due are easily removeable, and they apply only to a part of the region. The physical features of the Yukon district were described, and the lecturer expressed the belief that in the very near future the district would be self-supporting. As a proof that the climate of Dawson was much the same as that of Ottawa he cited the fact that he collected a rose (*Rosa acicularis*) in bud at Aylmer, Que., on the 3rd of June. When he reached Dawson he found that Mr. Tyrrell had collected the same species in full bloom one day earlier, and other species collected by Mr. Tyrrell were found to be as early in blooming as at Ottawa. Prof. Macoun's address will be printed in full in an early number of THE NATURALIST.

The report of the Botanical Branch was read before Prof. Macoun's lecture was delivered.

REVIEWS.

NATURE STUDY AND LIFE. By Clifton F. Hodge, Ph. D. Ginn & Co., Boston, 1902.

NATURE STUDY AND THE CHILD. By Charles B. Scott, A. M. D. C. Heath & Co., Boston, 1900.

As a result of Mr. Attwood's paper on "Nature Study," published in the January number of the OTTAWA NATURALIST, and Dr. Sinclair's recent address on "Nature Study in American Universities" at one of the Club's soirées, a lively impetus has been given to the growing interest in Nature Study, and there is a demand for books on the subject. Of the great number which have been recently published, the two selected for notice are among the best, and either will prove of immense value to the student. Nature as a subject for popular study has been treated from so many points of view that students who propose to become teachers of this fascinating subject, have a large list of books from which to select those best suited to their needs. For those who have never systematically studied Nature, either of the above books will open up a field of unfailing interest and delight, and such knowledge as is obtained from them may be augmented by attending the excursions and sub-excursions of the Ottawa Field-Naturalists' Club. Students of Nature are exceptionally well situated in Ottawa as we have in our midst leaders in every branch of natural science, who are ever ready to give time and knowledge to help the working student. At every excursion of the Club there are those able and willing to resolve any of the difficulties that are likely to confront the beginner, and for the advanced student the more difficult steps are made easy.

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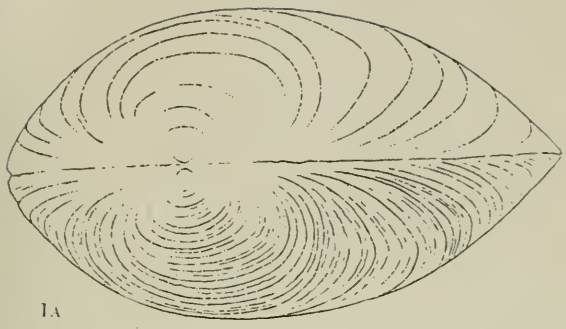

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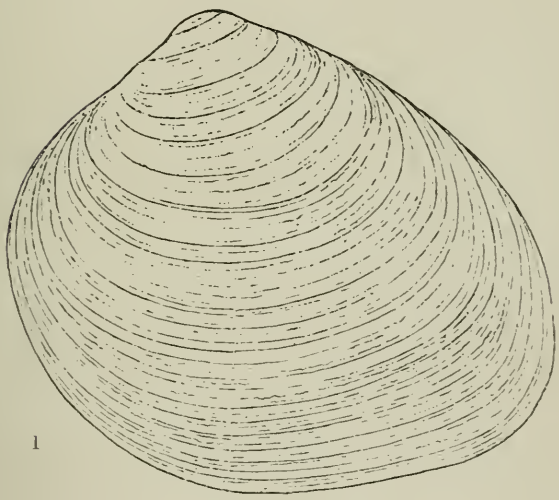

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L. M. Lambe, *del.*

Cyrena Albertensis.