1898. VOL. XII. 1899.

THE

OTTAWA NATURALIST,

Being VOL. XIV of the

TRANSACTIONS

of the

OTTAWA FIELD-NATURALISTS' CLUB.

Organized March, 1879. Incorporated March, 1884.

OTTAWA, CANADA:
Printed for the Ottawa Field-Naturalists' Club by Paynter & Abbott,
1898.

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THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, APRIL, 1898. NO. 1

ANNUAL REPORT OF THE OTTAWA FIELD-NATURALISTS' CLUB, 1897-98.

The Council submits the following account of the Club's work during the year 1897-98 :—

The number of members now on the roll is approximately 225. Twelve meetings of the Council were held during the year. At the first of these, according to custom, leaders in the several branches, viz., Geology, Botany, Entomology, Ornithology, Conchology and Zoology, were appointed, besides an Editor and Associate Editors of "The Ottawa Naturalist.

At the invitation of the Royal Society of Canada to send a Delegate, our President, Professor Prince, was chosen to represent us. Owing to his absence during the Royal Society's deliberations at Halifax, Dr. Ami presented the annual account of the work of the Club, which will be found in the Transactions of the Royal Society of Canada.

Three general excursions were held during the summer. The first to Chelsea on 22nd May, 1897, as reported in the June number of "The Ottawa Naturalist." The second was to the Pickanock on 19th June, and reported in the July number of "The Ottawa Naturalist." The third was to Chelsea on 2nd October, and is reported in "The Ottawa Naturalist" for September.

"The Ottawa Naturalist," the official organ of the Club, has been under the Editorship of Dr. H. M. Ami, with a staff of Associate Editors. During the year, in addition to the Reports of Branches and a record of the Proceedings of the Club, many valuable papers have appeared of a biological and varied scientific nature. Among these the following may be mentioned :

"Post pliocene deposits of the Ottawa Valley," by Dr. H. M. Ami.

"Bird Notes," by Mr. W. T. Macoun (several notes of much iuterest which appeared throughout the year).

"Weather," by Mr. Otto J. Klotz.

"Fruit Growing in Canada," by Mr. John Craig.

"The Pelican," by Prof. E. E. Prince.

"A Naturalist on the Pacific Coast," by Mr. A. Halkett.

"The Cryptogamic Flora of Ottawa," by Prof. J. Macoun.

"Birds of the Magdalen Islands," by Rev. C. J. Young.

"Recent Conclusions in Quebec Geology," by Dr. R. W. Ells.

"Geological Formations of the Ottawa District," by Dr. R. W. Ells.

"Pleistocene Geology of the Ottawa Valley," by Mr. W. J. Wilson.

Valuable additions have been made to the library, including a series of reports of the U. S. National Museum and a complete set of twelve volumes of the works of the late Professor George Ville upon Agricultural Chemistry, kindly presented to the Club by Mme. Ville.

During the winter months the Club held a course of seven soirees, at which papers were read by the various leaders and other members of the Club, and many interesting Natural History specimens were exhibited. Besides the ordinary course of lectures—the programme of which appeared in the Club's magazine for November—Prof. Prince, President of the Club, gave three special lectures or practical demonstrations of the anatomy of a Fish, of a Bird, and of a Mammal, respectively. These were of great interest and were highly appreciated by those in attendance.

The thanks of the Club are due to the Young Men's Christian Association, which kindly put the Association Hall at its disposal for the lectures, as well as to Dr. J. A. MacCabe for the use of rooms in the Normal School for the monthly Council meetings and for the library

In response to the appeal made by the Club to the Hon. G. W. Ross, Minister of Education for the Province of Ontario, a grant of $200.00 was received through the generous liberality of the Ontario Government: and some months ago Dr. S. P. May, of Toronto, Inspector of Mechanics' Institutes and Libra-

ries, had an informal interview with some of the members of the Council in regard to the work of the Club.

In addition to the ordinary work of the Club, as set forth above, certain work of an educational character has also been carried on. Considerable progress has been made in the naming and arranging of botanical specimens donated to various schools in the Province of Ontario—the ambition of the Club being to as far as possible aid in establishing a complete herbarium in the Normal School, Ottawa, and sister institutions. A special course of afternoon lectures, largely attended by the children of the Public Schools, was given in the Y.M.C.A. Hall, by Messrs. Fletcher, Prof. Macoun, Prince, and Ami. A special course of lectures was delivered at the Experimental Farm to students of the Normal School, by Dr. Saunders and the following four members of the Council : Messrs. Fletcher, Shutt, Craig, and W. Macoun. These lectures were on scientific topics, agriculture, and some other subjects of educational interest and value. Thus, outside its special work as a Naturalists' Society, the Club has continued to do active educational work in various directions, with, it is not too much to claim, results of a substantial character.

ANDREW HALKETT, *Secretary.* EDWARD E. PRINCE, *President.*

REPORT OF THE ENTOMOLOGICAL BRANCH, 1897.

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

The leaders have unfortunately to report that comparatively little was accomplished by members of the Club in this branch of its work, and few records of important, or even interesting captures have been handed in from the Ottawa district. Collections of considerable interest have, however, been made in different parts of Canada and submitted to the leaders for identification. Dr. Robert Bell, F.R.S., etc., Assistant Director of the Geological Survey, made a small but most interesting collection of Lepidoptera in Baffin Land, which greatly increases our

knowledge of that little visited region. Mr. A. W. Hanham, of Winnipeg, Mr. E. Firmstone Heath, of Cartwright, and Mr. Boger, of Brandon, have continued their studies of Lepidoptera in Manitoba, and have made records of great value in determining the geographical distribution of many species. At Qu'Appelle, Assa., Mr. W. E. H. Porter has commenced the collection of Coleoptera, and at Boucher, Mr. Coubeaux has made some very interesting captures, chiefly coleoptera.

Mr. T. N. Willing, of Sylvan Glade, near Olds, Alta, for several years a member of the Club, is now making a systematic study of lepidoptera, both diurnal and nocturnal. He has already added much to our knowledge of some rare species. During the past summer Mr. H. B. Sanson, curator of the Museum of the National Park at Banff, Alta, has taken up the insect fauna of the Rocky Mountains. Although his time was very much occupied by his official duties, he collected more than thirty species of butterflies, as well as some moths. One of the latter—*Brephos infans*—was of particular interest, as it occurs at Ottawa, and had not previously been recorded so far west. Mr. W. H. Danby, formerly of Victoria, B. C., has sent in two collections consisting of beetles, butterflies, moths and a few hymenoptera. These collections were made at Rossland, B. C., where Mr. Danby now lives.

In Vancouver Island excellent work has been done among the local insects, and the Leaders are delighted to welcome back again to the ranks of the active working entomologists our old friend Rev. G. W. Taylor, who has done more than any other man to work out the natural history of the Island, not only in Entomology and Conchology, in connection with which his name is so well known, but also in many other branches. Among many interesting insects captured by him may be specially mentioned a rare butterfly, *Thecla Siva*, and the curious wasp parasite, *Trigonalys Canadensis*, regarding which Mr. Taylor has published important observations in the "Canadian Entomologist" (Vol. XXX, p. 14, Jan. 1898).

In the Queen Charlotte Islands the Rev. J. H. Keen, probably the most westerly resident American collector, has con-

tinued a critical study of the coleoptera of those little known islands, where, in spite of the remarkable fact that it rains at least for some part of almost every day in the year, he has made a large collection of extreme interest. Several species, previously only know by one, or very few specimens, have been obtained in large series. Among such may be mentioned the curious *Liparocephalus brevipennis*, Mack., *L. cordicollis*, Lec., and *Tanyrhinus singularis*, Mack. Some species new to science have also rewarded his painstaking researches, such as *Haida Keeni*, Fauvel, and *Platycerus Keeni*, Casey.

Regarding the different orders of insects, there are a few records of general interest, as follows:

COLEOPTERA.—Since the last report a valuable contribution to entomological literature, "Coleopterological Notices, VII," has been received from the author, Capt. Thos. L. Casey. Among the new species described in this volume are several which occur more or less abundantly at Ottawa. With one exception they are all minute beetles belonging to the Scydmænidæ and Pselaphidæ, and occurring usually in the damp mosses of swamps, or in the nests of ants. The following is a list of the species mentioned as inhabiting Canada:

CARABIDAE.

Brennus insularis, n. sp. Queen Charlotte Islands (Keen).
Diplochila alternans, n. sp. A form occurring with *D. impressicollis*, Dej. (Ottawa, etc.), in which the alternate intervals of the elytra are dark red.

SCYDMÆNIDÆ.

Lophioderus biformis, Makl.—Queen Charlotte Islands (Keen).
Euconnus clavipes, Say.— Toronto.
fatuus, Lec.— Ottawa. Common in Dow's Swamp.
Pycnophus rasus, Lec.— Ottawa, etc. Not rare in colonies of *Lasius alienus*.
Connophron gandens, n. sp — Ottawa. Moderately abundant.
fossiger, Lec.— " Common in swamp moss.
pectinax, n. sp.— " Rather rare; a very small sp.
Scydmænus badius, n. sp.— " One specimen.
corpusculum, n. sp.— " Somewhat common in moss.
californicus, Mots.—Queen Charlotte Islands (Keen).

PSELAPHIDÆ.

Batrisus Harringtoni, n. sp. Ottawa.
Decarthron laurenticum, n. sp. "
Reichenbachia corporalis, n. sp "
borealis, n. sp. "
binodifer, n. sp. Vancouver Island.
spatulifer, n. sp. Ottawa.

Pilopius saginatus, n. sp. Ottawa.
Tyrus humeralis, Aubé. "

CURCULIONIDÆ.

Copturodes dispersus, n. sp. Ontario.

An excellent monograph of the North American species of Bembidium, one of the largest and most difficult groups of the Carabidæ, has been published by Mr. Roland Haywood, and will be of great assistance to students in this hitherto perplexing genus. During the preparation of this paper a series of Ottawa specimens was forwarded to the author for examination, and among them was found one new species, which received the name *Bembidium Canadense*. The only two examples known of this pretty little beetle were taken at Brown's Wharf, opposite Buckingham, on 24th May, 1891. Another interesting species which occurs here, generally in swamp moss, and which had passed in collections as *B. lampros*, Herbst., was found to be distinct from that European species, and was named *B. muscicola*.

American coleopterists, as indeed all entomologists, have to lament the death, on 24th Nov., 1897, of Dr. Geo. H. Horn, who for many years has been recognized as the most eminent exponent of the insects of this great order. His collection of beetles was probably unequalled by any in America, and in the groups which he specially studied he is stated to have been unsurpassed by any in the world. His numerous papers always gave evidence of careful and skilful work, and of a remarkable faculty for recognizing important structural characters, and of making critical comparisons of the various members of any group investigated.

LEPIDOPTERA—Some work has been done during the past season in tracing out the life-histories of native lepidoptera Eggs of the bright and active little moth *Brephos infans*, were received from Montreal, through the kindness of Mr. H. H. Lyman, President of the Entomological Society of Ontario. The caterpillars were reared on the leaves of the canoe-birch. They proved very interesting pets. During the whole larval period several leaves, around the

one on which the caterpillar was feeding, were held together by single silk threads ; not abundant enough to permit of the enclosure being termed a nest, but sufficient to give much protection, and to steady the leaves at the tips of the slender twigs. Perhaps the most interesting observation on these caterpillars was with regard to their behaviour when ready to pupate. Owing to the large amount of silk spun over the food during the caterpillar stage, it was expected that the larvæ would spin cocoons, but instead they wandered restlessly about their cages, sometimes entering the earth at the bottom, but always coming out again, after a short time, and resuming their wanderings, very much in the same way as had been observed of the larvæ of the Cornel Sawfly (*Harpiphorus tarsatus*). Profiting by experience with the latter, a piece of rotten wood was supplied to them and they immediately burrowed into it and were no more seen. It is therefore probable that this is the natural method of pupation for this species. The pretty little moth flies very early in the spring, and sometimes is seen before the snow is off the ground,

Of injurious insects particular mention must be made of the Forest Tent-caterpillar (*Clisiocampa disstria*), which, for miles along the Ottawa river, stripped the aspen groves of every vestige of foliage, and also attacked more or less seriously several other varieties of trees. Much attention was attracted by their depredations upon the trees on, and around, Parliament Hill and elsewhere. During a part of July the moths from these caterpillars, as will be remembered, were so remarkably abundant throughout the city for several evenings as to cause considerable inconvenience to pedestrians. This was especially the case in the vicinity of electric lights, and shopkeepers suffered much annoyance from their swarming upon and inside their windows, and flying in through every opening. Immense numbers were destroyed in the arc lamps, and by being trodden under foot as they crawled upon the pavements. It is hoped that these obnoxious moths may not be so abundant next season.

A visit to the Mer Bleue, in the middle of June, resulted in

the capture of two specimens of *Argynnis Triclaris* and one of *Thecla Augustus*, and in the woods near the railway station a pair of *Phyciodes Batesii* were captured.

HEMIPTERA.—But few specimens were collected in this order, but mention may be made of the rather unusual abundance of *Corimelæna nitiduloides* and *Pentatoma juniperina*. The former occurred upon Turtle-head and Goldenrod, and the the latter swarmed upon the White Cedars at the Experimental Farm. At a recent meeting of the Club an account was given of the San José scale, and specimens of this insect were exhibited. As was then stated, this minute insect, which has such enormous powers of injuring fruit trees, has occurred at five points in Western Ontario and at three in British Columbia. Vigorous efforts are being made by the Provincial and Federal Governments to stamp out this pest.

HYMENOPTERA.—An unusually wet spring was apparently the cause of a noticeable scarcity of at least the larger forms of hymenoptera. This scarcity was particularly marked among the social bees and wasps, whose colonies are started by solitary hibernated fertilized females, styled queens. If unfavorable weather prevents the mother bee or wasp from obtaining food for the first brood, it must follow that the growth of the colony is greatly retarded, or that it may even perish, Micro-hymenoptera seemed abundant on the comparatively few collecting outings, but these minute forms are so numerous, and so varied in their habits, that they may be obtained under almost any conditions. A very nice series, including several additions to our lists, was taken even as late as 3rd Oct., on the occasion of the Club Excursion to Chelsea. The Ottawa representatives of the genus Ichneumon have been recently re-studied and rearranged and are found to number over seventy species, which may serve to indicate the immense number of forms belonging to the order Hymenoptera.

JAMES FLETCHER,
W. H. HARRINGTON,
WILLIBERT SIMPSON, } *Leaders.*

REPORT OF THE ORNITHOLOGICAL BRANCH OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR 1897-98..

In submitting the report of the leaders of the Ornithological branch of the Ottawa Field-Naturalists' Club, we trust that it will not be considered amiss if it is prefaced by a few general remarks.

In a city the size of Ottawa, with the great facility which the collections at the Geological survey afford for the identification and comparison of specimens, it is a great disappointment to us, that so few persons take an interest in the study of our birds and their habits. To our knowledge not one boy or girl in the city is making a systematic collection of birds or eggs, nor attempting to study them in the field; and of the mempers of the Field-Naturalists' club, who are especially interested in birds, none seem to have the time or opportunity nowadays to make more than casual oberservations, with the exception of Mr. Geo. R. White, who seems to find leisure to make frequent excursions to the field, the results of whose expeditions appear, from time to time, in the columns of the "Naturalist." Much valuable data has been forthcoming from those who have had time for casual observations, only, but we are very desirous that more of our members should find opportunities to get to the woods and take notes on what they see and hear.

Those who have helped the Leaders of the Ornithological branch during the year by the free use of their notes are.--Mr. Geo. R. White, Dr. Jas. Fletcher, Prof. J. Macoun, Mr. W. A. D. Lees, Mr. H. B. Small, Mr. H. S. Marsh, Mr. W. E. Saunders, Mr. F. A. Saunders, and Mr. G. Muirhead, of Haddo Hall, Aberdeenshire, Scotland.

One addition was made this year to the list of Ottawa birds. On the 30th of March, Mr. G. Muirhead shot two female specimens of the Evening Grosbeak (*Coccothraustes vespertina* in the Rideau Hall grounds. According to McIlwraith this bird has been seen in Ontario but four times, previously. At Toronto

on the 25th of December, 1854; at Woodstock, in May, 1866; at London, in 1871, about the same time of year; at West Flamboro, in 1883, on the 17th of March; and along the shores of Hamilton Bay and other points east, 1890. The usual range of this bird is Western North America, east to Lake Superior and south to Mexico.

During the year, notes have been taken on 116 species of birds which is considered fairly good, considering the few persons who made observations. The dates on which these birds were first seen will be found in the "Naturalist."

The scarcity of bluebirds (*Sialia sialis*) was again noticed this year, but very few having been seen. It is a matter of great regret that this beautiful bird is disappearing so rapidly.

An increase in the number of meadow larks (*Sturnella magna*), was very apparent, several pair breeding on the Experimental Farm, where their peculiar call in early spring was heard very frequently.

On the 19th of July the Olive-sided flycatcher (*Contopus borealis*) was seen at Kazabazua, P.Q., by Mr. W. E. Saunders of London, Ont. It is not often that this bird is seen in the Ottawa district. The Red-tailed hawk (*Buteo borealis*) which is also a rare bird, was seen at the same place on the 20th by Mr. F. A. Saunders.

A Fox-sparrow (*Passerella iliaca*) was seen by Mr. Geo. R. White along the Aylmer road on the 4th of December, which is a late date for this sparrow to remain here.

A very interesting record was the passing up the Ottawa river of Brunnich's murre, or guillemot (*Uria lomvia*) in large numbers, on the 12th of December. The birds, in flocks of from 20 to 100, were passing Rockliffe from 10 a.m. until 3 p.m. Several were shot. On Monday the 13th, one was caught alive in a field between Metcalfe and Osgoode station, which lived for two days. On examination the stomach was found empty. All of the birds obtained were in very poor condition.

Birds have been scarce about Ottawa this winter, probably due to its great severity and abundant snow-fall and the lack of

certain kinds of food. A small flock of Pine grosbeaks (*Pinicola enucleator*) was seen by Mrs. Ridley of Vittoria St., on the 21st of December : another flock was seen by Dr. Fletcher on Argyle Avenue on 2nd of January, and small flocks, by Mr. Geo. R. White on the 6th, 9th and 13th. A female was seen by Mr. W. T. Macoun on 2nd of February, which is the last date recorded. No Cedar-birds or Bohemian wax-wings have been seen this winter, but crows and snow-birds have been noticed every month, of the latter Mr. H. S. Marsh saw a large flock on the Ottawa river on the 27th of February, and Mr. G. R. White noted the arrival of the spring migration of crows on the 6th of March.

The Great Northern Shrike (*Lanius borealis*) was seen by Mr. White on the 27th January and 8th and 25th of February. He also, on the 10th of February, saw a Sharp-shinned hawk (*Accipter velox*) feeding on an English sparrow, and on the 17th a male Goshawk.

The horned larks (*Otocoris alpestris*) were first seen at the Experimental Farm on the 17th of February. This is five days earlier than the first date last year and perhaps the earliest on record.

For other notes in regard to the work done by the Ornithological branch, we would refer you to the Ottawa Naturalist,

A. G. KINGSTON,
Gertrude HARMER, } *Leaders.*
W. T. MACOUN,

ORNITHOLOGY

Edited by W. T. MACOUN.

Last year a special effort was made to obtain, from several observers of birds, the records which were taken from time to time, by each individual, of the arrival, nesting, habits, and time of departure of our birds, and to publish those portions of them which were deemed of greatest value. The results of these efforts were published every month during the early part of the year and we are led to believe that many persons took

considerable interest in reading "Bird notes" in the columns of the "Naturalist."

This year we propose to continue this work and begin by publishing notes for February and March. We here give public expression of our obligation to those who so faithfully sent in the records of their observations last year. During this season the following persons have consented to assist in publishing reliable data regarding our birds: Miss G. Harmer, Mr. Geo. R. White, Prof. J. Macoun, Dr. J. Fletcher, Mr. A. G. Kingston, Mr. W. A. D. Lees, Mr. H. S. Marsh, and Mr. C. H. Young.

BIRD NOTES FOR FEBRUARY AND MARCH.

Horned Lark—*Otocoris Alpestris* (Linn.)

Two were seen on the 17th of February by Mr. W. T. Macoun, at the Experimental Farm. They were seen in small flocks a few days later.

Prairie Horned Lark—*Otocoris Alpestris praticola* (Hench.)

Miss Harmer identified one of these birds on the 24th of February; Dr. Fletcher records a small flock on 18th.

Purple Finch—*Carpodacus purpureus* (Gmel.)

A male specimen of this bird was seen by Mr. A. G. Kingston on the 11th of March and again on the 17th.

Song Sparrow—*Melospiza fasciata* (Gmel.)

Seen by Mr. C. H. Young, near Hurdman's Bridge, on the 11th and by Mr. H. S. Marsh, near Hartwell's Locks on the 13th. They were abundant near the Experimental Farm on the 17th.

Robin—*Merula migratoria* (Linn.)

Seen by Mr. C. H. Young, near Hurdman's Bridge, on the 15th; by Mrs. Ridley, of Vittoria St., Mr. Geo. R. White and Col. Irwin, on the 16th; and by Dr. J. Fletcher and Mr. A. G. Kingston on the 17th.

Bronzed Grackle—*Quiscalus quiscula æneus* (Ridgw.)

This bird was first seen on the 16th by Dr. J. Fletcher and Mr. White.

Red-winged Blackbird—*Agelaius phœniceus* (Linn.)

A male was seen by Mr. White, at the east end of the city

on the 16th :Mr. Young, saw one on the 17th, and on the 19th, one was observed by Mr. Marsh.

Bluebird—*Sialia Sialis* (Linn.)

One seen by Mr. W. T. Ellis, Mr. H. Fixter and Mr. Macoun, at the Experimental Farm, on the 16th ; Mr. Young saw one on the 27th and 28th, and Miss Harmer, on the 30th.

Canada Goose—*Branta Canadensis* (Linn.)

Seen by Miss Harmer, on the 16th ; a flock of about 41 was seen by Mr. Marsh on the 21st.

American Rough-legged Hawk—*Archibuteo lagopus Sancti-Johannis* (Gmel.)

Shot by Mr. Young on the 16th.

Meadow Lark—*Sturnella magna* (Linn.)

This bird was seen by Mr. Young on the 17th. It was observed by Dr. Fletcher and Mr. Macoun at the Experimental Farm on the 25th and a male was seen by Mr. White on the same date.

Cow-bird—*Molothrus ater* (Bodd)

Seen by Mr. Macoun near St. Louis Dam on the 18th.

Slate-coloured Junco—*Junco hyemalis* (Linn)

This bird was first seen by Mr. Macoun at the Experimental Farm on the 19th. On the 21st they were numerous.

Marsh Hawk—*Circus Hudsonius* (Linn)

First observed by Mr. Young on the 20th and a male shot on the 23rd.

Brown Creeper—*Certhia familiaris Americana* (Bonap)

Seen by Miss Harmer on the 26th.

Hooded Merganser—*Lophodytes cucullatus* (Linn)

A pair were seen by Mr. White near Templeton on the 26th.

Buffle Headed Duck—*Charitonetta albeola* (Linn)

Mr. White saw a pair below Rockliffe on the 26th.

Black Duck—*Anas obscura* (Gmel.)

Four were seen by Mr. White on the Ottawa River on the 26th.

Wood Duck—*Aix sponsa* (Linn)

A pair were observed by Mr. White near Duck Island on the 26th

Cooper's Hawk—*Accipiter Cooperi* (Bonap)

A male was seen by Mr. White on the 27th.

Tree Sparrow—*Spizella monticola* (Gmel)

Seen by Mr. Macoun at the Experimental Farm on the 28th.

Wood Pewee—*Contopus virens* (Linn.)

Seen by Dr. Fletcher on the 28th.

Phoebe—*Sayornis Phoebe* (Lath.)

Seen by Miss Harmer on the 29th.

Mr. W. E. Saunders, London, Ont., in a letter to Dr. Fletcher gives the following dates on which he first recorded the arrival of some of the birds at London. These are very interesting for comparison with our Ottawa dates:

Robin, 8th of March; Meadow Lark, 9th; Bluebird, 9th; Kildeer Plover, 10th; Bronzed Grackle, 10th; Song Sparrow, 10th; Red-winged Blackbird, 10th; Tree Sparrow 10th; Red-tailed Hawk, 11th; Junco, 11th; Flicker, 17th; Kingfisher, 18th,

Mr. Saunders says:—"Birds are not exceptionally early here. this spring; but just about the average or even a little late. Flowers however are early. Snowdrops were in bloom a week ago, Crocuses and Eranthis about 17th, Erigenia in my garden on 19th.

With regard to the dates of arrival of the birds, doubtless most of those noted on 10th, could have been seen a day or two previously. I have often noted that my own opportunity, rather than the presence of the birds marks their recorded arrival here. To obtain really reliable records of arrivals, one should have begun for this year on March 5th, and each day walked 10 or 20 miles along the railroad. He would then be prepared to hear the birds if they were here. As it is, one chances to hear a Bluebird on March 9th, and records it as the first, whereas if he had been walking a few miles away on the 7th, he might have seen a little company of them."

NOTES OF A NATURALIST IN BRITISH COLUMBIA

The following interesting notes have been kindly communicated to the Club by Mr. W. E. Brooks of Mount Forest, Ont. They are extracts from letters from Mr. Allan Brooks, an ardent naturalist sportsman and collector, now living at Vernon.

Vernon, B. C., 7th Nov., 1897. My dear Father, —After my last unlucky trip after Bighorn I did not like to tell you that I was going after them again, as I knew you would be anxious about my going so late in the year; but I am now safe back again, and I send you a sketch of my best head as mounted by myself; length of horns 26½ inches, circumference 14 inches. I also got a ewe and a yearling, as well as a 9-point buck male deer. My companion, Dick Ford, got a 2 year old ram, with horns about half as big as the above, and 3 deer. We could have shot many more deer, but it was no use wasting game. There was an old miner, placer mining in the creek up there, for whom we got a winter's supply of meat, so very little meat was wasted. I was so bent on getting them this time that I ordered a .30 cal. smokeless rifle, as they are the rifles for long range; but after all I had to go without it, as it was necessary to send to the factory for it. If I had had it, I should have got 3 heads like the above. The average shot is 300 yards, and most of my shooting was done at double that distance. I wounded some others which I never got. Like the Rocky Mountain goats the Big-horns are very tough and take far more killing than a Black Bear. I shot the old ram through, behind shoulder, smashing the opposite shoulder, and again as he was going away (175 yards) half an inch above root of tail, the bullet ranging through his vitals, and again in the chest before he went down. A big buck I shot in the same place, only made 2 jumps and rolled over, and it, too, was further away when I fired. The ewe I knocked over at 250 yds; she and a ram were standing together.

Of birds I saw large flocks of *Leucosticte*, Clark's Crows very common, and lots of Ravens, also Golden Eagles. Once

when I was scouring the opposite side of a canyon with my glass a fine adult Golden Eagle settled on a level with my eyes 30 yds. away ; I tried to raise my rifle slowly, but he spotted me at once and away he went ; a few minutes after when I saw my sheep 600 yds. away and opened fire, another flew out from under me, but far down the side of the canyon. Is is a fearfully rough country, deep canyons, rock slides, and precipices. The old ram that I shot was the only good chance I had, and it was over 150 yds., running, when Ifired my first shot. Most of my shots were across deep canyons at 500 yds. or so, or else straight, up over head. In either case it was almost impossible to estimate the distance. If I had only had my .30 I should have had a gun that would shoot up to 300 yds. without moving a sight and with far more killing power than my Remington, which in future I shall keep for target practice.

In the last three months I have bagged 5 deer, 2 goats, 3 sheep and 2 prairie wolves. I could have killed far more deer if I had wanted to, also goats and ewes, for that matter. The ewes have much smaller horns than the rams.

I have taken no less than 4 species of *Arvicola* here, which with the 4 taken in the Chilliwack District makes 8 species of *Arvicola* (or *Microtus*, as it is now called), and if the close allied genera of *Evotomys* and *Phenacomys* are included, it brings the total up to 10 or 11 species of Voles taken in the two localities.

Lots of prairie chickens here now; they go in big packs and are wild, getting up at long range with a great cackling and sailing away a mile or more before settling again.

We are having cold, snowy, windy weather here now, but I have a garment that defies cold, viz. a Hudson Bay shirt, made of heavy felt with knitted collar and cuffs like a jersey, and it is put on in the same way.

Vernon, B. C., Jan. 2, 1898, I am just back from another trip to the "Big-horn" Mountain. My companion was a man called Wilson, a very good fellow and the best guide for sheep around here ; but, for all this, neither of us got a shot at sheep, as they were on the steepest parts of the hillsides where our snow shoes would not work. One splendid old ram seemed to

challenge us to come up to him, as he stood silhouetted on a ridge two thirds of a mile above us. But it was as much as our lives were worth to attempt it, so we left him alone.

They should have been down in the bottom of the canyon at this time of the year, but the great numbers of Cougars' tracks explained their keeping to the bare open elevations, where they could see the crawling cat afar and make off.

Deer were very numerous: saw 73. The hillsides were all cut to pieces by their zig-zag trails, and we saw where several had been killed by cougars. We refrained from shooting them, as the meat would have been wasted. I shot one, a small one, for camp meat, and when we came out we shot one or two more, close to the lake, which we brought home. These gave me a chance to see how my rifle works. The first was nearly 200 yards away, I raised my sight 1½ degrees and shot over him; instead of lowering my sights, I simply held well down his fore-leg and piled him up in his tracks, with a shot through both shoulders, the two bullet holes in the snow bank at the other side of the deer were within three inches of each other, one straight over the other. My old rifle at this range would have had to be raised 3 degrees or so, while this one shot *high* with 1 ½. This shows how flat it shoots. I also shot a very big buck with a fine head at 140 yards as he walked across me, twice through the paunch and liver, and *he did not go ten yards* before dropping dead. His liver was torn to shreds, and his lungs were all congested; and bleeding bloody froth from nose showed what a terrible shock the bullet gives; the lungs were not touched by the bullet at all. I saw Golden Eagles and Ravens up there, after the animals the cougars kill.

Vernon, B. C., Feb. 1, '98.—I was near Okanagan Lake, opposite Vernon, during the 2nd and 3rd weeks of January, and brought back a lot of Nuthatches with me, Red-bellied (*Sitta Canadensis*), Slender-billed (*S. aculeata*), and Pigmy (*S pygmæa*). They were all mixed together in big bands, with Chickadees, Gold Crests, etc. Strange to say, Townsend's Solitaire, a delicate Sialine bird is staying here all winter and singing.

ALLAN BROOKS.

OTTAWA HORTICULTURAL SOCIETY.

The Premium list and Prize List of this thriving Society have appeared and are worthy of the attention of the members of our club. Not only are there offered as premiums new or little known plants, in value actually exceeding the modest annual subscription of $1.00, but prizes for over $400 are offered for competion at the monthly meeting; but what is of particular interest to our local naturalists, special prizes are offered by the President for the best collections of noxious weeds and injurious insects. We make this announcement of the society primarily for the benefit of our botanical and entomological members, but also in recognition of the excellent work which is being done by the Horticultural Society to advance the science of horticulture in what we consider is the proper way. Prizes are given for the best specimens that the skill of the horticulturist can produce of standard varieties of fruits, vegetables and flowers,also for novelties advertised by seedsmen, and upon which so much good money is sometimes wasted, and for new or little known plants or fruits of merit. At each of the monthly exhibitions, which are open to the public, an address is to be delivered by some specialist upon a seasonable subject. Intending competitors for the above prizes should send their names, together with the fee, $1, without delay to the secretary, Mr. J. F. Watson, 88 Sparks Street.

SPRING ANNOUNCEMENT.

Special efforts are going to be made this season to render the sub-excursions of the different branches as useful and interesting as possible. It has been decided to change the rendezvous from the post office to the end of the electric railway track, nearest to the locality chosen for investigation. Some of the leaders will therefore meet all who wish to avail themselves of these open air classes, at 3 p. m. on the following Saturday afternoons.

April 16, Rockliffe,

April 23, Hull.

April 30, St. Patrick St. Bridge for Beechwood.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, APRIL, 1898. No. 2.

THE CRYPTOGAMIC FLORA OF OTTAWA.

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

Continued from February No.

251. **J. barbata**, Schreb.

On damp limestone cliffs facing the Ottawa River, Rockcliffe Park, May 7th, 1896; on rocks, Gilmour's Park, Chelsea, Que, Sept. 9th, 1889; on rocks near Ironsides and on rocks Meeche's Lake, Que., Sept. 23rd, 1893.

252. **J. attenuata**, Lindenb.

On rocks on damp cliffs, Rockcliffe Park, April 16th, 1891.

253. **J. lycopodioides**, Wallr.

On rocks on the east side of the cliff, close to the old sawmill, Rockcliffe Park, Oct. 26th, 1889.

254. **J. exsecta**, Schmid.

Common on dead wood, Beechwood Cemetery, April 23rd, 1892; on moss on logs in Dow's Swamp, Oct., 1884.

255. **J. incisa**, Schrad.

On rotten wood in Beechwood Cemetery, Sept. 2nd, 1884; also on old logs west of Beaver Meadow, Hull, Que., Oct. 6th, 1885.

256. **J. excisa**, Dicks.

Rather common on rotten wood around Ottawa; in Dow's Swamp, Oct., 1884; also at Meeche's Lake near Chelsea, Que., Sept. 24th, 1893.

257. **J. pumila**, With.

On rocks along Meeche's Lake, north of Chelsea, Que., Sept. 23rd, 1893.

XIX. FOSSOMBRONIA, Raddi.

258. **F. Dumortieri**, Lindb.

On earth subject to inundation close to Leamy's Lake, Hull, Que. Sept. 24th, 1889.

XX. BLASIA, Micheli,

259. **B. pusilla**, (Linn.)

On earth subject to inundation in a gully at Leamy's Lake, Hull, Que., Sept. 24th, 1889 ; on wet clay banks, Meeche's Lake, north of Chelsea, Que., Sept. 23rd 1893 ; also on clay banks at the confluence of the Leivre River with the Ottawa River near Buckingham, Que., Sept. 26th, 1892.

XXI. PELLIA, Raddi.

260. **P. epiphylla**, Corda.

On earth subject to inundation in a gully at Leamy's Lake, Hull, Que., Sept. 24th, 1889.

XXII. ANEURA. Dumortier.

261. **A. latifrons**, (Lindb.) Dumort.

On old logs in the swamp, Glebe property, Bank St., Ottawa, April 27th, 1896 ; on old logs, Beechwood Cemetery, April 23rd, 1892.

262. **A. palmata** (Hedw.)

On old logs and stumps in Dow's Swamp, Oct. 6th. 1885 ; also on logs in McKay's Woods, Oct. 17th, 1890.

263. **A. sessilis**, (Sprengel.) Dumort.

On old logs in a swamp about a mile south-east of Carleton Place ; in fine fruit, May 30th, 1884.

264. **A. pinguis**, (Linn.) Dumort.

Amongst peat moss in the Mer Bleue, near Eastman's Springs, June 15th, 1892.

XXIII. METZGERIA, Raddi.

265. **M. myriopoda**, Lindb.

On damp rocks near Ironsides, five miles north of Hull, Que., Oct. 21st, 1884.

266. **M. conjugata**, Lindb.

On stones in McKay's Woods near the Lake, Oct. 9th, 1884.

XXXIV. ANTHOCEROS, Micheli.

267. **A. Macounii**, Howe (N. Sp.) Torr. Bull. Vol. xxv, page 19 (1898).

Thallus forming small dark green rosettes, 4-10 mm., in diameter, strongly undulate-crisped, subradiately inciso-laciniate or somewhat broadly lobed, rugose, pitted, sometimes slightly lamellate ecostate 6-8

cells thick in axile parts, cavernose, becoming at the margin gradually 3 or 2-stratose, now and then glandular-thickened ; surface cells distinct, translucent, lightly protuberant, subrhombic, trapezoidal, or oblong-pentagonal 35·75 x 30·35 mik ; *Nostoc* colonies spherical ; monoicous ; antheridia in groups of 3 or 4 ; involucres short, sometimes united in pairs cylindrical oblong, or by contraction at base and mouth dolioform or subglobose, ·85-1·25 x ·5-·9 mm., inerassate except at the thin erose or subentire mouth ; capsule black, erect or a little curved, 3·6 x 3-·5 mm., thick-walled, with numerous stomata, the valves rigid or slightly flexuose when dry, brittle and often broken ; columella sometimes appendiculate ; spores fuscus or black, rounded tetrahedral densely and rather minutely muriculate on both the inner and outer faces, 48-65 mik. in maximum diameter ; sterile cells short, nearly as broad as long, without spiral thickenings, separate or variously adherent, often shriveled and inconspicuous.

On earth subject to inundation along the discharge of Leamy's Lake, near Hull, Que., Sept. 24th, 1891.

XXV. MARCHANTIA, Marchant.

268. **M. polymorhpa,** Linn.

Quite common around springs and on earth along the borders of swamps around Ottawa. On earth, by the lake in McKay's Woods, April 28th, 1896.

XXVI. PREISSIA, Nees.

269. **P. commutata,** Nees.

Under dripping limestone rocks under the cliffs near the old mill, east side of Rockcliffe, May 7th, 1896.

XXVII. CONOCEPHALUS, Necker.

270. **C. conicus,** Neck.

Quite common on old logs and earth by brooks around Ottawa. In a swamp on the rear of Cowley's Farm, west of Hintonburg, April 18th, 1896.

XXVIII. GRIMALDIA, Raddi.

271. **G. rupestris,** (Nees.) Lindenb.

On calcareous earth in crevices of rocks near Governor's Bay, Rockcliffe Park, May 20th, 1884.

XXXIX. RICCIA, Micheli.

272. **R. arvensis,** Aust.

On damp earth covered by the spring floods around the east side of Leamy's Lake, Hull, Que., Sept. 24th, 1889.

273. **R. fluitans,** Linn,

Very abundant in Patterson's Creek, Bank St., Ottawa ; also in the Beaver Meadow Creek, west of Hull, Que., Oct. 9th, 1896.

274. **R. natans,** (Linn.) Corda.

In stagnant pools east of Beechwood Cemetery, April 23rd, 1892.

Forma terrestris.

Grows late in the season where pools had been in the spring. On earth along the Ottawa and Lievre rivers, near Buckingham, 20 miles below Ottawa, Sept. 18th, 1892 ; also along the discharge of Leamy's Lake, Hull, Que., Oct. 16th, 1893.

LICHENES.

I. RAMALINA, Ach.

275. **Ramalina calicaris** (L) var. **fastigiata,** Fr.

On old rails, old logs and trunks rather rare. On bark of young red maples at Britannia, April 20th, 1895 ; rare on old logs near Ottawa River, Hull : on a pine tree, Pine Hill, Rockcliffe Park, rare on old stumps and rails in a fence one mile south east of Billing's Bridge ; also on red maples Leamy's Lake ; on trees in a swamp in Stittsville ; old logs King's Mountain, west of Chelsea.

Var. **farinacea,** Schaer.

On trees, old fence rails, and ledges of rocks. Rare on bark along the C.A.R. in Stewart's Bush, April 12th, 1895 : on old fence rails West End Park ; on limestone ledges on the face of the cliff, opposite Gatineau Point, Rockcliffe Park.

Var. **canaliculata,** Fr.

On a balsam fir in a swamp a little east of Stittsville, May 14th, 1897.

276. **Ramalina pusilla** (Prev.) Var. **geniculata,** Tuck.

On twigs of spruce tress near Ironsides, Que., Oct. 6th, 1891.

II. CETRARIA, (Ach.) Fr.

277. **Cetraria ciliaris,** (Ach.)

On old fence rails and boards and occasionally on pine stumps and trees. On old fence rails, West End Park, April 16th, 1892 ; on old board fencing at Buckingham, Que. ; on an old pine stump one mile above Britannia ; on tamarack trees in a swamp at Stittsville, May 14th, 1897.

278. **Cetraria sæpincola**, (Ehrh.) Ach.

Rare. Occasionally in swamps. On branches of black spruce in the Mer Bleue, Eastman's Springs, June 16th, 1891.

279. **Cetraria lacunosa**, Ach.

Rare in the Ottawa district. ; on trees and rails. On old fence rails and boards at Buckingham, Que., May 14th, 1896.

280. **Cetrartia Oakesiana**, Tuckerm.

Very rare in Canada. On the base of living pine trees and at the base of pine stumps, Rockcliffe Park, April 17th, 1895 ; on the base of a pine stump by a swamp at Stittsville : old pine log, King's Mountain, west of Chelsea, May 22nd, 1897,

281. **Cetraria juniperina** (L.) Var. **Pinastri**, Ach.

Rare in the Ottawa district. On dead branches of black spruce and old logs in the Mer Bleue, at Eastman's Springs, June 16th, 1891 ; on branches of tamarack in a swamp at Stittsville, May 14th, 1897.

III. EVERNIA, Ach.

282. **Evernia prunastri**, (L.) Ach.

On trees, stumps and old fences ; rare. On old pine stumps at Britannia, April 10th, 1884 ; on old rails along the Richmond Road above Hintonburg ; on an old fence, Ottawa East ; on trees in the swamp west of Hull Station ; on branches of tamarack trees in a swamp at Stittsville, May 14th, 1897.

IV. USNEA, (Dill.) Ach.

283. **Usnea barbata**, (L.) Var. **hirta**, Fr.

On trunks south of the Aylmer Road, west of Hull, Que., April 26th, 1891 ; on a spruce tree, Rockcliffe Park ; on pine stumps at Britannia ; on spruce and tamarack trees in the Mer Bleue, at Eastman's Springs ; on tamarack trees in a swamp at Stittsville ; old log, King's Mountain, west of Chelsea, May 22nd, 1897.

V. ALECTORIA, (Ach.) Nyl.

284. **Alectoria jubata**, (L.) Var. **chalybeiformis**, Ach.

Rare on dead wood or on the earth. On old pine stumps at Britannia, April 20th, 1895 ; on tamarack trees in a swamp at Stittsville, May 14th, 1897.

Var. **implexa**, Fr.

Quite common in tamarack and other swamps, hanging like black hair from the branches. On black spruce and tamarack in the Mer Bleue, at Eastman's Springs, June 16th, 1891.

VI. THELOSCHISTES, Norm.

285. **Theloschistes polycarpus**, (Ehrh.)

A common species on living trees and dead wood. On black ash and white cedar trunks and balsam poplar branches in Stewart's Bush, April 12th, 1895 ; common on willow, red ash and alder at Britannia ; on balsam poplar and white ash trunks, at Hintonburg ; and on ash and rock elm in Beechwood ; on old fence boards at Billing's Bridge ; on red maple and ash at Leamy's Lake ; rare on trees at Stittsville ; on trunks, King's Mountain, west of Chelsea, May 22nd, 1897.

286. **Theloschistes concolor**, Dicks.

On ash trees west of West End Park, April 16th, 1892 ; on white cedar bark by the C.A.R. in Stewart's Bush ; quite common on willow, ash, maple and alder at Britannia ; common on bark of trees, Aylmer Road, west of Hull ; on trunks of black ash in woods west of Hintonburg ; also on basswood trees at Carleton Place ; on a black ash log, Ottawa East, and on ash trees in Beechwood ; on old fence boards at Billing's Bridge ; on various trees in woods, Leamy's Lake ; on trees at Stittsville ; on trunks, King's Mountain, west of Chelsea, May 22nd, 1897.

VII. PARMELIA, (Ach.) De Not.

287. **Parmelia perlata**, (L.) Ach.

Not uncommon on trunks in wet woods or swamps. A fine species but seldom found in fruit. On ash trees by the C.A.R., Stewart's Bush, April 12th, 1895 ; on a spruce trunk in Rockcliffe Park ; on birch trees, Skead's Farm, Richmond Road ; on white cedar, black ash, and cherry birch in the swamp near Beechwood Cemetery ; on a birch tree in Dow's Swamp ; on trees in woods at Chelsea, Que. ; also on trees at Carleton Place ; on trees in the swamp west of Hull Station, Oct. 9th, 1896.

288. **Parmelia tiliacea**, (Hoffm.) Floerk.

Rather uncommon except in deep, cool woods. On birch trees on Skead's Farm, Richmond Road ; on beech and other trees, Rockcliffe Park ; on young spruce trees in woods, Beaver Meadow west of Hull ; on a beech tree in woods one mile south-east of Billing's Bridge ; on red maple at Leamy's Lake ; on beech trunks, King's Mountain, west of Chelsea, May 22nd, 1897.

289. **Parmelia Borreri**, (Turn.)

Apparently rare in the vicinity of Ottawa. On trunks in woods north of Beechwood Cemetery, April 23rd, 1891 ; on trees in a swamp at Stittsville, May 14th, 1897.

Var. **rudecta**, Tuckerm.

Very common on old rails and dead wood, around Ottawa. On dead wood and old rails in Stewart's Bush, April 12th, 1895 ; on dead wood, living spruce trees and boulders, Rockcliffe Park ; on dead wood at Britannia ; on dead pines, Aylmer Road, west of Hull ; on white cedar north of Beechwood ; on dead trees at Carleton Place ; on a beech tree in woods one mile south-east of Billing's Bridge ; on large trees in woods, Leamy's Lake ; on old rails and logs, King's Mountain, west of Chelsea, May 22nd, 1897.

290. **Parmelia saxatilis**, (L.) Fr.

On trunks, dead wood, and rocks. On trunks in woods at Leamy's Lake, May 7th, 1897 ; on tamarack and other trees in a swamp at Stittsville, May 22nd, 1897.

Var. **sulcata**, Nyl.

On trunks, dead wood and rocks. On the branches of a dead spruce, Rockcliffe Park, April 17th, 1895 ; on boulders along a fence, Ottawa East ; on red maples in woods near Leamy's Lake, Hull, Que. ; on old logs and rails east of Stittsville ; on rocks and trunks, King's Mountain, west of Chelsea, May 22nd, 1897.

291. **Parmelia physodes**, (L.) Ach.

On dead wood, old fence rails, boards and rocks. On the branches of dead spruce, Rockcliffe Park, April 17th, 1895 ; on pine stumps at Britannia ; on old fence rails and boards at Buckingham, Que. ; on old fence rails and tamarack trees at Stittsville ; on old logs and rails, King's Mountain, west of Chelsea.

292. **Parmelia colpodes**, (Ach.) Nyl.

Not rare, chiefly on tamarack trees. In a swamp a little east of Stittsville, north of the Can. Pac. Railway, May 14th, 1897 ; on trunks, western slope King's Mountain, May 22nd, 1897.

293. **Parmelia olivacea**, (L.) Ach.

On trees and old rails. On alders, red maple and red ash at Britannia, April 20th, 1895 ; rare on pine trees west of Hull ; on old rails, Ottawa East ; on old rails at Dow's Swamp ; and on young pines at Carleton Place ; on old pine stumps, Leamy's Lake ; common on tamarack trees in a swamp at Stittsville, May 14th, 1897.

Var. **aspidiota**, Ach.

Same habitat as the species. On alder bushes at Britannia, April 20th, 1895 ; on alder bushes near Leamy's Lake, Hull, Que. ; on tamarack trees in a swamp at Stittsville, May 14th, 1897.

Var. **sorediata**, (Ach.) Nyl.

On trees and rocks ; rare. On maple trunks north of Aylmer Road, west of Hull, Que., April 26th, 1891.

294. **Parmelia caperata**, (L.) Ach.

On trunks, dead wood, and stones ; common. On old rails and pine trees, Clemow's Woods, Bank St., April 12th, 1895 ; common on dead and living trees at Rockcliffe, Beechwood and Ottawa East ; abundant on old rails and dead wood at Britannia ; common on dead pines Aylmer Road and by the Beaver Meadow, Hull ; old fence rails, west of Hintonburg and West End Park ; on rails in Dow's Swamp ; and on trees at Carleton Place ; on old fences around Billing's Bridge ; on trees of all kinds at Leamy's Lake ; on old stumps and fences at Stittsville ; very common, King's Mountain, Chelsea, Que.

295. **Parmelia conspersa**, (Ehrh.) Ach.

Abundant on boulders in all old fields and fences around Ottawa. Collected in Rockcliffe Park, Ottawa East, by Dow's Swamp, fields at Hintonburg, and along the Aylmer Road west of Hull ; on boulders around Billing's Bridge ; on boulders at Brigham's Creek, near Leamy's Lake ; on boulders at Stittsville ; on boulders and other rocks, King's Mountain, Chelsea, Que.

VIII. PHYSICA, DC.

296. **Physcia speciosa**, (Ach.) Nyl.

On trees and mossy rocks in woods. On trees at Ottawa, 1884 ; on trees in Beechwood Cemetery ; on trunks, Pine Hill, Rockcliffe Park, April 16th, 1896 ; on a hemlock trunk in woods north of Beechwood Cemetery ; on a beech tree in woods one mile south-east of Billing's Bridge ; on the bases of basswood trees in woods at Leamy's Lake, May 7th, 1897.

297. **Physica granulifera**, (Ach.) Tuckerm.

On trunks. On bark of trees north of Aylmer Road, Hull, Que., April 26th, 1891 ; on ash trees, Cowley's Farm, west of Hintonburg ; on large trees in woods at Leamy's Lake, May 7th, 1897.

298. **Physcia pulverulenta**, (Schreb.) Nyl.

On trunks and rocks. On black ash trunks, Stewart's Bush, April 12th, 1895 : on ash trees at Britannia ; on living and dead trees, Skead's Farm, Hintonburg ; quite common on ash and other trees along the Aylmer Road west of Hull ; on ash trunks in Dow's Swamp, Ottawa East, Beechwood and Rockcliffe Park ; on large trunks in woods, Leamy's Lake ; on trees at Stittsville ; on trunks and rails, King's Mountain, Chelsea, Que., May 22nd, 1897.

WINTER LECTURES, 1897-8.

A novel and most interesting feature of the lecture course of the past winter was a series of three practical demonstrations given by the President, of the three most important divisions of the Animal Kingdom, illustrated by A Fish, a Bird, and a Mammal. All who were fortunate enough to attend these lectures were charmed at the skill shown by the lecturer in dissecting the specimens and explaining the uses of the various organs exposed by the dissecting knife at the same time that they were pointed out on enlarged charts hung on the walls. At all of these lectures, specimens and a fine selection of lantern views were shown, which added largely to their educational value.

I "A FISH."—In his first lecture (Feb. 8th) Professor Prince described the main features in the form and structure of such a typical fish as the Pickerel or Doré. The pointed head, the tapering tail and the powerful fins, especially the breast fins, were referred to. The teeth are sharply hooked and not adapted for mastication, but rather for seizing and holding the prey selected for food. Digestion, on account of the powerful solvents secreted in the alimentary canal, is rapid. In the main fold or bend of the intestine the ductless spleen lies. It is an organ probably connected with the formation of blood. There is no pancreas (or sweetbread) in fishes, but the bunch of finger-like organs attached to the stomach, called the pyloric cæca, performs the same function in connection with digestion. By means of the red gills, through which the blood circulates, the pure air dissolved in water is breathed and oxygenates the blood. The circulation in fishes is very simple. The two-chambered heart, situated far forward, almost beneath the chin, drives the blood by the central aorta and afferent branchial arteries to the gills, where it passes along the fine comb-like filaments and returns to the dorsal aorta, which carries it along the underside of the backbone and thence all over the body. It collects again in the two large veins which empty into the ductus cuvieri, and thence into the auricle of the heart. There is thus no separated double circulation in fishes. The hearing of fishes

is far more acute than the sense of smell, as is proved by the delicate structure of the ears in the hind part of the skull. But the most sensitive structure in fishes is the lateral line, a series of openings in the scales along each side of the body. Temperature, water pollutions and other external conditions, affect the lateral line, the microscopic structure of which shows that its importance has apparently been over-looked by naturalists. The brain is of the simplest kind, merely six rounded lumps or lobes, the first pair being the olfactory lobes, the second the optic, and the third the cerebral hemispheres, which are very small. The optic lobes, whence spring the nerves of sight, are by far the largest. Behind all is the cerebellum, which continues into the spinal cord. The eggs, larval condition, and other interesting features, were detailed in the concluding part of the lecture.

II. "A BIRD."—In contrast with the fish, Professor Prince drew attention in his second lecture to the skull of the bird, which in the adult is very compact and soldered together, whereas in the early stages the bones (or cartilages) are separate, like the separate elements in the fish's skull. A single knob or joint, called the occipital condyle, projects from the back of the skull and unites it to the atlas or first joint of the neck. The fore-limb is not a fin, but a wing consisting of two fingers and a thumb. In the penguins the wings are used as fins for swimming and bear scale-like feathers. The heart is four-chambered and one great artery (the right aortic arch) carries the blood all over the body. Two pulmonary arteries carry blood from the right ventricle to the lungs. The lungs open by air-tubes into large sacs, which often penetrate the bones and increase the buoyancy of the body. The ribs of birds bear projections called uncinate processes, which are also found in reptiles. Birds and reptiles have many points in common. The concluding part of the lecture dealt with the egg and the embryonic development of a bird. The growth of the skeleton, of the feathers, &c., was described in full detail.

III. "A FOUR-FOOTED ANIMAL" formed the subject of the last lecture, and it was shown that the complex structure of mammals, or highest animals, admitted of a description of only

the main features. As characteristic of these highest animals, Professor Prince stated that two condyles, or projections behind the skull, the possession of hair at some period of life, the existence of the left aortic arch (not the right as in birds) and a perfectly separate lung and body circulation of the blood, were named. The diaphragm, practically absent in birds, forms the floor of the chest and aids in respiration. The brain shows an enormous enlargement of the cerebral lobes proportionate to the increased intelligence exhibited by mammals. All, or nearly all, suckle the young, and the organs of sense (sight, smell, hearing, &c.) are highly developed. Some, like bats, have the hand expanded like a wing, covered with an expansion of thin skin, others, like the sloth, have huge hook-claws, as the animal spends its life hanging, back downwards, from the branches of forest trees, while hoofs, padded feet (like the camel's) and other modifications, point to the varied life of the group amongst which man stands as the highest and most specialised.

The thanks of the Club are due to the President, Professor Prince, for this valuable series of lectures, and we feel confident that should a similar course be given next year, the room will be filled to overflowing on every occasion. No teacher, student, school-boy or school-girl should miss such an opportunity of acquiring much valuable knowledge in so pleasant a manner.

IN THE BERMUDAS.

Written for THE OTTAWA NATURALIST.

Although the Bermudas or Sommers Islands are so far from Canada that the Field-Naturalists' Club is debarred from an excursion thereto, they possess as far as the birds are concerned a certain amount of interest to the more northern parts of the adjacent continent, as a stopping or resting place in the spring and autumn migratory flights. During the summer months the regular amount of bird life is limited, but in the autumn and spring almost every variety of bird met with in Canada has been noticed here. Dr. Hart Merriam made this

a special object of enquiry during his stay here. The most conspicuous regular bird is the Cardinal Grossbeak, and there is a bluebird of about the same size, of the most cærulean blue; the two flitting in and out of the monotonous evergreen juniper which clothes the hillsides add a brilliancy to the foliage, the brighter by contrast. A law of the Islands prohibits the killing of birds, and as a consequence bird life is very abundant. In the vicinity of the towns and settlements the English sparrow has managed to drive off to a great extent the native birds, but in the country their number makes up for the town's loss.

The fauna of the Bermudas as far as mammals and butterflies are concerned, is excessively limited. Two or three species of rats, a rare occurrence of bats, and a very limited number of butterflies constitute all there is. The fauna, excepting the rats, has been pronounced exotic, and inblown by storms.

To the botanist the Islands are a veritable garden of Eden. Most of our hot-house flowers waste their fragrance on the desert air, and the flowering shrubs clothe the hillsides with a beauty which the North cannot conceive. Everywhere may be seen the Oleander in every shade of colour, from white to crimson, while Cacti, Aloes, Bamboo, Night-blooming Cereus, the Passion flower and Honeysuckle find a foothold in the crumbling coral rocks or on the old stone walls which here take the place of Canadian fence rails. Very few of the numerous plants found here are indigenous, but so kindly do importations take to the soil and climate and escape from cultivation, that it is a hard matter to say what is a wild plant. Fain would I dwell on the beauty of the palms and palmettos, on the foliage of the Tamarind or the grand flowers of the Loquat, but space will not allow of this. Adding greatly to the semi-tropical appearance of the islands is the Banana, generally growing in every garden, and its successive bunches of fruit keep on ripening all through the year.

The climate may be styled that of a perpetual spring, the temperature never exceeding 90, and never nearing the freezing point. The air is heavily charged with moisture, and vegetation

is mainly sustained by the dew, which may be seen at sunrise dropping off the leaves. The porosity of the coral rocks retains like a half dry sponge moisture enough for growth. There is everywhere here a remarkable plant known as the Life plant (*Bryophyllum calycinum*), a leaf of which pinned up against a wall throws out rootlets and young plants from each indentation of the margin, these are nourished apparently by the air alone, for which reason the plant is sometimes called the Air Plant.

I have compiled a work entitled "In the Bermudas" dealing with all the fauna and flora of the islands, and containing a large amount of interesting history which will give details of use to naturalists. I only wish the O. F. N. C. could get an outing here, but I fear many of them after a day among the flowers here would feel loath to return to a northern clime.

H. B. SMALL.

Hamilton, Bermuda,
April 12th, 1898.

THE CRETACEOUS OF ATHABASCA RIVER.

By J. B. TYRRELL, M.A., B.Sc., F.G.S., F.G.S.A.

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In the spring of 1893 the writer descended the Athabasca river from Athabasca Landing to Athabasca Lake, on his way to unknown portions of the Barren Lands west of Hudson Bay. The descent of this river was only a preliminary part of the work of the season, to be accomplished with as little delay as possible, so that no stoppages were made except such as were necessary for preparing the meals, pitching camp, examining rapids or making portages.

Besides, Mr. McConnell, of the Geological Survey, had carefully examined the river a few years before, and had given an excellent account of the character and thickness of the rocks which compose its banks.

The rocks first met with below Athabasca Landing are all

of Cretaceous age, and in describing them Mr. McConnell gives a section as follows :

La-Biche Shales, upper	700	Montana.
La-Biche Shales, lower	225	Colorado.
Pelican Sandstone	40	
Pelican Shales	90	
Grand Rapids Sandstone	300	
Chearwater Shales	275	
"Tar Sands"	220	Dakota.

The upper parts of the La Biche shales are thus correlated with the Montana terrane, which corresponds to what is usually known as the Fox Hills and Pierre formations in most of the reports of the Geological Survey of Canada. The lower portion of the La Biche shales, the Pelican sandstone and shales, the Grand Rapids sandstone and the Clearwater shales, were correlated with the Colorado (Niobrara and Benton) terranes, while the "Tar Sands," in which no fossils were found, were provisionally classed with the Dakota.

The observations which it was possible for the writer to make were chiefly confined to the examination of a few horizons in this section and to the collection of fossils at occasional localities, and while they do not add anything to the accuracy of the section in itself, they may add something to our knowledge of the correlation of the beds with those along the Manitoba escarpment in western Manitoba, and they besides indicate the existence in this rather remote northern region of a Dakota fauna of distinctly marine type.

For the provisional generic or specific determination of the fossils, thanks are due to Mr. J. F. Whiteaves, Palæontologist to the Geological Survey, but since many of the species, though determinable, are as yet undescribed, letters of the alphabet have been added to them to designate them more exactly, where it is necessary to speak of their range through different beds.

Sixteen miles below the mouth of La Biche river the Cretaceous shales contain, along with crystals of selenite, many rounded calcareous grains, apparently foraminifera, associated with *Ostrea congesta*, *Baculites ovatus* and fragments of a small gasteropod and of a large aviculoid. They also contain bands of nodules of limestone, many of which are mottled like the

calcareous bands in the Niobrara shale of Manitoba, and contain foraminifera, oysters, gasteropods, &c.

A few miles lower down the stream another outcrop of hard gray mottled shale was observed. It contained, besides the little calcareous dots representing foraminifera, fragments of fish bones, and a few specimens of *Ostrea congesta*, and was thus precisely similar in general appearance to the Niobrara shale of North-Western Manitoba.

The presence of this foraminiferous horizon, with its association of other sossils, would go to confirm Mr. McConnell's conclusions that these lower beds of the La Biche shales are of Niobrara age.

The Pelican sandstones and shales were not closely examined, but as they are evidently poor in fossils, Mr. McConnell having found none in them, they would in that respect, as well as in position, correspond closely with the Benton shales of Manitoba, in which fossils are very rare.

In the Grand Rapids sandstones, at Grand Rapids, a large ammonite was seen, which seemed to be clearly *Hoplites McConnelli*, but it was found impossible to get it out.

An Burnt Rapids the interesting glauconitic band described by Mr. McConnell as occurring in the Clearwater shales (which are everywhere very arenaceous) was carefully examined, and found to be very similar to some rather persistent green bands in the upper portion of the Dakota sandstone along the banks of Red Deer river, and in exposures in the adjoining area of North-Western Manitoba, and the whole bank had very much the general appearance and character of many of the Dakota beds.

At the foot of the bank the following fossils were collected, some of which had already been collected by Mr. McConnell from the same vicinity : *Ostrea congesta*, *Camptonectes* sp. *a*, *Modiola* sp. *a*, *Nucula* like *N. Coloradoensis*, Stanton, *Yoldia* sps. *a* and *b*, *Callista tenuis* ?, *Protocardia borcale* ?, *Panopea* sp. *a*, *Chemnitzia* like *C. Coalvillensis* Meek, *Actæon* sp. *a*, a gasteropod of uncertain affinities and a conical tooth like that of *Teleosaurus*.

Eleven miles lower down the stream the Clearwater shales were again searched for fossils and the following were found :

Camptonectes sp. *a*, *Yoldia* sp. *a*, *Callista tenuis ?*, *Panopæa* sp. *a*, *Dentalium* sp. *a*, *Lunatia* sp. , *Hoplites* like *H. McConnelli*, but with much stronger ribs.

At Boiler Rapids, where the "Tar Sands" first crop out from beneath the Clearwater shales, many masses of rotten ferruginous limestone were lying on the beach, apparently derived from the top of the "Tar Sands." From these were collected *Pecten* sp. *a*, "large, four inches high, and higher than broad, nearly smooth, one valve convex, the other flat" (Whiteaves). A small gasteropod, and a small ammonite, perhaps a form of *Hoplites McConnelli*.

At middle rapid a large number of fragments of ferruginous limestone were lying on the beach, derived from bands in the "Tar Sands." From these were collected specimens of fossil wood· *Pecten* sp. *a*, *Camptonectes* sp. *a*, *Inoceramus* sp., *Modiola* sp. *a*, *Cytherea* or *Cyprina* sp., *Panopæa* sp. *a*, *Dentalium* sp., *Hoplites McConnelli*, and fragments of large dinosaurian bones.

At the head of the bend above Crooked Rapids, a thin band of ferruginous limestone outcrops at the very base of the Tar Sands and from it were obtained a number of specimens of *Pecten* sp. *a*, and fragments of a minute gasteropod.

From the list of fossils above enumerated it will be seen that the fauna of the arenaceous Clearwater shales continues downwards into the conformably underlying "Tar Sands," and as far as could be determined from the few traces of fossils seen in the Grand Rapids Sandstone, it also contains essentially the same fauna.

It is to be noted, that the fauna is marine, and not fresh water, as in the original Dakota of the States to the south.

In lithological character, also, as well as in stratigraphical position, all these beds are very similar to the Dakota Sandstones of Western Manitoba.

The palæontological evidence thus appears to show that it is necessary to modify Mr. McConnell's correlation of the Cretaceous of the Athabasca river to the extent of taking all the beds below the base of the Pelican Shales out of the Colorado Group, and of grouping together the Grand Rapid Sandstone, the Clear-

water Shales, and the "Tar Sands" as one formation. This is a marine formation, stratigraphically equivalent to the Dakota, the fossils of which are practically the same throughout, and although no corresponding marine fossils are known elsewhere in the west, it appears to represent the marine conditions of the Dakota Period.

BIRD MIGRATION 1898.

To the Editor of the Naturalist.

The bird migration of the present spring, so far as it has yet progressed, has developed some features which I think are worthy of note.

The usual course of the migratory movement of the earlier part of the season may be described somewhat as follows:—As soon as the March thaw has made sufficient progress to lay bare a good part of the surface of the ground—say one-third—the earliest of the true migrants begin to arrive. The song sparrow and the robin are generally first, but they are followed in three or four days, if not actually accompanied, by the bluebird and several species of grackle. These are all ground-feeders, at least at this time, for the winter visitants and the storms have stripped the trees and shrubs of the last remains of last season's fruits and seeds, so that the only food supply is that which has lain all winter under the snow. Should the warmth of the sun bring out a few winged insects in sheltered nooks, an odd phœbe will be found looking after them; but he may be considered a venturesome pioneer, while all the other flycatching birds still linger in their winter homes. Probably every individual of these first arrivals will have spent, at least the latter part of the winter in Southern New York or Pennsylvania, for the first two species regularly winter there while the others, though retiring somewhat further south at the commencement of the cold weather, begin to push northward early in February.

Some 10 or 15 days later, say when the snow has almost entirely disappeared from the open fields, we are generally able to record two of our commonest meadow-sparrows, the vesper and the savanna ; and about the same time the whitebellied, or tree, swallow. This latter is the second to arrive of the flycatching birds, and usually appears in compact flocks, even before the ice has entirely withdrawn from the ponds and rivers over which it loves to sport. The three last mentioned species spend the winter in a much more southerly clime than the robin, song sparrow and their companions. According to Chapman (Birds of Eastern N.A.) the tree swallow winters from South Carolina southward, the vesper and savanna from Virginia southward ; and all three usually put in their first appearance at New York city during the first 10 days of April. My own note book, running back to 1889 shows first appearances at Ottawa to range between the following dates :— Robin, 20 March to 7 April ; song sparrow, 24 March to 7 April ; tree swallow, 1 to 22 April ; vesper sparrow, 11 to 22 April ; savanna, 7 to 27 April. Now, the peculiarity of the present year is this : The migratory movement opened rather earlier than usual ; robin, song sparrow and grackle were recorded, as stated in your notes for March, before the middle of that month and by the 20th all were quite common. During the 3 or 4 following weeks the weather was almost continuously warm and springlike, so that by 8th April snow or ice could hardly be found, and winged insects were quite abundant. All conditions seemed to call for the second contingent of migrants ; but one looked in vain for either tree swallow, savanna sparrow or vesper.

The pioneers of the tree swallows only began to be seen on 13 April, those of the savannas on the 16th and the vespers not until the 19th, and even yet (30 April), they cannot be said to be common.

If we search for an explanation of the long delay in the arrival of these somewhat southerly species, I believe it will be found in the peculiar weather conditions of the country immediately north of their winter home. While we in Ontario and Quebec, in common with the state of New York, have been enjoying unusually mild weather through March and April, the people

living 500 miles south of us have had a season of marked severity. On 5th and 6th April, a snowstorm followed by frost visited Maryland, Virginia and Tennessee, and inclement weather seems to have prevailed in that region, more or less, throughout the spring. This state of things has no doubt formed a barrier which southern birds have not cared to pass through, although the weather further north was such as they would have delighted in had they only pushed on far enough and fast enough.

In this connection let me allude to one item in your notes for March which, with due regard for the observer, seems to me almost incredible. I refer to the record of a wood pewee on 28th March by Dr. Fletcher. This species spends the winter in Central America ; Chapman gives 10 to 20 May for its usual arrival at New York. Ottawa records since 1890 vary between 13 and 24 May. In view of the late arrival of all other insect-feeders this year, one cannot help doubting the identification of this solitary wood pewee.

A. G. KINGSTON.

Ottawa, 30th April.

ORNITHOLOGY.

Edited by W. T. MACOUN.

The weather during most of the month of April has been cool, the nights being especially so, with the result that the birds did not arrive in large numbers and those that came did not show themselves very openly. Many birds which, after a warm night, are so full of song in the early mornings at this time of year, are almost silent. On the 19th of April there was quite a chorus of melody from a flock of vesper sparrows at the Experimental Farm, but they must have caught cold for they have been very quiet ever since. A few purple finches, during the last week of the month, helped to dispel by their full, sweet notes, the almost universal gloom which seems to have fallen over bird life.

BIRDS' NESTS.—Northern Shrike *Lanius borealis*. Two

nests of this bird were found by Mr. Richard Shillington at City View. There were four eggs in each nest. Eggs probably a week in incubation. Nests were in cedars, about seven feet from the ground. The eggs were presented to the Geological Survey by Mr. Shillington.

BROAD-WINGED HAWK.—Nest seen by Miss Harmer on the 22rd, in an elm tree thirty feet from the ground. She was unable to discover whether eggs had been laid.—W.T.M.

SEMI-ALBINO SONG-SPARROW.—Mr. C. H. Young, of Hurdman's Bridge, has shown me a very beautiful specimen of a male song-sparrow, which he shot this spring (March 26th) near his house. The head and shoulders are white, as is the whole lower surface with the exception of the patch of feathers on the breast, In this specimen these feathers are darker than usual. The wing coverts and secondaries are beautifully and symmetrically marked with brown and white Primaries white. Tail and tail coverts brown. The specimen has been beautifully mounted by Mr. Young, who is a skilful taxidermist, and will be exhibited at one of the evening meetings next winter.—J.F.

NOTE.—Owing to lack of space "Bird Notes for April" have been held over till the next number.—EDITOR.

SUGAR: ITS CHEMISTRY AND MANUFACTURE.

The honour of delivering a popular lecture at the recent convocation of Queen's University was conferred upon Dr. Adolf Lehmann, who for several years was Assistant Chemist of the Experimental Farms, and therefore personally well known to many of our Ottawa members. Since his return from Leipzig, Dr. Lehmann has been lecturing on organic chemistry and allied branches at Queen's University, and the esteem in which he is held there is evidenced by the fact that he was this year chosen to give the annual lecture in connection with the closing exercises.

Dr. Lehmann took for his subject, Sugar, treating it historically, commercially and chemically. His special research work

on sugars in Louisianna and subsequent investigation pursued in the laboratories at Leipzig, eminently qualified Dr. Lehmann to speak with authority on this interesting and important subject. The Toronto *Globe* of 26th April, devotes two columns to an account of the lecture, which evidently was a most successful effort and one highly appreciated by the large audience that greeted this talented Canadian Chemist.

THE WALKER GRAND HONORARY PRIZE.

The members of the Ottawa Field-Naturalists' Club will learn with pleasure of the great honour which has just been conferred upon our friend Dr. S. H. Scudder, the eminent Entomologist and Palæontologist of Cambridge, Mass., by the Boston Society of Natural History unaminously awarding to him the Walker Grand Honorary Prize. The following data with reference to this prize have been kindly supplied by Mr. Samuel Henshaw, of Cambridge, Mass.:

"The Walker Prizes are awarded from funds given in 1864 to the Boston Society of Natural History by the late William Johnson Walker of Newport, R.I. In addition to the annual prizes given for memoirs or subjects proposed, the Walker foundation allows the Council of the Society to award not oftener than once in five years a Grand Honorary Prize. For this Grand Honorary Walker Prize the Council may award the sum of five hundred dollars for such investigation or discovery in natural history as may seem to deserve it, provided that such investigation or discovery in natural history shall have first been made known and published in the United States of America, and at the time of said award shall have been made known and published at least one year; if, in consequence of the extraordinary merit of any such investigation or discovery, the Council of the Society shall see fit, they may award therefor the sum of one thousand dollars.

"The award of the maximum sum, one thousand dollars, on

the 20th of April last, to Dr. Scudder for his contributions to entomology, is the fifth award made.

"The prize was first given in 1873 to Dr. Alexander Agassiz for his work on the embryology, geographical distribution and natural history of Echinoderms; second in 1880, to Prof. Joseph Leidy for his prolonged investigations and discoveries in zoology and palæontology; third in 1884, to Prof. James Hall for his work on North American palæontology; and fourth in 1892, to Prof. James D. Dana for his distinguished services in natural history."

ZOOLOGICAL NOTES.

Edited by Prof. E. E. PRINCE.

THE FIRST BAT OF THE SEASON.—On March 1st, at about 9 o'clock in the evening, a small bat was seen flying at the corner of Elgin and Sparks Streets, high above the heads of the crowd that had collected there to hear the results of the Ontario elections. The day had been bright and mild, but so early an appearance of a bat may have been due primarily to the unusual noise and light in the street below.—LAWRENCE LAMBE.

FIRST GENERAL EXCURSION OF THE SEASON.

The Council have arranged to hold the first General Field-Day of the season at Chelsea, the date and time being announced on the cover of this number. We feel sure from past experience of a large attendance. The charms of this lovely locality, so prolific in all objects of interest to naturalists, have always had a special attraction for our members and their friends. Most of the leaders have expressed their intention of being present, so there will be plenty of assistance for those desirous of it, for the naming of specimens, etc. Students of the Normal School and other educational institutions in the city are warmly invited to join the Field-Naturalists on this occasion, when as usual, all students and teachers will be supplied with tickets at club rates. The train leaves C. P. R. Depot at 1.30 p.m.

SUB-EXCURSIONS.

No. 1. The first Sub-Excursion of the season was held on Saturday afternoon, April 16, to Rockcliffe. The President Prof. Prince and Messrs. Wilson, Halkett and Fletcher, were present as leaders. The party was rather small, but a most enjoyable and instructive afternoon was spent in the woods at Rockcliffe, around Hemlock Lake and at Beechwood. Flowers were few but on sheltered warm knolls, particularly near the gates of Beechwood cemetery, several kinds of flowers were found. Mr. Wilson explained the nature of the rocks found *in situ* as well as of the various boulders observed. Mr. Halkett captured many a hapless insect, spider, or reptile, and descanted admiringly on their beauties. Dr. Fletcher drew attention to the staminate and pistillate flowers of the hazel, poplars and red maples. On one tree of aspen both staminate and pistillate flowers were found. This is an unusual occurrence. Owing to the remarkably early season, many plants were found in blossom which, as a rule, do not occur till much later in the season. The swamp alder, the silver and red maples, the American elm, the aspen and the large-toothed aspen were in full flower. The hazel catkins were shedding their pollen and the little crimson tufts of pistillate flowers were very conspicuous. At Rockcliffe, fresh green fronds were found of *Polypodium vulgare* and *Aspidium marginale*, which had passed the winter beneath the snow. *Capsella Bursa-pastoris* caught by the winter before it had expanded its flowers, now pushed up its head again, to go on with its work of life after 6 months' sleep. On the sunny knoll near Beechwood, *Hepatica acutiloba* with pink, blue, and white flowers was found in profusion, together with *Claytonia Caroliniana*, one or two fully expanded flowers of *Erythronium Americanum* and sturdy clumps of *Caulophyllum thalictroides*. One or two less advanced but open flowers of *Uvularia grandiflora* and *Dicentra Cucullaria* were also found and red and white trilliums just opening. In the swamp at the foot of the hill *Salix discolor* was in full bloom. In all 18 different plants were collected in flower, a surprising number for the 16th of April.—J. F.

No. 2.—To the Beaver Meadow, Hull, was held on Saturday, April 23. About forty members and their friends were present at this excursion, under the leadership of Prof. Macoun, Mr. Kingston, Mr. Sinclair and Mr. Wilson. Mr. Sinclair was accompanied by quite a number of Normal School students. The weather was very fine, but the season was found to be considerably later than on the warm bank at Beechwood a week earlier. Very few flowers were found, except hepaticas, which were at their best. About five o'clock the excursionists met on the top of the hill, and Prof. Macoun spoke on the flowers of trees, showing that those with pistils and stamens on different trees were passing away, while those with perfect flowers were geologically young. He also said a few words on lichens, fungi and mosses. Mr. Kingston was asked to speak on birds, but said that he had seen practically nothing during the afternoon worth mentioning. The afternoon's ramble through the woods was thoroughly enjoyed by all present. There is never a lack of objects of interest to lovers of nature, The trees with their various branching habits, the formation of the swelling buds and and gnarled trunks can be studied to better advantage at this time of the year than at any other.—M. I. W.

No. 3.—To Beechwood, April 30. Upwards of 40 ladies and gentlemen took part in this Sub-Excursion. *Erythronium Americanum* was found profusely in perfect condition, as well as most of the the flowers found April 16. The new arrivals since that date were *Viola Selkirkii*, *Waldsteinia fragarioides* and *Dicentra Canadensis*. *Dentaria laciniata* had been found by Miss Marion I. Whyte a few days earlier. Beechwood is one of the two localities where this plant, locally so rare, is found.—J. F.

SUB-EXCURSIONS FOR MAY.

No. 1.—May 7. Bank Street Bridge, for Dow's Swamp and Billings Bridge.

No. 2.—May 14. New Edinburgh.

May 21—GRAND GENERAL EXCURSION TO CHELSEA, 1.30 p.m.

No. 3.—May 28. Aylmer.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, JUNE, 1898. NO. 3.

THE CRYPTOGAMIC FLORA OF OTTAWA.

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

Continued from the May Number.

299. **Physcia stellaris**, (L.)

Very common on trunks and dead or living branches. On black ash trees in a swamp in Stewart's Bush, April 12th, 1895; on dead and living trees at Rockcliffe Park, Beechwood, Ottawa East, Dow's Swamp and Skead's Farm, Richmond Road, and common at Britannia; common on trees in woods at Leamy's Lake; on balsam trees at Stittsville; on trunks and rails, King's Mountain, Chelsea, Que., May 22nd, 1897.

Var. **aipolia**, Nyl.

Same range as the species. On the bark of trees at Ottawa, 1884; on a black ash trunk in a swamp west of Beechwood Cemetery; on beech and maple trees in woods one mile south-east of Billing's Bridge; on trees in woods, Leamy's Lake; on tamarack and other trees at Stittsville, May 14th, 1897.

300. **Physcia astroidea**, (Fr.) Nyl.

On old rails and trunks. On old rails near Hintonburg, April 18th, 1896; abundant on the upper part of a fallen hemlock near McKay's Lake, Beechwood, Sept. 29th, 1896; also on old rails at Aylmer, Que.

301. **Physcia hispida**, (Schreb.) Tuckerm.

On trees, but generally on boulders with us. On black ash trees in a swamp in Stewart's Bush along the C.A.R., April 12th, 1895; on boulders in a pasture along Brigham's Creek, near Leamy's Lake, May 7th, 1897.

302. **Physcia obscura**, (Ehrh.) Nyl.

Trunks, dead wood and rocks. On the bark of white cedar in Stewart's Bush, April 12th, 1895; on granite boulders, Rockcliffe Park; on trees and limestone and granite boulders at Britannia; common on trees and rocks at Hull and Aylmer, Que.; on trunks in Dow's Swamp; and on stones in Ottawa East; on old fence boards at Billing's Bridge; on trunks and boulders between Brigham's Creek and Leamy's

Lake, Hull, Que. ; on old boards at Stittsville ; on rocks, trunks and old rails, King's Mountain, Chelsea, Que., May 22nd, 1897.

303. **Physcia setosa**, (Ach.) Nyl.

On rocks, and upon mosses, and trunks. On trunks along the Beaver Meadow, west of Hull, Que, April 26th, 1891 ; on trunks "Pine Hill," Rockcliffe Park ; on black ash trunks, Cowley's Farm, west of Hintonburg ; on black ash trunks amongst moss in woods north of Beechwood Cemetery ; on beech trees in woods one mile south-east of Billing's Bridge, on various trees in woods at Leamy's Lake ; on trees in a swamp at Stittsville, May 14th, 1897.

304. **Physcia adglutinata**, (Flœrk.) Nyl.

On trees and shrubs. On beech trunks at Beechwood Cemetery, April 23rd, 1892.

IX. PYXINE, Fr.

305. **Pyxine sorediata**, Fr.

On trunks in woods. On black ash in Stewart's Bush, April 12th, 1895 ; on beech trunks, "Pine Hill," Rockcliffe Park ; in woods north of Beechwood Cemetery ; on ash, balsam fir and other trees in woods west of Beaver Meadow, Hull, Que.; on trees at Britannia ; on trunks in woods at Leamy's Lake, May 7th, 1897.

X. UMBILICARIA, Hoffm.

306. **Umbilicaria Muhlenbergia**, (Ach.) Tuckerm.

On perpendicular rocks near the summit of King's Mountain, west of Chelsea, Que., Sept., 1884 ; also May 22nd, 1897.

307. **Umbilicaria vellea**, (L.) Nyl.

On the face of a perpendicular rock near the summit of King's Mountain west of Chelsea. May 22nd, 1897.

308. **Umbilicaria Dillenii**, Tuckerm.

On the faces of perpendicular rocks near the summit of King's Mountain west of Chelsea, May 22nd, 1897.

XI. STICTA, (Schreb.) Fr.

309. **Sticta amplissima**, (Scop.) Mass.

On large trunks in old woods, not rare. Common in Rockcliffe Park and McKay's woods, April 16th, 1891 ; in Dow's Swamp ; on rear of Skead's Farm, Richmond road ; also on trees at Carleton Place ; on trees in the swamp west of Hull Station ; on basswood trunks in woods near Hull Cemetery ; on trunks King's Mountain and near Chelsea, May 22nd, 1897.

310. **Sticta pulmonaria**, (L.) Ach.

On large old trees in thick woods, common. Common in Rockcliffe Park and McKay's woods and woods north of Beechwood Cemetery, April 20th, 1891; on trees at Carleton Place; on trees in a swamp at Stittsville; on trunks King's Mountain and near Chelsea, May 22nd, 1897; on trees in a swamp west of Hull Station.

XII. NEPHROMA, Ach.

311. **Nephroma Helveticum**, Ach.

On rocks at King's Mountain, west of Chelsea, Sep., 1884; also on rocks below the summit, May 22nd, 1897.

312. **Nephroma lævigatum**, Ach.

On large boulders in old woods. In woods north of the Aylmer road and west of Hull, Que., April 27th, 1895; in McKay's woods and in Beechwood Cemetery; on rocks near the summit of King's Mountain, May 22nd, 1897.

313. **Nephroma parile**, Nyl.

On rocks at King's Mere, west of Chelsea, Que., Sept 3rd, 1884.

XIII. PELTIGERA, (Willd.) Fee.

314 **Peltigera venosa**, (L.) Hoffm.

On earth along the broken bank of the Lievre River at Buckingham, Que., May 14th. 1896.

315. **Peltigera aphthosa**, (L.) Hoffm.

On rocks, logs and earth and among mosses in swampy woods. On earth and old logs in wet woods east of the Beaver Meadow, west of Hull, Que., April 26th, 1891; on damp rocks by the Lievre River, Buckingham, Que.; on dead logs at Carleton Place; on old logs in a swamp at Stittsville, May 14th, 1897.

316. **Peltigera horizontalis**, (L.) Hoffm.

On moist rocks amongst mosses In woods near the lake at the head of the Beaver Meadow west of Hull, Que., May 16th, 1896.

317. **Peltigera rufescens**, (Neck.) Hoffm.

On earth, rocks, the bases of trees and amongst moss. On rocks in Rockcliffe Park, Beechwood Cemetery, and Ottawa East on a boulder; on rocks rear of Cowley's Farm west of Hintonburg; on old logs Dow's Swamp; on earth at Britannia; common on earth and rocks south of the Aylmer road, Hull, Que.; on earth in a swamp at Stittsville; on rocks near summit of King's Mountain, May 22nd 1897.

318. **Peltigera canina**, (L.) Hoffm.

On earth, rocks and the bases of trees in cool woods. On earth in pine woods Rockcliffe Park; on earth Ottawa East; on earth and rocks in woods west of the Beaver Meadow, Hull, Que.; on old logs in woods Carleton Place; on the earth at the base of trees in woods, Leamy's Lake; on earth in a swamp at Stittsville; very common on earth, old wood and rocks, King's Mountain, May 22nd, 1897.

XIV. SOLORINA, Ach.

319. **Solorina saccata**, (L.) Ach.

On calcareous earth in the damp crevices of the limestone ledges facing the Ottawa below Governor's Bay, Rockcliffe Park, April 17th, 1895.

XV. PANNARIA, Delis.

320. **Pannaria lanuginosa**, (Ach.) Kœrb.

On limestone ledges along the cliffs of Rockcliffe Park, April 17th 1895; on overhanging rocks along the Beaver Meadow west of Hull, Que.; also along the Ottawa River on limestone cliffs near Tetreauville, Little Chaudiere; on limestone rocks Ottawa East; also near the Experimental Farm; very common on the faces of damp rocks King's Mountain, May 22nd, 1897.

321. **Pannaria leucosticta**, Tuckerm.

On trunks and rocks, rare. On bark of, balsam poplar in woods south of the Aylmer road, west of Hull, Que., April 27th 1895; on boulders Rockcliffe Park; and on stones West End Park; on beech trunks in woods one mile south east of Billings Bridge; on beech trunks north or Beechwood Cemetery; on rocks King's Mountain, May 22nd, 1897.

322. **Pannaria microphylla**, (Schm) Delis.

Forming a thick crust on rocks. On boulders in woods north of Aylmer Road, west of Hull, Que., April 27th, 1895; on boulders, "Pine Hill," Rockcliffe Park and in Beechwood Cemetery; quite common on damp boulders, King's Mountain, May 22nd, 1897.

323. **Pannaria lepidiota**, Fr.

On earth and amongst moss on rocks. On moss on a stone in woods, south of Aylmer Road, west of Hull, Que., April 27th, 1895.

324. **Pannaria nigra**, (Huds.) Nyl.

On limestone rocks by the cliffs along the Ottawa, Rockcliffe Park, April 16th, 1891,; on limestone rocks in a field by the Beaver Meadow

Creek, west of Hull, Que.; on limestone rocks at Leamy's Lake; on limestone rocks between Aylmer and King's Mountain, May 22nd, 1897.

XVI. COLLEMA, Hoffm.

325. **Collema myriococcum**, Ach.

Growing on moss, on limestone rocks by the Ottawa, below Governor's Bay, Rockcliffe Park, April 16th, 1891.

326. **Collema pulposum**, (Bernh.) Nyl.

On earth on limestone rocks "Pine Hill," Rockcliffe Park, April 16th, 1896.

327. **Collema crispum**, Borr.

On calcareous earth in the cutting for the Aylmer Railway west of Hull, Que., April 27th, 1895; on earth in crevices of rocks at King's Mountain near Chelsea, Que., May 22nd, 1897.

328. **Collema limosum**, Ach.

On calcareous earth in the cutting for the Aylmer Railway west of Hull, Que; very rare. April 27th, 1895.

329. **Collema floculosa**, Nyl.

On limestone rocks below Governor's Bay, Rockcliffe Park, April 17th, 1895; on naked limestone rocks in woods south of the Aylmer Electric Railway, west of Hull, Que.; very rare, May 16th, 1895.

330. **Collema tenax**, (Ach.) Tuckerm.

On calcareous earth on wet rocks in the cutting for the Aylmer Electric Railway west of Hull, Que., April 27th, 1895; on calcareous earth along the limestone ledges at Rockcliffe Park, April 12th, 1896.

XVII. LEPTOGIUM, Fr.

331. **Leptogium tenuissimum**, (Dicks.) Koerb.

On sandy earth, on old fence rails along the Richmond Road west of Hintonburg, April 18th, 1896.

332. **Leptogium lacerum**, (Ach.)

On limestone rocks amongst moss in the cutting for the Aylmer Electric Railway, west of Hull, Que., April 27th, 1895; on limestone rocks by the Ottawa below Governor's Bay, Rockcliffe Park; on damp rocks, King's Mountain, May 22nd, 1897.

333. **Leptogium pulchellum**, (Ach.) Nyl.

On trees in woods, Rockcliffe Park, Sep. 16th, 1889, very rare.

334. **Leptogium Tremelloides** (L.) Fr.

On rocks and trunks; common. On boulders and trees north of the Aylmer Road, west of Hull, Que., April 27th, 1895; on trees in Dow's Swamp; on boulders in Beechwood Cemetery; in McKay's woods, and on "Pine Hill," Rockcliffe Park; on old logs and rocks King's Mountain, May 22nd, 1897.

335. **Leptogium chloromelum,** (Sw.) Nyl.

On old rails near Aylmer and on damp rocks near the summit of King's Mountain, west of Chelsea, May 22nd 1897.

336. **Leptogium respulinum**, Ach.

On limestone rocks near the Ottawa below Governor's Bay, Rockcliffe Park, April 16th, 1891.

XVIII. PLACODIUM (DC.)

337. **Placodium elegans,** (Link.) DC.

On a large boulder in woods, Governor's Bay, Rockcliffe Park, April 16th, 1895.

338. **Placodium aurantiacum**, (Lightf.)

On trees and rocks; also on dead wood. On a granite boulder in woods, Governor's Bay, Rockcliffe Park, April 17th, 1895; on limestone rocks at Britannia; on boulders in woods west of Hull and on boulders at Leamy's Lake, Oct. 9th, 1896.

339. **Placodium cerinum,** (Hedw.)

Common on trees, on dead wood and mosses. On maple and poplar bark Stewart's bush near the C. A. R. track, April 12th, 1895; on dead trees and living ash bark at Britannia; on poplar bark south of the Aylmer Electric Road, west of Hull, Que.; on black ash Ottawa East; on trunks in woods at Leamy's Lake; on poplar trees in a swamp at Stittsville; on old rails and trunks King's Mountain, May 22nd, 1897.

340. **Placodium vitellinum**, (Ehrh.)

On dead wood and rocks. On old pine rails at Britannia, April 20th, 1895; on cedar rails Ottawa East; on boulders in pasture by Brigham's Creek; on old rails and logs, King's Mountain, May 22nd, 1897.

341. **Placodium vitellinum,** (Ehrh.) var. **aurellum**, Ach.

On granite boulders in woods, Governor's Bay, Rockcliffe Park, April 17th, 1895; on boulders in woods north of the Aylmer road west of Hull, Que.; on boulders Ottawa East; on boulders in pastures by Brigham's Creek, May 7th, 1897.

XIX. LECANORA, Ach.

342. **Lecanora muralis**, (Schreb.) var. **saxicola.** Schaer.

Very common on both gaanite and limestone boulders, Governor's Bay, Rockcliffe Park, April 17th, 1895; quite common on boulders south of the Aylmer road and west of Brigham's Creek, Hull, Que.; on rocks between Chelsea and King's Mountain, May 22nd, 1897.

343. **Lecanora pallida**, (Schreb.) Schaer.

On young pine trees Carleton Place, May 7th, 1892; on a pine trunk Rockcliffe Park; on trunks in woods west of Hull station, also in woods near Leamy's Lake; on trunks in a swamp at Stittsville; on rails and trunks, King's Mountain, May 22nd, 1897.

344. **Lecanora pallida**, (Schreb.) var. **cancriformis**, Tuck.

On living pine trees in woods near the C. P. R. bridge over the Ottawa, west of Hull, April 27th, 1895; on beech trees, Rockcliffe Park.

345. **Lecanora subfusca**, (L.) var. **allophana**, Ach.

On living pine trees in woods near the C. P. R. bridge, over the Ottawa, Hull, Que., April 27th, 1895; on old cedar rails in McKay's woods and Ottawa East; on maple and beech trunks Rockcliffe Park and Beechwood; on maple trunks one mile south east of Billings Bridge; on basswood bark in Dow's Swamp; on trees in a swamp west of Hull station and on boulders in a field by the Aylmer Road; on trunks in woods by Leamy's Lake and on boulders by Brigham's Creek; on trunks in a swamp at Stittsville; on trunks, common, King's Mountain, May 22nd, 1897.

346. **Lecanora subfusca**, (Schreb.) var. **coilocarpa**, Ach.

On beech bark in woods, Rockcliffe Park, April 15th, 1891; on beech bark in woods one mile south east of Billings Bridge; on trunks on King's Mountain, May 22nd, 1897.

347. **Lecanora subfusca** var. **argentata**, Ach.

On small trees at the western base of King's Mountain, west of Chelsea, May 22nd, 1897.

348. **Lecanora Hageni**, Ach.

On old rails near McKay's Lake, April 23rd, 1891; on cedar bark on fences, Ottawa East; on old cedar rails along the Richmond Road above Hintonburg, April 18th, 1896.

349. **Lecanora atra**, (Huds.) Ach.

On young beech trees at Buckingham, Que., May 14th, 1896; on limestone shingle at Britannia, April 20th, 1895.

350. **Lecanora badia**, (Pers.) Ach.

On limestone rocks in woods, north of the Aylmer Road, west of Hull, Que., April 27th, 1895.

351. **Lecanora varia**, (Ehrh.) Nyl.

On bark of trees old boards and fence rails. On pine bark in woods near the C. P. R. bridge west of Hull, Que., April 27th, 1895.

352. **Lecanora varia**, var. **symmicta**, Ach.

On trees and fences; not rare. On bark of living pine trees in woods west of the Beaver Meadow, Hull, Que., April 27th, 1895.

353. **Lecanora varia**, var. **sæpincola**, Fr.

On the board fence in the cutting for the Aylmer Electric Railway, west of Hull, Que., April 27th, 1895; on old fences at Stittsville; on old fences between Aylmer and King's Mountain, May 22nd, 1897.

354. **Lecanora pallescens**, (L.) Schaer.

On birch trees near Ottawa 1884; on trunks at the base of King's Mountain, May 22nd, 1897.

355. **Lecanora privigna**, var. **pruinosa**, Auct.

On limestone rocks, in woods, south of the Aylmer Road, west of Hull, April 27th, 1895; on boulders along the road and in fields, Rockcliffe Park; on limestone boulders in a pasture by Brigham's Creek; abundant on rocks, King's Mountain, May 22nd, 1897.

XX. RINODINA, Mass.

356. **Rinodina Ascociscana**, Tuck.

On beech trees in McKay's woods near the Lake, April 24th 1891; on beech trees in woods one mile south-east of Billings Bridge, April 19th, 1897.

357. **Rinodina sophodes**, (Ach.) Nyl.

On bark of young red maples in Stewart's bush south of the C. A. R. track April 12th, 1895; very common on bark of young and old red maple trees along the lake at Britannia; on beech trees in woods one mile south-east of Billings Bridge, April 19th, 1897.

358. **Rinodina constans**, Nyl.

On beech trees in Beechwood Cemetery, April 20th, 1891.

XXI. PERTUSARIA, DC.

359. **Pertusaria multipunctata**, (Turn.) Nyl.

On old trees in Rockcliffe Park and Beechwood Cemetery, April 27th, 1892; on butternut trees along the Aylmer Road west of Hull; on trunks of the same near the entrance to Hull Roman Catholic Cemetery; on old cedar rails between Aylmer and King's Mountain, May 22nd 1897.

ENTOMOLOGY.

NOTES FOR APRIL IN VANCOUVER ISLAND.

By Rev. Geo. W. Taylor, F.R.S.C.

The past month, April, has been exceptionally mild and the season so far as many of the insects are concerned, is fully three weeks in advance of last year.

As early as the 22nd of March, in the course of an afternoon walk, I was able to collect no fewer than 40 species of Coleoptera. These were mostly found under bark and perhaps the best capture was *Elaphrus Clairvillei* of which rare beetle I took 3 specimens. Thus far I seem to have been giving most attention to Coleoptera though collecting in all orders. Consequently I have more to report in the beetle line than in any other.

Among notable captures during April I may mention as occurring under back the rare Carab *Psydrus piceus* together with *Clinidium calcaratum* and *Peltis Pippingskoeldi*, both very common. *Adelocera profusa*, *Hylastes cavernosus*, *Gnathotrichus retusus*, *Dendroctonus rufipennis ? Rhizophagus sculpturatus*, the strange looking *Phellopsis porcata* and the curiously flat *Pediacus subglaber*. Under dead crows (these are the only kind of crows a farmer in these parts cares to see) were found, the very abundant and always in season *Necrophilus hydrophiloides*, *Silpha Lapponica*, two species of *Choleva*, *Hister fœdatus*, *Saprinus lugens*, and two or three *Histeridæ* not yet determined; also of course *Creophilus villosus* and many smaller *Staphylinidæ*. An inspection of the fences brought to light *Hylesinus sericeus* (common), numerous specimens of *Haltica*, *Malachius auritus*, *Ellychnia Californica*, *Trogosita virescens*, an unknown *Lasconotus*, *Platycerus Oregonensis*, *Clerus sphegeus* and *abruptus*, *Hylotrupes ligneus* (very common) and an interesting little beetle, *Listrus Motschulskii* which I took last year, for the first time, on the same fences. Under logs I found two *Ditylus gracilis* and *Ipthimus serratus* and very many *Carabidæ*. Hiding in crevices *Plectrura spinicauda* and two kinds of *Helops*, *pernitens* and *lætus*. On the wing in the bright sunshine I have taken many

specimens of the beautiful *Cucujus puniceus* and the equally brilliant *Eros simplicipes* and *E. lætus*, *Odonteus obesus*, *Synaphœta Quexii*. This last named insect attacks the willow and some years ago I took more than twenty specimens from a heap of dead willow branches in my yard.

On flowers there have not yet been many beetles, the only captures perhaps worth noting being *Anthaxia æneogaster*, *Lathrimæum pictum* and *Grynocharis pilosula*. Assisting me to rid my fruit trees of Aphides are 11 species of Lady birds and their efforts are seconded I think by *Podabrus pruinosus*. This insect is very common on the affected trees and I believe its errand is a friendly one. Lastly in my pantry, in stale bread left there as a bait, I have found many beetles, *Omosita discoidea*, *Colastus truncatus*, a *Cryptophagid* for which Professor Wickham cannot give me a name and numerous small fry which have not yet been determined.

By the way there is one other beetle I must mention as it is both rare and curious, *Nosodendron Californicum*, I found this for the first time on May 13th last year, when I took about twenty in an old wound on the trunk of a balsam fir (*Abies grandis*). This year I have taken other specimens in the same place, the earliest date being April 26th, but I cannot find a single specimen elsewhere.

Among the Lepidoptera I have not been doing much. The hibernated Graptas with *V. Antiopa* and *Milbertii* put in an appearance before the end of March. By the beginning of April the early Blues, *Thecla Siva*, *T. melinus* and *T. iroides*, *Anthocaris ausonides* and *A. stella* and *Pieris venosa* were all abundant. A single specimen of *Papilio Eurymedon* was observed on April 24 a month before its proper time of appearance. The larvæ of *Limenitis Lorquinii* left their hibernacula on the apple trees and spiræas before a leaf was out, but managed to satisfy their hunger by nibbling the buds. The larva of *Anthocaris* (I am not sure which species) was also to be found at the end of the month feeding on *Arabis perfoliata*.

Of moths I have hardly made any notes this season, but I remember seeing *Hemaris rubens* (which is a very common insect with us, the larvæ feeding on *Symphoricarpus*) in the last week of March. Towards the end of April I cut some pupæ of *Sesia tipuliformis* from my currant bushes and on the last day of the month I bred a fine specimen of *Telea Polyphemus* from one of three larvæ taken on willow last September

Among the *Hymenoptera* our enemy *Gymnonychus appendiculatus* appeared on April 1st and all through the month has been busy ovipositing on the currant and gooseberry bushes. Two other saw flies, *Strongylogaster distans* and *Dolerus sericeus* have also been abundant; but I think they do not meddle with our cultivated plants. Wasps and bees have been in hundreds and in thousands at the gooseberry blossoms (both wild and cultivated kinds) but as yet I know not their names. Of ants I have collected nearly 20 kinds but these too are as yet undetermined. I have also found under bark some other curious apterous Hymenoptera which I intend to send to Mr. Harrington in my next box.

In other orders I have not taken many species. The smaller of our two kinds of Cicada appeared on April 13th, very much in advance of its usual season. Our earliest and smallest grasshopper (*Tettix granulatus* I believe) has been swarming since the beginning of the month and I have also taken a few specimens of another orthopterous insect, to wit the curious little cricket *Mrymecophila Oregonensis* described and figured by Bruner in Can. Ent. XVI. p. 41-43. These I found under bark of fir logs apparently associating with a honey-coloured species of ant.

But I must stop this lengthy enumeration, having said enough I am sure to show my Ottawa brothers of the Ottawa Field Naturalists' Club that April has not been an unprofitable month for us Entomologically in Vancouver Island and to make you, Mr, Editor, wish that you could have a little of our British Columbia early spring in exchange for some of your prolonged, but healthy and pleasant Ottawa winter.

Gabriola Island, Nanaimo, B.C.,
May 18, 1898.

EXCURSION No. 1 TO CHELSEA.

The first General Excursion of the year was held on May 28th to Gilmour's grove at Chelsea. This beautiful spot overlooking the rapids of the Gatineau, never loses its charms for our members. Here all, whatever their tastes, can be satisfied, the wild grand scenery, the cool woods and rocks rich with specimens of all kinds, and the facility of reaching the locality, all tend to make this an ideal spot for a naturalist's hunting ground.

About 175 Members of the Club and their friends left Ottawa by the 1.30. train. The weather was proclaimed on all sides to be simply perfection and the afternoon passed all too quickly. Mr. Shutt, the always reliable, Chairman of the Excursion Committee had made the arrangements so well that everything went off with the smoothness of clock-work, except perhaps that he had not arranged to have the sun put back an hour to give the Excursionists more time to enjoy themselves. Specimens of many kinds were collected by eager hands, plants, insects, shells, minerals, etc. The lovers of birds were peering into every tree and bush with eyes no less sharp than those of the birds they were observing.

The Botanists brought in many specimens for the leaders to name and explain the characters of—*Cypripedium acaule* was found in some numbers, the beautiful flowers calling the attention of the most unobservant. One enthusiastic botanist was seen ruthlessly picking off the flowers from a clump of plants "to prevent thoughtless people digging up the roots which they cant grow and cleaning out the locality" he said.

The small but striking flowers of *Corydalis glauca* and Canada Columbine were found on the rocks, as well as the vines of *Epigea repens*. *Viburnum lantanoides* was one of the most beautiful flowering shrubs observed, but most of the bushes were past flowering.

Viola Cucullata was in great beauty and a few fungi were collected. The most interesting being a very large specimen of

the Morell, *Morchella esculenta*, of the remarkable size of 10 inches from the bottom to the apex, found by Mr. Conrad Ostrom.

Insects were abundant and the leaders' hearts were, made happy by taking no less than 5 specimens of the rare and beautiful longicorn *Anthophylax Malachiticus*. Mr. C. H. Young was the lucky captor of a beautiful specimen of *Amblyscirtes Samoset* a pretty little Skipper butterfly only twice before taken here.

The President, Prof. Prince, called the meeting to order at the end of the afternoon and two excellent addresses were listened to, the first from Prof. Bailey F.R.S.C. of Fredericton, N. B. and a Member for many years of the Club, who spoke on the Geology of the locality and another by Prof. Macoun who spoke of some of the more interesting plants collected. He alluded to some very interesting investigations which had been made by Mr. James Macoun on the violets of the locality and pointed out that undoubtedly 4 or 5 distinct species had been confounded under the name *V. Cucullata.*

The whistle of the train at 7.30 warned the excursionists that their pleasant afternoon in the woods had come to an end and all returned to Ottawa happy, satisfied and very tired.

SUB-EXCURSIONS.

No. 4.—To Dow's Swamp. May 7. The day was clear, bright and hot. The President, Prof. Macoun, Miss Marion Whyte and Mr. Attwood led the party. The Spring had advanced considerably since the last sub-excursion on the previous Saturday, Trilliums, Uvularias and Claytonias were in perfection. The President and Prof. Macoun struck out into the swamp to visit the small lake (the true Dow's Lake) *Caltha palustris* was conspicuous with its golden cups and rich green leaves. *Salix candida* too, with its striking crimson anthers, was much admired. Prof. Prince caught among other interesting denizens of the lake, the Mud Minnow. The majority of the party remained with Miss Whyte on the higher ground which

skirts the swamp and worked their way towards Billings Bridge. The Sugar maples were now just at the fullest glory of their golden splendour. How strange it is that, often as the maple is written of and depicted, little is said of the extremely beautiful flowers which hang in copious silken tassels from the tip of every twig, their yellow flowers and anthers hanging on the slender thread-like pallid pedicels contrasting with the delicate green of the expanding foliage and making up for their small size by the profusion in which they are produced. Passing on towards Billings Bridge the only Ottawa locality for *Claytonia Virginica* was visited. Close by fine specimens of *Viola Cucullata* in varying forms were collected. Before the close of the Excursion Mr. Frank T. Shutt joined the party and added to the interest of the outing. The wild Plum was one of the conspicuous ornaments of the open woods.

No. 5.—To New Edinburgh, May 14th. A rather dull morning with a sharp shower was followed by an exquisite afternoon and a most pleasant outing was enjoyed in the woods between Rideau Hall, Hemlock Lake and Beechwood. The party was led by Dr. Fletcher, Miss Whyte and Mr. Halkett The rocky hill by the Governor General's bay produced many interesting specimens—*Hepatica triloba* with pink, blue and white flowers attracted the attention of all. *Corydalis aurea* and *Pedicularis Canadensis* were first recorded to-day for this season. *Aquilegia Canadensis* was found in quantities. This pretty plant sometimes called inaccurately "Honeysuckle" seems to have given its namers some trouble, its Latin name, *Aquilegia*, is derived from *Aquila*, an eagle while its English name, Columbine, comes from *Columba*, a dove. Several birds attracted attention, among these the beautiful Brown Thrasher and its relative the Catbird, both close kinsmen of the true Mocking bird and themselves mockers of no mean attainments. The Purple Finch poured forth his delightful song with special fervour in honour of his visitors. In the cedar woods near Crichton Lodge the naturalists had a good opportunity of examining closely a fine American Hare which

surprised and surrounded in his lair, remained in view for a minute or two before he scampered off. No plants of special rarity were collected but the woods were full of beautiful flowers. *Orchis spectabilis* was found in bud, *Viola Canadensis*, and *V. pubescens* were in great profusion and beauty. The Sugar Maples and Beeches still bore many flowers and other plants were noted in bloom for the first time this season.—J. F.

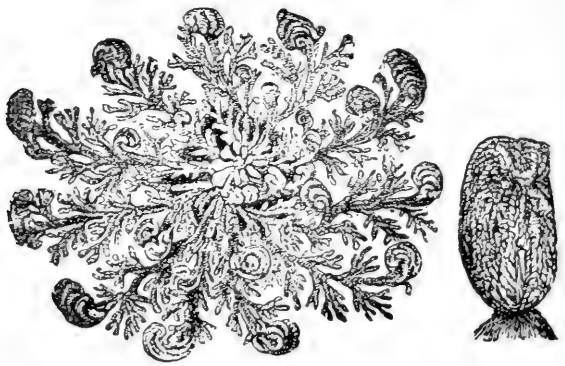
RESURRECTION PLANTS.

Our attention has been called to the above subject by the Hon. R. B. Dickey, who has very kindly furnished the editor with notes on these plants, as well as with the interesting extract given below from a letter written by Mr. H. E. Milner, of London, England.

Certain members of the vegetable kingdom are possessed of such remarkable tenacity of life that their vital spark seems well nigh unquenchable. For such the most unfavourable and adverse conditions, such as being submitted to long periods of drought, or even being broken into small pieces, are not sufficient to kill entirely, though they may arrest life and growth and even cause an appearance of death. With the return of favourable conditions, as the presence of moisture and warmth, these plants spring forth again into renewed life and growth. Plants with this great vitality are apt to become troublesome enemies of the agriculturist. It is only necessary to mention such succulent plants as the Live-for-Ever (*Sedum Telephium*) and the common Purslane (*Portulaca oleracea*), the latter of which will continue to expand flowers and ripen seeds for weeks, when pulled up and hung on a nail against a brick wall in the full blaze of an August and September sun. Those plants which have an extensive system of underground stems, like the Field Convolvulus (*Convolvulus arvensis*), the so-called Canada Thistle (*Cnicus arvensis*), and Couch grass (*Agropyrum repens*), are thereby enabled to withstand much aggression from the farmer

Plants with fleshy compact stems, like Cacti, Euphorbiæ, etc., or with bulbous roots such as many of the *Liliaceæ* are able to remain a long time in a dormant condition. This is particularly the case with the Onions, the difficulty of drying which, as botanical specimens, unless the bulbs are scalded at the time of pressing, collectors of plants know well. Some of the plants which possess this marvellous recuperative power are known as Resurrection plants, though the name might imply that these plants die and come to life again, which is not actually the case. In the animal world this condition would be called "suspended animation." This extraordinary ability of apparently coming to life again, or of re-vegetating, is possessed by members of many widely divergent genera of plants; most of which grow naturally in deserts or in arid districts, and it is easy to understand how this exceptional power must assist in the perpetuation of the species when the plants are subjected to severe, and in the case of ordinary plants, fatal conditions of environment. It is not our purpose, however, to discuss now this interesting phase of physiological botany, but to bring before our readers brief accounts of the three species most frequently spoken of under the title of Resurrection plants.

SELAGINELLA LEPIDOPHYLLA.



This is a cryptogamous plant allied to the Lycopodiums or Club-mosses. It is a vivid green, rosulate, branching plant, covering a space on the ground of from five to eight inches in

diameter. When dry it rolls up into a dull grayish ball, but upon the return of moisture expands again into a beautiful green flat rosette, The Hon. Senator Dickey writes as follows of a specimen which was brought to him by a friend from Mexico:

"The habitat of this strange plant is in the crevices of mountain rocks, to which it clings as a dry nest-like ball of twigs, in the dry season. In the rainy season the stems uncurl and the plant flourishes as a beautiful rosette of brilliant green. On the return of the dry season, it again curls up to be brought back again to life the next year with the return of the rainy season. The peculiarity of this plant is that you can witness the phenomenon of its opening and shutting as often as you please, when the plant is, so to speak, in confinement. I had the opportunity of testing this repeatedly last summer after my friend had brought it in his trunk from Mexico, and before I sent it on another 3,000 miles to my son-in-law in London, who has had the same experience. As a dry roll of brittle tangled fibres, it can be sent for thousands of miles rolled up in a piece of brown paper, and a few hours after being placed in a saucer filled with water, will gradually present an appearance of the greatest beauty."

The following extract is from a letter received by Mr. Dickey from his son-in-law, Mr. H. E. Milner:

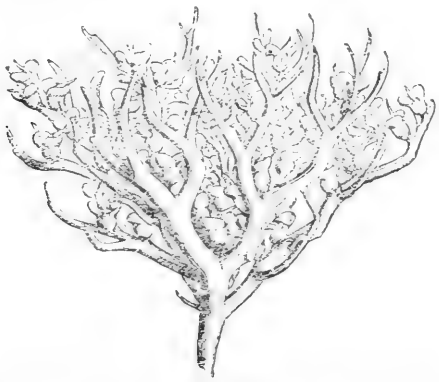
"The name of your Resurrection plant is *Selaginella convoluta*, a species which occurs from Mexico right through tropical America. There are several Resurrection plants; a Japanese one is a Selaginella nearly allied to the species you sent over. The plant usually called Resurrection plant and connected with the Holy Land is a small Crucifer, *Anastatica Hierochuntina*, but opinion, in which Mr. Nicholson, the Curator of Kew shares, now is that the true thing is a Composite. The plant appears on the arms of some of the old crusader families and certainly the plant there figured is not the Crucifer, but the Composite."

Another opinion with regard to the Resurrection plant of heraldry, referred to above, is that it is a species of *Mysembryanthemum*.

The interesting Selaginella spoken of by Mr. Dickey is apparently not the same species as that usually sold in shops in

Europe and America, under the name of Resurrection plant; but is closely allied with it and has almost the same range. The form most usually seen in curiosity shops is *S. lepidophylla*, which extends from Texas to Peru and of which an excellent figure is given herewith, copied from the American supplement of the Encyclopedia Britannica. These plants, like the mosses, nearly all of which—as pointed out by John Ruskin—may be called Everlasting plants and will regain their green colour and former beauty upon being moistened, even when they have been quite dead for years.

ROSE OF JERICHO—*(Anastatica Hierochuntina.)*



Probably the plant most widely known under the name of Resurrection plant—the generic name of which, indeed, is derived from the Greek word *Anastasis*, resurrection—is a small annual Crucifer belonging to the Cress family, which grows wild in Syria. It is a curious little plant, with thick stems, fleshy leaves and small white flowers. The leaves fall from the plant after flowering, and the many branches and branchlets thickly beset with short seed-pods then become dry and woody and rising upward, bend inward at their points. In this condition the dry plant becomes separated from the ground, and like the "Tumbling-weed" of our western plains, is driven long distances across the desert by the winds. It is stated in Nicholson's Dictionary of Gardening that this is supposed by some commentators to be

the "rolling thing before the whirlwind" mentioned by Isaiah. This plant does not resume vitality or even the appearance of it as in the case of the Club moss mentioned above; but upon the application of moisture, first the hard woody branches, and then the copious, 2 to 4-seeded pods open up and the seeds are discharged. The plant can be easily grown from seed even after the stems have been kept dry for a great many years. The living plant, however, is of no beauty, and but for its associations, is of little interest. It is frequently to be seen exposed for sale in curiosity shops both in Europe and in this country.

The figure given herewith is from a photograph taken by Mr. Shutt of a plate in Nicholson's Dictionary of Gardening.

LEWISIA REDIVIVA.

By far the most beautiful of the plants, which from their power of resuming active growth after being for a long time dry and to all appearances dead which have been called Resurrection Plants and received specific names indicating their recuperative power, is the charming member of the Portulaca family named above, of which specimens were found by Capt. M. Lewis who accompanied Capt. Clark, in his celebrated journey to the Rocky Mountains at the end of the last century. Specimens were brought back by these travellers and sent home to Europe as dried botanical specimens; when, however, these were unpacked many months afterwards the roots were found to have thrown out healthy leaves. Some of the roots were planted and were the first plants of *Lewisia rediviva* ever cultivated in Europe.

There are only two species in the genus *Lewisia*, one extending from California to the interior of British Columbia, with leaves terete and succulent, growing in tufts, from the apex of the tapering fleshy rootstock. These die down before the flowers appear (in June at Ashcroft B. C.) and then the large and beautiful flowers, four or five from each root are produced. These are somewhat like those of a cactus, opening out from three to four inches in diameter, pink at the outside and shading towards the centre where they are almost white. The scapes

are from 1 to 2 inches high and each bears besides the one large flower, 3 bracts just below it on the stem.

The calyx is conspicuous and adds much to the beauty of the flower being waved at the margins and of a rich brownish red. The stamens are indefinite in number, about 36. The pistil is compound, seven-cleft.

This interesting plant is very abundant in some parts of the interior of British Columbia. I have found it in the Okanagan valley and the Hon. Senator Cornwall sent me some years ago roots from Ashcroft, and at the same time described the great beauty of the flowers as they lay close to the sandy ground in every direction around his house.

The root of *Lewisia* is eaten by the Indians and has various designations among different tribes. It is the "Bitter Root" of some writers, "Spætlum" of others.

Many years ago Dr. Kellog, of the California Academy of Sciences showed me specimens found by him in California which had instead of grass-like terete leaves much shorter spatulate leaves from a quarter to ⅜ inch in diameter. This I presume is the other species mentioned by authors. J. FLETCHER

ORNITHOLOGY.

(Edited by W. T. MACOUN.)

BIRD NOTES FOR APRIL AND MAY.

April 1. American Herring Gull—*Larus argentatus Smithsonianus.* Mr. W. A. D. Lees. On 2nd, Mr. G. R. White.

" 3. American Merganser, Goosander—*Merganser Americanus* Mr. White.

" 3. Pigeon Hawk—*Falco columbarius*—Mr. C. H. Young.

" 9. Tree Swallow—*Tachycineta bicolor.* Mr. Young. Other records are four days later.

" 10. Ruby-crowned Kinglet—*Regulus calendula.* Mr. White.

" 10. Horned Grebe—*Colymbus auritus.* Mr. White.

" 12. Chipping Sparrow—*Spizella socialis.* Dr. Fletcher.

April 14 Vesper Sparrow—*Poocætes gramineus.* Miss G. Harmer and Mr. Lees. A flock was seen at the Experimental Farm on the 19th.
" 14. Belted Kingfisher—*Ceryle Alcyon.* Mr. White.
" 15. Downy Woodpecker—*Dryobates pubescens.* Mr. Lees.
" 16. Flicker—*Colaptes auratus.* Mr. Young.
" 16. Savannah Sparrow—*Ammodramus sandwichensis savanna.* Dr. Fletcher and Mr. Lees.
" 16. Great Blue Heron—*Ardea Herodias.* Mr. White.
" 17. Ivory Gull—*Gavia alba.* Mr. Young.
" 17. Rusty Blackbird—*Scolecophagus carolinus.* Mr. White.
" 20. Yellow-bellied Woodpecker—*Sphyrapicus varius.* Mr. White.
" 21. Fox Sparrow—*Passerella iliaca.* Mr. Young.
" 21. Purple Martin—*Progne subis.* Mr. Young.
" 23. Loon—*Urinator imber,* Mr. White.
" 23. American Osprey—*Pandion haliætus carolinensis.* Mr. Young.
" 23. Pied-billed Grebe—*Podilymbus podiceps.* Mr. White.
" 27. White-throated Sparrow—*Zonotrichia albicollis.* Mr. White. On 29th, Miss Harmer.
" 28. Barn Swallow—*Chelidon erythrogaster.* Mr. White.
" 30. American Bittern—*Botaurus lentiginosus.* Mr. White.
" 30. Hermit Thrush—*Turdus aonalaschkæ Palasii.* Mr. White.
" 30. Wood Thrush—*Turdus mustelinus.* Prof. J. Macoun.
May 1. Swamp Sparrow—*Melospiza georgiana.* Mr. Lees.
" 1. Crested Flycatcher—*Myiarchus crinitus.* Mr. Lees.
" 1. Cliff Swallow—*Petrochelidon lunifrons.* Mr. Lees.
" 1. Bank Swallow—*Clivicola riparia.* Mr. Lees. On 3rd, Mr. White
" 3. Chimney Swift—*Chætura pelagica.* Miss Harmer and Mr White.
" 5. Spotted Sandpiper—*Actitis macularia.* Mr. White
" 5. Yellow Warbler—*Dendroica æstiva.* Mr. Kingston.
" 6. Least Flycatcher—*Empidonax minimus.* Mr. Lees.
" 7. Myrtle Waabler—*Dendroica coronata.* Mr. White
" 8. American Goldfinch—*Spinus tristis.* Mr Lees. On 22nd, in full breeding plumage, Mr. White.
" 8. Red-shoulder Hawk—*Buteo lineatus.* Mr. Kingston.
" 8. Golden-crowned Kinglet—*Regulus satrapa.* Mr. Kingston.

" 10. Baltimore Oriole—*Icterus galbula.* Mr. Lees. On 12th, Mr. Kingston.
" 10. Catbird—*Galeoscoptes carolinensis* Mr. White. On 12th, Miss Harmer.
" 10. Kingbird—*Tyrannus Tyrannus.* Mr. Kingston. On 12th, Mr. White.
" 10. House Wren—*Troglodytes aedon.* Mr. Lees. On 12th, Mr. White.
" 10. Black and White Warbler—*Mniotilta varia.* Mr. White.
" 10. Nashville Warbler—*Helminthophila ruficapilla.* Mr. White.
" 10. Magnolia Warbler—*Dendroica maculosa.* Mr. White.
" 10. White-crowned Sparrow—*Zonotrichia leucophrys.* Mr. W. T. Macoun. On 12th, Mr. Lees.
" 10. Warbling Vireo—*Vireo gilvus.* Mr. Lees.
" 11. Bobolink—*Dolichonyx oryzivorus.* Mr. Macoun.
" 11. Wilson's Snipe—*Gallinago delicata.* Mr. White.
" 11. Greater Yellow-legs—*Totanus melanoleucus.* Mr. White.
" 12. Brown Thrasher—*Harporhynchus rufus.* Seven were seen by Mr. Macoun at the Experimental Farm, four were in one tree at the same time.
" 12. Killdeer—*Ægialitis vocifera.* Mr. White.
" 12. American Pipit—*Anthus pennsylvanicus.* Mr. White. On 15th, Mr. Kingston.
" 14. Hairy Woodpecker—*Dryobates villosus.* Miss Harmer
" 14. Blue Jay—*Cyanocitta cristata.*—Mr. Lees.
" 14. Solitary Sandpiper—*Totanus solitarius*—Mr. White.
" 14. American Redstart—*Setophaga ruticilla*—Miss Harmer. On 15th, Mr. Kingston and W. T. Macoun.
" 14. Chestnut-sided Warbler—*Dendroica pennsylvanica*—Miss Harmer.
" 14. Black-throated Green Warbler—*Dendroica virens.*—Miss Harmer.
" 15. Wilson's Thrush—*Turdus fuscescens*—Miss Harmer.
" 15. Red-eyed Vireo—*Vireo olivaceus*—Mr. Lees.
" 15. Rose-breasted Grosbeak—*Habia ludoviciana*—Mr. Kingston and Mr. Macoun.
" 15. Maryland Yellow-throat—*Geothlypis trichas.*—Mr. Macoun.
" 15. Ruby-throated Humming-bird—*Trochilus colubris.* Mr. Lees.

" 15. Night Hawk—*Chordeiles virginianus*—Mr. Kingston. On 19th Prof. Macoun.
" 18. Whip - Poor - Will—*Antrostomus vociferus*—Miss Harmer.
" 18. Blackburnian Warbler—*Dendroica Blackburniæ*—Mr. White.
" 18. Tennessee Warbler—*Helminthophila peregrina*—Mr. White.
" 18. Black-poll Warbler—*Dendroica striata*—Mr. White.
" 18. Orange-crowned Warbler—*Helminthophila celata*—Mr. White.
" 18. Black-throated Blue Warbler—*Dendroica cærulescens*—Mr. White.
" 19. Scarlet Tanager—*Piranga erythromelas*—Mr. Kingston. On 28th Miss Harmer.
" 19. Oven-bird—*Seiurus aurocapillus*—Mr. Kingston.
" 19. Red-headed Woodpecker—*Melanerpes erythrocephalus*—Mr. Lees.
" 21. Loggerhead Shrike—*Lanius Ludovicianus*—Mr. Kingston.
" 23. Black-billed Cuckoo—*coccyzus erythrophthalmus*—Mr. White.
" 24. Cedar Wax-wing—*Ampelis cedrorum*—Mr. Kingston.
" 24. Wood Pewee—*Contopus virens*—Mr. Kingston.
" 24. Olive-backed Thrush—*Turdus ustulatus Swainsonii*.—Mr. White.
" 26. Yellow-billed Cuckoo—*Coccyzus Americanus*—Miss Harmer.
" 26. Wilson's Warbler—*Sylvania pusilla*.—Mr. White.
" 26. Bay-breasted Warbler—*Dendroica castanea*—Mr. White.
" 27. Traill's Flycatcher—*Empidonax pusillus Traillii*—Mr. White. On 28th, Mr. Lees.
" 28. Blue-headed Vireo—*Vireo solitarius*—Miss Harmer, at Chelsea.
" 29. Indigo Bunting—*Passerina cyanea*—Miss Harmer.

BIRDS' NESTS.

Mr. White sent in the following notes.

Crows started to build April 16th. The American Robin started to build April 16th. Young birds were able to fly on May the 24th, and on 28th, two eggs of the second brood were

laid. Bronzed Grackle started to build on April 14th and young were about to leave the nest on May the 20th. Song Sparrow started to build April 15th. Bank Swallow commenced to dig holes on May 8th. Catbird started to build on May 18th. House Wren started to build on May 15th.

On May 12th a Prairie Horned Lark's nest was found at the Experimental Farm containing four eggs. The nest was beside a large dandelion on the lawn in the arboretum. Miss Harmer found a nest of the same bird with young on the 11th. A Chickadee's nest was found by Miss Harmer on the 14th of May in a hollow stump, three feet high and four feet in diameter, the entrance to the nest was from the top of the stump the hole apparently being made by the birds, the nest was about 9 inches from the top.

A Purple Finch's nest was found by Dr. Fletcher near his house at the Experimental Farm on the 21st of May. The nest was in a white spruce tree, about 9 feet from the ground.

On the 28 of May, Miss Harmer found a Blue-headed Vireo's nest at Chelsea. It was only partly built and was composed of finely shredded birch bark, and down, probably brought from some willows near by. The nest was snspended from a horizontal branch of a young maple.

The following notes of arrivals of birds at London, Ontario were kindly furnished by Mr. W. E. Saunders. Flickers, March 17th, Belted Kingfishers, 18th, Cowbird, 19th, Red-shouldered Hawk, 20th, Vesper Sparrow, Phœbe, 27th, Fox-coloured Sparrow, April 3rd, Rusty Grackle, 5th, Chewink, 11th, Savannah Sparrow, 12th, Chipping, 14th, Tree Swallow, 14th, Yellow-bellied Wood-pecker, 16th, Dove, 17th, White-throated Sparrow April 23rd, Ruby-crowned Kinglet April 24th, Louisiana Water-Thrush, Hermit Thrush, Field Sparrow, Brown Thrasher, Barn Swallow, April 27th, Myrtle Warbler, Bobolink, Purple Martin, Chimney Swift, April 28th, Black-throated Green Warbler, Spotted Sandpiper, Warbling Vireo, Baltimore Oriole, May 1st, Least Flycatcher, Catbird, Water Thrush, Yellow warbler, Rose-breasted Grosbeak, Whip-poor-will, Maryland Yellow-throat, Ovenbird, Nashville warbler, Black and White Warbler, House Wren, May 2nd. W. T. M,

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, JULY, 1898. No. 4.

THE VANISHED BUFFALO.

BY PROF. EDWARD E. PRINCE,

Dominion Commissioner of Fisheries.

It is hardly possible for the thoughtful traveller to cross the prairies of Western Canada without some reflections on the vanished buffalo. That these apparently interminable plains, now so silent and destitute of animal life, were once the pasture ground for incredibly vast herds of bison or American buffalo (*Bos americanus*) can scarcely be realised. For fully a couple of days the Pacific express speeds across this treeless waste, clothed with brown grass except in summer when it is carpeted with the strange flowers peculiar to these monotonous plains. In every direction the flat waste melts in the blue distance like the sea in mid-ocean but no sign of life appears except a few birds, and that ubiquitous prairie rodent, the gopher. Herds of domestic cattle, the property of isolated ranchers, roam at will: but an occasional cayote or prairie wolf (*Canis latrans*, Say), a startled badger (*Taxidea americana*, Bod.), or a few antelope (*Antilocapra americanus*, Ord.) may be seen hastening away from the railway track.

It is fully twenty years ago since the buffalo in any considerable numbers were found on the plains. In 1884 out of a herd of twenty, eleven or twelve were killed in the vicinity of Cypress Hills not far from Maple Creek, and so recently as eight years ago a small herd of six or seven cows and calves was killed by Indians a little north of Swift Current, Assiniboia, N. W. T., these being probably the remnant of the Cypress Hills buffalo. In the early part of 1886 the Smithsonian expedition scoured Montana with the hope, a very meagre one, of finding

some living buffalo, and no less than 24 specimens, including 10 old bulls, were killed. The wood-buffalo still survive in remoter parts of the North West ; but they are probably not numerous, and are doomed to early extinction with the present opening-up of these distant gold producing areas.

Observers who crossed the prairies, before the buffalo were nearing extermination, confess that no description can do justice to the impressive spectacle which these bovine monsters presented. Their brown almost black forms scattered over the plains and quietly grazing in untold numbers or spurred by fear and fury rushing in irresistible stampede and leaving clouds of dust behind, can be only dimly imagined. Single herds of ten thousand buffalo were not at all uncommon, and nothing could resist the shock of these legions when in stampede. Fences, tents, waggons, even settlers' huts were thrown down, and railway trains have been compelled to stop until the monstrous troop passed by or run the risk of being overturned by the onward sweep of the buffalo.

The narrow winding paths along which they moved in single file can be still clearly seen upon the prairie, radiating in every direction and converging and crossing each other, while the hollow basins in the earth, the " wallows " where they rolled in the dust, or in wet mud where the ground was marshy are distinctly visible though hollowed out twenty or thirty years ago. Of the thousands of paths to be clearly discerned by the traveller on the C. P. R. west of Winnipeg, a large proportion run nearly north and south and indicate no doubt seasonal migrations from the usual summer resorts to more southerly winter grazing grounds. Six or eight paths frequently run side by side, and as the western rivers usually take an east and west course, the buffalo paths lead to water. Some of the paths are stated to have been worn down to a depth of 24 to 30 inches so vast where the long lines of buffalo which tramped along them.

If it is hardly possible to adequately picture the roving buffalo herds as they appeared a quarter of a century ago, we can happily still form some conception of their imposing and

even terrible aspect from the few living specimens that yet survive. Those survivors, like the couple of hundred in the Yellowstone Park, Montana U. S. are either in a practically wild state, under protection more or less effective, or in a confined park, securely fenced in, as at Silver Heights, near Winnipeg, where a herd of sixteen or seventeen roam in an extensive enclosure.* Col. Bedson, ten years ago had 70 or 80 of them, pure bred, at Stony Mountain, near Winnipeg but they have been sold and form part of the herd of Mr. C. J. Jones, Garden City, Kan., which probably numbers about 150 full blood buffalo. Mr. W. F. Cody and others have a few specimens, but there can hardly now be more than 1000 of these noble animals remaining of the countless myriads which not long ago peopled the plains.

Lord Strathcona had kindly suggested on my visits to the west that I should view his herd at Silver Heights, but the opportunity did not occur until last August, and my notes, made at the time may be of interest although nothing that is new or of scientific importance can now be said of the buffalo. The herd have a fenced reserve covering eight or ten square miles, and over this grassy park they wander with as much freedom as in nature. Some horses feed on this ground; but, while the buffalo do not associate with them much, there appears to be no animosity between them. One of the horses was injured, I learned, some months before, but the animal was possibly lame or weak, and unable to quickly get out of the way of the buffalo. Weak members of their own tribe are invariably attacked and killed. The principle of the survival of the fittest finds rigorous fulfilment among the buffalo. When a friend and myself reached the farm, the buffalo had not been seen for some hours, and were said to be several miles away. We determined to find out their whereabouts, but like other visitors who departed disappointed at not seeing the buffalo, we were just beginning to share in the same feeling, and were about to give up hope of viewing the herd, when we observed two

*Since these notes were jotted down Lord Strathcona has gifted his herd to the Dominion for the Banff National park.

buffalo rapidly making for the cattle sheds where troughs of water stand. They were busily drinking as we approached, and we imagined that they were pretty well domesticated. We were quickly undeceived. In the first place, they were drinking out of the small pools formed by water overflowing from the adjacent pump. They are never known to drink out of the spacious troughs provided with clean water. In the second place a slight breeze arose and blew towards them from our direction. The effect was instantaneous. They raised their heads, sniffed suspiciously, curled their tails aloft, and bounded away with lightning speed. One gained some idea of the strength and swiftness of the buffalo, for these two monsters bounded away lightly as deer, and in a few minutes were lost to view. Their fear of man is still strong, and they retain so much of their original wariness, that anything touched by human hands they avoid. Hence they refuse to enter the cattle sheds in winter, and prefer the snowy waste. They will not even lie down upon dry straw which was thickly spread over the snow for them. Hence also they refuse to drink out of troughs, buckets, or any vessels placed for cattle or horses, and invariably quench their thirst at mud-puddles and small scattered pools of water. Foxes, bears, etc, exhibit similar wariness, and are able to detect the touch of man's hand on traps set for their capture. Hunters adopt many devices to elude this keen sense of smell, which warns wild animals of danger. Castor, which the beaver hunter procures, is invaluable for smearing traps set for certain fur animals.

We feared that the startled pair had rejoined the herd and that all would have hurried far away. That they were shy we had been assured. They were also less trustworthy than formerly, having been much disturbed by numbers of visitors, some of whom had thoughtlessly teased the animals. We were cautioned if we went in search of the buffalo to move quietly and slowly. Sudden movements or noises startle them, and they either rush off in stampede and may not be visible any more that day, or they turn threateningly upon the intruders.

Fortunately we found the herd leisurely feeding in the open not very far away from the farm buildings. They had been rejoined by the two animals which we had disturbed, but the whole herd were coming in for water.

There they stood like great bronze monsters statuesquely surmounting a slight eminence on the grassy plain. It is difficult to accurately describe the impression produced upon the spectator when he first beholds a living buffalo. Something of sentiment will naturally mingle with his thoughts, but apart from the feeling that he is beholding one of the last of a tribe of noble game, practically extinct, he is awed by the massive uncouthness of the animals. Uncouth and monstrous they are, yet noble and grand. A fine specimen of an adult lion in life never fails to impress the spectator, but he realises that it is a huge cat, a gigantic type of a familiar mammal. The buffalo recalls no other animal with which the spectator is acquainted. It is a wholly unfamiliar form, and unlike any other creature which the observer has seen before. For myself I had a feeling akin to that experienced when I have discovered upon some leafy branch a huge caterpillar rearing its bushy head in proud defiance—a strange delight and curiosity. The buffalo struck me as resembling in some features a bull, in others a lion, in others a bear, in others a colossal mule, yet really unlike any of them. His limbs resemble the first ; his mane, the second ; his dark furry head and cheeks, the third ; his body and tail, the last-named. The combination is a grotesque one, yet it is not wholly fanciful, and I was interested recently to find in Hornaday's report on the buffalo, a quotation from a writer in 1724, who gives his impression in these words : "a wonderful combination of diverse animals. It has the crooked shoulders with bunch on its back like a camel, its flanks dry and tail large, and its neck well covered with hair like a lion. It is cloven-footed, its head armed like a bull, which it resembles in fierceness, with no less strength and agility." The effect, at any rate, is as strange as it is impressive. The animals, as already stated, were grouped upon slightly rising ground, and their dark forms contrasted strongly with the

pale tints of the surrounding pasture. We moved quietly towards them ; but they appeared unconscious of our presence and with noses to the ground continued browsing. Not until we were within 60 or 70 yards did they appear to be aware of our presence. They all raised their heads together, turned and stared at us curiously. The small calves, of which there were several, kept at the further side of the cows, and ran hither and thither as if afraid. The bulls stand very high at the shoulder, the height being increased by the curly mane, which is golden or tawny, glistening like silk. A height of 5 ft. 8 in. appears to be a maximum measurement though the bushy mane adds another 4 or 5 inches. A short ridge of stiff bushy hairs extends behind the shoulders along the middle line of the back. The mane shows a distinct line of demarcation passing diagonally down from the back forward to the front legs. Behind this line the body is of a rich sooty-brown with a silky sheen like the coat of a well-groomed horse. In winter the hair becomes long, thick, and matted, and gives the buffalo a very different appearance. The tail is rather like that of a cow, or rather a mule as it is short and has a very slight terminal brush. The body slopes backward and diminishes very rapidly behind the massive shoulders. It falls away very much as does the body of a lion. Indeed, the appearance of the buffalo in many respects is suggestive of the lion. When the animal turns round the view from behind recalls the small and slender body of the mule or ass, but bears little resemblance to that of the ox or of the horse. A bushy conical beard of jet black hair hangs from the under side of the head in the bull buffalo. The horns are smooth and grey, not polished and black like those burnished for ornament. They are very sharp, and are gracefully curved upward and to the front. Between the horns, and above them, the hair of the forehead is long and thick and stands erect like plush or the pile of the richest black velvet. Later, in winter it may become paler and brown, and matted or curly ; but seen as I saw it, late in the summer, it did not appear woolly or curly, but erect and thick, so that it was blown about by every breath of

wind. The ears are not prominent. The snout is wholly unlike that of a horse, being blackish or dark grey, wet and shining, and so blunt and crinkled that it might be compared to the nose of a bull-dog. It certainly reminds one less of a cow than of a huge pug or bull-dog. I confess to a feeling of fear when standing fifteen or twenty yards from the full grown bull. He looked so much like a monstrous bull-dog, with no trace of mildness or docility. When the whole herd raised their heads and gazed at us the effect was not reassuring. They are not at all trustworthy, and the cow-buffalo, when her calf is young, is very fierce. They will not brook impediments or obstructions and will throw such down rather than divert their course. The massive skull, and the cushion of hair in the frontal region, enables the buffalo to charge an obstruction without injury. They are very obstinate, and a few weeks prior to our visit one of the Silver Heights buffalo had to be shot. He got into the vegetable garden, and was busy tearing up the beds and throwing down the crop, and every means taken to stop his unruly proceedings failed. It was found impossible to eject him. He made terrific rushes at the men who attempted to drive him out—nothing could move him, and the only feasible course appeared to be a dose of lead. When the herd are disturbed they gallop off in a straight line. Nothing can turn them aside. They never tire, but go on and on with their tongues hanging out like monstrous dogs, and no horse has sufficient endurance to keep up with them in a lengthened run. They are said to bellow at times like a bull ; but as a rule are perfectly silent. When wounded, especially by a shot breaking one of their legs, they endeavor to rise and charge at the hunter, snorting fiercely and glaring in the most savage manner. Many a hunter has been awed by the splendid fury of the wounded buffalo ; but unless the region of the heart or some vital part were penetrated, bullet after bullet might be discharged at the head or shoulders without effect. In early days when the Indian pursued the buffalo with bow and arrow, instances were common, of an arrow directed at the heart passing clean through the buffalo's body,

and out on the further side, so terrific was the force of the Indians' bow and so closely were the victims approached. The colour of the calves is uniform, not spotted or striped, and is much the same as that of the cows. The cow is invariably smaller than the bull and lacks his sullen ferocity and massive grandeur. Both sexes possess horns. The voice of the bull is a deep sonorous bass call or growl, and in the distance, especially when several bulls were bellowing together, it is said to have resembled the roll of distant thunder.

Among many traditions still current, old settlers have one respecting the so-called "sharpening-places," *i.e.*, low rocky cliffs in the "coulees" or hollows of the prairie where the bulls were said to rub their horns in spring in preparation for the pairing period in August or September. The bulls were fierce fighters, but this sharpening of the horns is probably a myth. I have, however, several pairs of very thick old horns, which are quite worn down by rubbing upon one side of each horn. Possibly this rubbing was done when the buffalo rolled upon the ground, a habit which was constantly indulged in, partly no doubt to get rid of the flies, which annoy them just as they annoy the caribou on the barren plains of the north. The tips of the horns in old bulls, are often narrow and pointed at the tip, but very thick, clumsy, and corrugated down to the base.

All attempts to induce the buffalo to shelter in winter, or even to lie down on beds of straw in the open air have failed at Silver Heights. Straw was abundantly laid down for them in winter, but they invariably preferred some place well covered with snow, where they lay down and slept.

While the extinction of the noble buffalo may be justifiably deplored, it is questionable whether the western country could have been settled, or crops profitably grown as long as their immense herds roamed at will. Certainly man's ferocious barbarity and love of merciless slaughter would have continued so long as any wild buffalo remained to be butchered.

AN OTTAWA NATURALIST'S JOURNEY WESTWARD.

III.—The Aleutian Islands and Behring Sea.

By Andrew Halkett,

Marine and Fisheries Department.

The Aleutian Islands present unusual physical features. Some are craggy and barren, but many, although wholly devoid of trees, are densely covered with a low growth vegetation ; such floral forms as irises, blue-bells, anemones, daisies, &c., growing in rich profusion, and lending a charm to the islands. I arose between three and four o'clock one morning to see the Entrance to Captain's Bay. That was a dreary dismal morning in a wild place. A very heavy mist hovered over the precipitous rocks, between which appeared intervening spaces of verdure. A few hours later the vessel anchored at Dutch Harbour, near the village of Unalaska.

This village is an interesting and picturesque place. It is situated in the midst of mountains in a beautiful bay. An ornament to the village is a neat little Russo-Greek church. It is a wooden structure, built in a somewhat oriental style, having, instead of spires domes with crosses on their tops. The Russo-Greek ritual, a very ancient form of nominal Christianity, and a most imposing ceremonial, is the recognized religion of the Aleuts.

I was delighted to see in this far-off village, a domesticated flock of Canadian Geese (*Bernicla canadensis*) comprising fourteen fine birds, but they were by no means so handsome as the specimens of this goose at the Central Experimental Farm. Apparently they were of the variety known as the Smaller White Cheeked Goose (*B. c. leucoparia*).

At the village, and around the island of Unalaska were numbers of Ravens (*Corvus corax*, L.), and as I found the broken tests of sea-urchins at considerable distances from the sea, it is

possible that these birds carry them to considerable heights, and dropping them descend to feed upon their contents.

To a naturalist the bay at Dutch Harbour is a fascinating spot. Mollusks are rich, as to numbers, in both species and specimens. In places exposed to the beating waves were found in plenty the beautiful striped Chiton known as *Tonicella lineatus*, Wood; and a species of *Anomia* with thin perlaceous valves of such pleasing deep lustrous green, that it might vie with many a tropical shell. Upon the stones, high and dry, awaiting the return of the tide, are innumerable gastropods called *Littorina sitkhana*, Philippi. They are of a dull but often varigated colour, and have a wide distribution. I saw them in plenty at Vancouver Island, and specimens collected in Siberia are in my possession.* The shell of this species is thin, and the edge easily broken, and therefore in this respect is unlike the thick shell of the Scotch "Buckie" or British Periwinkle. (*Littorina littorea*, L.) Numerous specimens of *Purpura lima*, Martyn; and various Limpets (*Acmæa*) were found in the pools.

At another spot, some miles down the shore from the village of Unalaska, I found a neat little specimen of the genus *Natica*, with a close shutting calcareous operculum.

One evening two of the seamen went fishing, and I accompanied them. We rowed over the bay in full view of the islands until we were several miles away from the schooner. We caught a number of cod-fish, halibut, skulpins, and rock-cod.

Near by on one of the mountains were some Bald-headed Eagles, and as one of them had settled on a crag, high over head, we resolved to climb the cliff, in order to get a better view of this really magnificent bird. We arduously toiled our way to the top, clutching moment by moment the firm vegetation, but were well repaid with the excellent view we obtained of the eagle when parallel with it. It was a fine sight to see the large bird up there, and it repeatedly opened its great beak in a threatening manner. The Bald-headed Eagle (*Haliætus leucocephalus*, Linn.) belongs to the Falcon family of rapacious birds.

*Collected by Mr. R. N. Venning, Dept. of Marine and Fisheries.

It is of a dark brown colour, with a white head and tail, and the feet, bill, and eyes are yellow. It preys largely upon fishes. Although scarcely so handsome a bird as its ally the Golden Eagle (*Aquila chrysætus*, Linn.), yet this is the species which has been honoured as the emblem of the United States. An egg of the Bald-headed Eagle, from Long Island, Lake Erie, is in my possession.* The nest was built near the top of an elm tree, about 70 feet high, and contained two white eggs.

At the end of July the schooner which had been anchored for some time near Dutch Harbour, made her way into the open waters of Behring Sea. Having left the Entrance to Captain's Bay behind, on one side of which is a promontory rock called the "Priest"; and on the opposite side a water-fall, pouring itself over the cliff—the first notable thing we observed in the sea was a number of Fin-back Whales (*Balænoptera velifera*, Cope). These huge Cetaceans were often close to the vessel's side, and shewed their great mouths and blow-holes (nostrils). The blowing, which is respiratory, is very audible. At one spot and time the water was fairly agitated as these monsters rolled over, but unfortunately only a small part of the creature's body can be seen at the same moment, for if the head is above water the tail is under, and *vice versa.*

One day when far from land, I scooped up a specimen of Medusa from the surface of the sea; and finding it tenacious of life placed it in a glass-vessel containing sea-water, in order to watch its graceful motions, and examine its structure. It was of a soft brown colour: very complicated and delicate in its organization, but probably belonged to the genus *Chrysaora*. The Medusæ differ considerably among themselves, but are generally mushroom shaped, and from the body, or disc, are suspended numbers of tentacles. Besides this small form many other Medusæ were seen during the voyage, and whilst approaching the Straits of Juan de Fuga, when "homeward bound" we passed through a regular field of them. On that occasion various

*Collected by Mr. W. H. Noble.

species were observed, and many specimens were nearly a foot in diameter.

A few days afterwards I scooped up another Cœlenterate, very different from the Medusa, but equally as beautiful. This was a species of Ctenophore.* It was of a transparent white colour, with a red internal part, and bright yellow spots underneath.

The beautiful, but grotesque looking, Puffin or Sea Parrot (*Luna cirrata*, Pall), is frequently seen in Behring Sea. With its brilliant colours it suggests the ludicrous among birds, almost as much as the mandrill does among mammals. The head is white with yellow tufts, the bill green and red, the legs red, and the general colour of the body black.

While on deck one night, when all was quiet, and it was calm, mild, and still on the sea, I heard the cry of a Murre—never heard by me before. It was a simple and single "mur" each time, coming from the distance, and at once revealed why the bird had been so named. The Murres (*Uria*) of which there are a number of species inhabiting both the Atlantic and Pacific are dark coloured above and white below, and are frequently to be see in the Behring Sea, either on the wing or resting on the surface of the water. I saw one one day when hundreds of miles from land, on the surface of the waves with her brood, which consisted of a single young one; for the Murre lays only one egg at a time. Countless thousands, however, of these birds congregate together among the rocks during the breeding time, so that Murres' eggs have considerable commercial value. In large collections of the eggs the most varied ground colours and markings are displayed: the ground colours are different shades of white, different shades of green, bluish, grayish, earthy: the markings are spots, blotches, and zigzag lines of brown, black, or lilac: occasionally eggs are devoid of markings.

At times I have seen great numbers of sea-birds, when out in a boat on the open sea. On one such occasion hundreds of

*The Cœlenterata are divisible into the Hydrozoa and the Actinozoa—the Medusæ belong to the former, and the Ctenophora, along with Corals, Anemones, &c, to the latter.

Gray Fork-tailed Petrels (*Oceanodroma furcata*, Gmel.) were seen resting on the bosom of the water, also an occasional Murre flying past and three Terns hovering about over head.

The Terns were particularly beautiful : the head was black on the top, the back ashy grey, the breast pure white, the tail forked. I was attracted to them by the cry. I was further unabled to examine this tern, as one example came on board towards night-fall, and I had it in my hand. There was a white mark along the crown of the head, and I would have pronounced it the Aleutian Tern (*Sterna aleutica*, Baird), except that the bill was orange on the under mandible, and Coues says the bill of that species is black. The feet were also orange : the hallux small and well set behind the tarsus. It was seemingly a young bird and tired, and so had sought a resting place on the deck of the vessel. I took it down to the cabin and put it on the table, where it dressed its feathers with its bill and pecked at my finger. I then released it. Away it soared, far up into the air, the wind and the waves congenial, far distant from the land.

ANDREW HALKETT.

Ottawa, 30th June 1898.

LIQUID HYDROGEN

A notable event in the history of chemistry is being chronicled in the scientific journals. At the meeting of the Royal Society (England) on the 12th may last. Professor Dewar, a chemist eminent by reason of his successful research work at low temperatures, announced that by means of special apparatus, a pressure of 180 atmospheres and a temperature of -210 degrees C. he had liquefied hydrogen. It has only been within the the last few years that oxygen, nitrogen and air have been liquefied ; the liquefication of hydrogen and helium, the last of the so-called permanent gases, is now an established fact.

The apparatus for this achievement, says Dr. Dewar, " took

a year to build, and many months were occupied in testing and making preliminary trials." Success attended the experiment made on May 10th when hydrogen gas at a temperature of -205 degrees C. and under a pressure of 180 atmospheres "was allowed to continuously escape from the nozzle of a coil of pipe at the rate of 10 to 15 cubic feet per minute, in a vacuum vessel doubly silvered and of special construction, surrounded with a space kept below -200 degrees C." Under these conditions liquid hydrogen began to form in drops, until in five minutes there were about 20 c.c. of liquid hydrogen. Further liquefaction was prevented by "the solidification of the air in the pipes of the apparatus, closing the orifice of the hydrogen jet." It is thus evident that air freezes at a temperature higher than that at which hydrogen becomes a liquid.

Liquid hydrogen, according to Professor Dewar, is colourless and clear, with a high refractive index and a density evidently greater thau that ascribed to it by theory, namely, .10 to .12. Its boiling point had not then been determined, but that it is excessively low was proved by immersing in the liquid hydrogen the closed end of a glass tube containing air. The tube as far as it was immersed became filled with solid or frozen air. A further experiment made by Professor Dewar in this connection was the liquefaction of helium (a recently discovered element) by placing in liquid hydrogen a sealed tube containing this hitherto considered permanent gas

This highly interesting and valuable paper goes on to state that chlorine was liquefied by Faraday in 1823, that sixty years afterwards, Wroblewski and Olszewski produced liquid air and that now fifteen years later the two last of the gaseous elements to baffle efforts at liquefaction had been obtained as static liquids.

Professor Dewar concluded by saying that "with liquid hydrogen as a cooling agent, a temperature could be reached within 20° or 30° of the zero of absolute temperature, and its use would open up an entirely new field of scientific enquiry. Nobody could predict the properties of matter near that zero."

F. T. S.

BIRD NOTES FOR JUNE.

EDITED BY W. T. MACOUN.

By the time June has arrived most of the birds which come to Ottawa have put in an appearance, so that there are never many new records for that month. Those birds which are noted for the first time had probably been here for some days, but were not seen previously this year. Mr. F. A. Saunders has done very good work during the month of June, and had he not kindly furnished us with his records, there would have been but few bird notes for this month. He was fortunate enough to add two new species to the list of Ottawa birds, namely, the Short-billed Marsh Wren (*Cistothorus stellaris*), and the Grasshopper Sparrow (*Ammodramus savannarum passerinus*).

The following observations were made by Mr. Saunders:

June 11—American Sparrow-hawk, *Falco sparverius.*

" 11—Pine Warbler, *Dendroica vigorsii.* A pair breeding at the Experimental Farm.

" 11—Canadian Warbler, *Sylvania canadensis.* Breeding in Dow's Swamp and elsewhere.

" 11—Long-billed Marsh Wren, *Cistothorus palustris.* Common near the canal.

" 12—Mourning Warbler, *Geothlypis philadelphia.* Seems to be getting much commoner. Breeds in Dow's Swamp and elsewhere.

" 13—Least Bittern, *Botaurus exilis.* A pair, doubtless breeding, in marsh at Experimental Farm.

" 13—Sora (Carolina Rail) *Porzana carolina.*

" 14—Winter Wren, *Troglodytes hiemalis.* Dow's Swamp.

" 14—Water Thrush, *Seiurus noveboracensis.* Dow's Swamp. Breeds regularly in same place.

" 14—Red-breasted Nuthatch, *Sitta canadensis.* Dow's Swamp.

" 15—Olive-sided Flycatcher, *Contopus borealis.* Mer Bleue.

" 15—Yellow Palm Warbler, *Dendroica palmarum hypochrysea.* Mer Bleue. Common.

" 15—Short-billed Marsh Wren, *Cistothorus stellaris.* One seen in Mer Bleue. June 17, two seen and one shot. This is a new species for Ottawa.

" 16—Parula Warbler, *Compsothlypis americana.* Chelsea.

" 24—Grasshopper Sparrow, *Ammodramus savannarum passerinus.* One seen beyond Hull on the 24th, doubtless breeding. Seen in rear of Experimental Farm on 26th and 27th, and one shot on the 28th. This is another addition to Ottawa's bird list. The Grasshopper Sparrow was not taken previously nearer than the St. Clair Flats.

BIRDS' NESTS AND BREEDING PLACES.

PRAIRIE HORNED LARK—On the 8th of June a nest of the Prairie Horned Lark was found in the arboretum at the Experimental Farm by Mr. Macoun. The nest was in a hole in the lawn and contained three eggs. Young fledged birds were flying about at the time.

BROWN THRASHER—A Brown Thrasher's nest was found by Mr. Macoun in the arboretum at the Experimental Farm on the ground on the 16th of June. The nest contained three eggs and was built at the base of a climbing honeysuckle. Later the nest contained four eggs.

MARYLAND YELLOW-THROAT.—On the 22nd of June a nest, containing three young and one egg, was found by Mr. Macoun at the Mer Bleue. The nest was at the base of a small shrub. On the 23rd a nest was found in Dow's Swamp at the foot of a plant of Meadow Rue, with four young, apparently but recently hatched.

AMERICAN BITTERN—Miss Harmer reports that Prof. Macoun found a nest with three young, half-grown, at Moore's Landing on the 25th. The nest was in a tuft of marsh grass.

NASHVILLE WARBLER—Breeds in Dow's Swamp, Mer Bleue, Chelsea, etc. Mr. Saunders.

BLACK-THROATED BLUE WARBLER—June 16th. Breeding in the grove at Chelsea and in hard woods northward.

BLACKBURNIAN WARBLER—June 24th. Breeding in the grove at Chelsea Mr. Saunders. At Moore's Landing. Miss Harmer.

YELLOW-BELLIED FLYCATCHER—June 15th. A nest found in Mer Bleue with young. June 24th. A nest found at King's Mountain with young, Mr. Saunders.

The following notes of birds seen at Long Island, Lake Erie, were sent by Mr. L. J. Boughner: *Corvus americanus*, June 1st; *Gallinago delicata*, 1st; *Icterus galbula*, 1st; *Megascops asio*, 2nd; *Colymbus auritus*. 4th; *Ægialitis vocifera*, 4th; *Zenaidura macroura*, 4th; *Colaptes auratus*, 3rd; *Petrochelidon lunifrons*, 3rd; *Spizella socialis*, 5th; *Urinator arcticus*, 6th; *Ceryle alcyon*, 9th; *Melospiza fasciata*, 10th; *Agelaius phœniceus*, 11th; *Melanerpes erythrocephalus*, 10th; *Larus argentatus*, 13th; *Anas obscura*, 11th; *Antrostomus vociferus*, 14th; *Dolichonyx oryzivorus*, 13th; *Podilymbus podiceps*, 17th; *Botaurus lentiginosus*, 17th; *Aix sponsa*, 17th; *Clivicola riparia*, 17th; *Sayorhis Phœbe*, 20th; *Poocætes gramineus*, 21st; *Sialia sialis*, 21st; *Galeoscoptes caroliniensis*, 21st; *Tyrannus tyrannus*, 23rd; *Tachycineta*

bicolor, 27th ; *Urinator imber*, 28th ; *Bonasa umbellus*, 28th ; *Haliæetus leucocephalus*, 29th ; *Arden herodias*, 29th ; *Grus americana*, 29th ; *Trochilus colubris*, 30th.

FRESH WATER FOUND BY BORING IN GRANITE AND OTHER HARD CRYSTALLINE ROCKS.

Sir Clements Markham, K.C.B., President of the Royal Geographical Society of London, draws attention* to a remarkable discovery recently made by Baron Nordenskjold, viz :— that fresh water will be found by boring through hard crystaline rocks to a depth of from 30 to 35 metres, *i.e.*, from 100 to 120 feet.

The practical utility of this fact becomes very apparent in a country like Canada, where Archæan rocks are so extensively developed, and especially so on islands or isolated areas where fresh water does not readily flow at the surface.

As early as 1867, in his "Sketch of the Geology of Spitzbergen Island," Stockholm, Baron Nordenskjold gave the results of a series of observations from borings in rocks of Carboniferous Age capped by others of Tertiary Age, the latter being quite folded and disturbed, the former having alternating bands of plutonic rocks interstratified with them. In attempting to account for the crumpling of the Tertiary rocks by means of an almost imperceptible but nevertheless continually operating force, he points out that differences of temperature at different times of the year are sufficient to cause dislocation of the strata, and " it should not surprise us," he goes on to say, " to find even the newest formations greatly folded, while older formations in the vicinity may be quite undisturbed." These facts taken into consideration with the general occurrence of cracks and fissures in all rock formations, he argued that in all solid rocks at an insignificant depth below the surface a horizontal crack would generally exist.

A series of borings was carried on in Scandinavia under the Baron's supervision, with results that have more than fully justified the hypothesis and stand he took, and warranted the expenditure of moneys in boring in the hard solid granite rocks on isolated areas and islands off the coast of Norway, leading to the discovery of fresh water at depths from 30 to 35 metres from the surface.

He had ascertained on enquiry, that the water and springs from mines and openings below or near the sea coast, was fresh rather than salt or brackish.

*The Geographical Journal, Vol. X, pp. 465.469, Nov., 1897.

The first boring undertaken in hard crystalline rocks was on the little island of Svangen, in 1891, south of Kosterfjorden. This was abandoned "because a long crack was arrived at extending from the sea to the boring-hole."

Baron Ruuth, General Director for Pilots, caused a second boring to be tried. It was at Arko, beyond Braviken in May, 1894, under the direction and supervision of Gustav Nordenskjold, the geologist Svenonius, and Director Casselli. "The rock consisted of hornblende, gneiss and diorite. As soon as a depth of 35 metres was reached they came to excellent water, yielding 450 litres an hour. The boring had a diameter of 64 millimetres." The water obtained was "perfectly clear."

At forty-four different stations water was thus obtained since the successful trial at Arko, and at Stockholm the temperature of the water reached in the bore-hole varies from 6° to 7° C. (about 43° to 75° Fahrenheit); Gelliavaara water, 13° C., or 55° Fahr.

"Baron Nordenskjold is convinced," says Sir Clements Markham, "that water will be found in the same way as in Sweden wherever hard close rock exists, with variations in temperature and not permeable."

In Canada where the Archæan gneisses, granites and diorites are so abundant, we find that the whole Archæan area is fairly teeming with flowing springs, even on the crests and brows of our Laurentide Hills. These springs or streams supply an innumerable quantity of fresh water for the numerous lakes which abound everywhere throughout our Archæan country as may be readily seen on examining the geological maps of Canada which include part of the Archæan complex.

I venture to throw out the suggestion, that, the presence of these cracks or fissures in the hard crystalline rocks of Canada is probably due to the variations in temperature to which the Archæan areas are subjected in coldest winter and warmest summer, or in the rapid and pronounced variations in temperature of alternating day and night.

Such an hypothesis appears to be in keeping with the views and facts advanced Baron Nordenskjold in Scandinavia, and the presence of such streams (many of them intensely cold in summer, indicating that they come from considerable depths) as issue from the cracks and crevices everywhere present, would account for the supply of a great deal of the fresh water in our great and small lakes. H.M.A.

METEOROLOGICAL OBSERVATIONS FOR OTTAWA, 1897.

B. C. Webber, Esq., Acting Director of the Meteorolgical Service, Toronto, Ont. in the absence of Dr. R. F. Supart, Dirictor, has kindly forwarded to the Club an abstract of the Meteorolgical observations taken at Otttawa, Canada for the year 1897, for publication in the OTTAWA NATURALIST.

The editorial s aff and members of the Club appreciate very highly the value of the annual abstract of these observations.

H. M. A.

Frequency of the Different Winds from Observations at 8 a.m., 3 and 8 p.m., Ottawa, 1897.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
January	15	16	6	8	6	11	28	3	0
February	3	9	17	9	5	15	16	10	0
March	3	4	22	2	5	16	23	14	4
April	7	7	8	4	12	18	18	16	0
May	11	6	15	5	12	14	18	12	0
June	12	1	11	7	11	11	19	18	0
July	6	8	27	11	12	5	16	6	2
August	5	6	10	1	9	21	25	14	2
September	15	9	7	2	15	15	11	15	5
October	6	10	19	2	9	15	8	15	9
November	2	11	19	1	9	9	21	17	1
December	9	8	22	3	3	10	22	11	5
Year	94	95	183	55	108	160	225	151	24

January 18—Stormiest day of year, mean velocity 27.3 miles per hour.
" 19—Coldest day of year, mean temperature—13°.0.
March 14—Heaviest snow storm of year, depth 6.5 inches.
" 20—First thunder of year.
April 27—Last snow of season.
" 27—Last frost of season.
July 8—Warmest day of year, mean temperature 83°.85.
Aug. 10-11—Heaviest rain storm of year, depth 1.20 inches.
Sept. 28—First frost of season.
October 8—Last thunder.
Nov. 9—First measurable snow, a few flakes on previous day.
Dec. 2—First record below zero—4°.3.

Abstract of Meteorological Observations at Ottawa for the Year 1897.

	Month.												Year.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Average height of barometer at 32 and reduced to sea level	30.108	30.135	30 083	30.073	29.756	29.931	29.948	29.962	30.159	30.162	30.070	30.083	30.056
Highest barometer	30.838	30.764	30.912	30.645	30.458	30.220	20.305	30.256	30.445	30.684	30.605	30.623	30.912
Lowest barometer	29.472	29.590	29.198	29.471	29.595	29.673	29.634	29.573	29.680	29 598	29.227	29.388	29.198
Monthly and annual ranges	1.366	1.174	1.714	1.174	0.863	0.553	0.731	0 683	0 765	1.086	1.578	1.235	1.714
Average temperature of air (Fah.)	13.69	17.27	24.82	43.11	54.55	62.02	72.35	61.07	59.42	47.67	29.92	17.49	42.20
Difference from average	+4.10	+6 57	+3.02	+2.81	0 35	−2.28	+2.85	−0 93	−2.28	+3.97	−1.78	+0.49	+1 35
Highest temperature	45.5	40.0	49.9	77.0	76 0	84 0	97.2	85.2	92 0	85 0	54.0	45.0	97.2
Lowest temperature	−25.1	−12.0	−18.0	13.2	33.5	36 8	55 2	42.2	32.3	22.2	6.8	−15.6	−25.7
Monthly and annual ranges	71.2	52 0	67.9	63.8	42.5	47.2	42.0	43 0	59.7	42.8	47.2	60.6	122.9
Average maximum temperature	22.1	26.1	33.2	53.9	65 0	72.6	82.2	74.3	71.1	59.0	36.3	25.4	51.8
Average minimum temperature	5.3	8.5	16.5	32.3	44 1	51.4	62.5	52.8	47 7	36.3	23.6	0.6	32 6
Average daily range	16 8	17.6	16.7	21.6	20 9	21.2	19.7	20.5	23.4	22.7	12.7	15.8	19.2
Average pressure of vapour	0 085	0 092	0.129	0 272	0.299	0.377	0.611	0.479	0.381	0.247	0 158	0.102	0.268
Average humidity of the air	83	81	81	83	67	65	74	74	66	70	84	87	76
Average temperature of dew point	12.4	16 5	24 0	42.5	45 0	51.2	64 7	57.8	51.6	39.9	25.5	17.0	37 4
Amount of rain in inches	0.38	0.35	1.51	1.62	1.31	3.03	5.21	3.40	0 45	0 69	2.19	1.84	23 98
Differefice from average	−0.12	−0.42	+0.71	+0 10	+0.88	+0.11	+1.86	+0.25	−1.89	−1.86	+0.52	+1.14	+1.28
Number of days of rain	3	2	7	10	13	14	13	13	6	6	8	4	99
Amount of snow in inches	15.5	15.7	28.6	2.0	.....	.....	.....	.....	.....	.....	5.8	22. 9	90.5
Difference from average	−9.2	−6.9	+11.6	−2.5	.....	.....	.....	.....	.....	.....	3.3	+1.0	−9.3
Number of days of snow	7	8	6	3	.....	.....	.....	.....	.....	.....	3	10	40
Percentage of sky clouded	61	60	58	61	64	66	57	54	42	48	66	72	60
Number of days completely clouded	12	10	17	11	12	12	12	10	5	9	16	21	146
Average velocity of wind (miles)	7.3	7.1	6.6	9.3	7.3	7.0	5.2	6.3	6.1	7.0	9.3	6.2	7.1
Number of auroras	0	0	0	0	0	0	0	0	0	1	0	0	1
Number of thunder storms	0	0	1	1	2	1	3	0	0	1	0	0	9
Number of fogs	0	0	0	0	0	0	0	0	0	4	1	0	5
Number of days without rain or snow	18	14	15	15	17	14	16	17	24	23	18	19	211

Days of rain or snow only reckoned when 0.01 inch or over fell.

THE OTTAWA NATURALIST.

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THE CRYPTOGAMIC FLORA OF OTTAWA.

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

Continued from the June Number.

360. **Pertusaria communis**, DC.

On bark of old trees. On maple trees in Stewart's Bush near the C.A.R. track, April 12th, 1898; on beech trees in woods one mile south-east of Billings' Bridge; on old fence rails along the Richmond Road west of Hintonburgh; on trees in woods west of Hull; on trees in woods at Leamy's Lake; on trees and old logs, Aylmer and King's Mountain.

361. **Pertusaria velata**, (Turn.)

On an ash tree in a swamp, Britannia, April 20th, 1895; on beech trunks, "Pine Hill," Rockcliffe Park; on old rails near Aylmer and at the base of King's Mountain; on butternut trees along the Aylmer Road west of Hull.

362. **Pertusaria leioplaca** (Ach.)

On beech trees in woods at Buckingham, Que., May 14th, 1896.

363. **Pertusaria Wulfenii**, DC.

On beech trees in woods, Rockcliffe Park, April 21st, 1891; on the base of beech trees in woods one mile south-east of Billings' Bridge; on beech trees in woods west of Hull Station; also on beech trunks near Leamy's Lake.

XXII. CONOTREMA, Tuckerm.

364. **Conotrema urceolatum**, (Ach.) Tuckerm.

On bark of bitter nut hickory in woods north of the Aylmer Road and west of Hull, Oct. 4th, 1884.

XXIII. GYALECTEA, (Ach.)

365. **Gyalectea lutea**, (Dicks.) Tuckerm.

On the bark of hemlock trees in woods north of Beechwood Cemetery, April 27th, 1892.

XXIV. THELOTREMA, (Ach.)

366. **Thelotrema lepadinum**, Ach.

On black ash trees in a swamp west of the entrance to Beechwood Cemetery, Oct. 16th, 1884.

XXV. STEREOCAULON, Schreb.

367. **Stereocaulon paschale,** (Ach.)

Abundant on damp shingle along the C. P. R. west of Britannia, April 20th, 1895 ; on boulders in pastures, Ottawa East, and almost everywhere around Ottawa ; on boulders around Hull, quite common ; also on boulders near the Catholic Cemetery, Hull ; on boulders in fields at Stittsville ; on boulders at King's Mountain.

XXVI. CLADONIA, Hoffm.

368. **Cladonia alcicornis,** Flœrk.

On limestone boulders, in shade, south of the Aylmer Electric Railway and west of the C. P. R., Hull, Que., April 27th, 1895 ; on earth on stones along Brigham's Creek ; on limestone rocks between Aylmer and King's Mountain.

369. **Cladonia mitrula,** Tuckerm.

On earth at the base of pine stumps west of Britannia, Oct. 11th, 1890.

370. **Cladonia cariosa,** Flœrk.

On earth on stones by a fence, Ottawa East, April 14th, 1897 ; on earth at the base of a stump in woods, Leamy's Lake ; on old rails near Aylmer.

371. **Cladonia pyxidata,** Fr.

On earth, rocks, old logs and old fence rails. Old rails, Stewart's Bush, April 12th, 1895 ; on boulders, earth and old stumps, Rockcliffe Park ; common on earth and pine stumps at Britannia ; on old pine logs and limestone rocks, Aylmer Road, Hull, Que. ; on boulders, borders of Dow's Swamp ; on boulders, Ottawa East and Billings' Bridge ; on boulders along Brigham's Creek ; on old rails and stones near Aylmer.

372. **Cladonia fimbriata,** (L.) Fr.

On pine stumps, "Pine Hill," Rockcliffe Park, April 14th, 1895 ; on cedar stumps in Dow's Swamp ; and also in a swamp east of Beechwood Cemetery ; on the base of stumps in woods west of Hull Station ; on the base of stumps in a swamp at Stittsville ; on old rails near Aylmer and King's Mountain.

373. **Cladonia fimbriata** var. **tubæformis,** Fr.

On pine stumps and old pine logs at Rockcliffe Park, April 17th, 1895 ; on pine logs and stumps at Britannia ; on rotten pine logs and stumps south of the Aylmer Road, west of Hull, Que. ; on old logs in Dow's Swamp ; on dead wood in woods near Leamy's Lake ; on old logs in a swamp at Stittsville ; on old rails near Aylmer and King's Mountain.

374. **Cladonia gracilis**, var. **verticillata**, Flœrk.

Quite common on earth at Britannia, along the Can. Pac. Railway west of the station, April 20th, 1895; on boulders in woods, Rockcliffe Park; on earth in woods at Leamy's Lake.

375. **Cladonia gracilis**, var. **hybrida**, Schær.

On pine stumps and earth; common. Pine stumps, Rockcliffe Park, April 17th, 1895; on earth and pine stumps at Britannia; on old pine logs and stumps at Stittsville and Carleton Place, and on the same at Aylmer; on earth in woods, Leamy's Lake; on old rails and logs near Aylmer.

376. **Cladonia gracilis**, var. **elongata**, Fr

On old pine logs in a swamp at Stittsville, May 14th, 1897.

377. **Cladonia squamosa**, Hoffm.

On old pine stumps at Britannia, April 20th, 1895; on the base of a stump in woods, Leamy's Lake.

378. **Cladonia furcata**, var. **crispata**, Flœrk.

A small clump on a pine stump a mile west of Britannia, April 20th, 1895; on old pine logs south of Aylmer Road, west of Hull; on damp earth in woods along the cliff, Rockcliffe Park, May 7th, 1896.

379. **Cladonia furcata**, var. **racemosa**, Flœrk.

On old logs in woods in Rockcliffe Park; also on pine stumps at Britannia, April 20th, 1895.

380. **Cladonia rangiferina**, (L.) Hoffm.

On pine stumps in Rockcliffe Park, April 17th, 1895; on earth and pine stumps at Britannia; on old logs and stumps in a swamp at Stittsville; on old stumps at Carleton Place; on old logs and stumps in a swamp east of Beechwood Cemetery; on old pine stumps and logs, Aylmer Road, west of Hull; on old logs and earth, King's Mountain.

381. **Cladonia rangiferina**, var. **alpestris**, L.

On rotten pine stumps at Britannia, April 20th, 1895.

382. **Cladonia uncialis**, (L.) Fr.

On rocks on the island at Gilmour's Mill, Chelsea, Que., May 15th, 1896; on the summit of King's Mountain.

383. **Cladonia delicata**, (Ehrh.) Flœrk.

On rotten pine stumps at Britannia, April 20th, 1895; not uncommon on old pine logs in woods close to the Can. Pac. Railway bridge west of Hull; on the base of stumps in woods at Buckingham, Que.; on an old pine log in a swamp at Stittsville.

384. **Cladonia deformis**, (L.) Hoffm.

On a pine stump at Britannia; very rare. April 20th, 1895; on an old stump in a swamp at Stittsville; in a swamp near Lake Flora, Hull, Que.; on earth slopes of King's Mountain.

385. **Cladonia digitata**, (L.) Hoffm.

On an old pine stump about a mile west of Britannia, April 20th, 1895 ; on old pine logs south of the Aylmer Road, west of Hull.

386. **Cladonia cristatella**, Tuckerm.

On cedar rails and pine stumps and old logs in Stewart's Bush, April 12th, 1895 ; on old pine stumps, Rockcliffe Park ; very common on pine stumps at Britannia ; on dead pine logs and stumps at Aylmer, Que. ; on logs in a swamp east of Belleville ; on stumps and old logs at Stittsville ; on logs and stones in woods near Leamy's Lake ; on old stumps and pine logs near Aylmer.

XXVII. BÆOMYCES, (Pers.) DC.

387. **Bæomyces æruginosus**, (Scop.) DC.

On dead pine wood in cool woods In woods at Meeche's Lake, Que., Sept. 23rd, 1893 ; in woods at Buckingham, Que., May 14th, 1896.

XXVIII. BIATORA, Fr.

388. **Biatora rufo-nigra**, Tuckerm.

On limestone rocks in Rockcliffe Park, April 17th, 1895.

389. **Biatora granulosa**, (Ehrh.) Pœtsch.

On carbonized wood on dead pine stumps one mile above Britannia, April 20th, 1895 ; on burnt logs, King's Mountain.

390. **Biatora rubella**, (Ehrh.) Rabenh.

On bark of maple and ash trees at Stewart's Bush near the Car. Atlantic Railway, April 12th, 1895 ; on ash trees in a swamp at Britannia ; on black ash, white cedar and maple, Aylmer Road, west of Hull ; also on oak bark in Rockcliffe Park ; on trees in a swamp at Stittsville ; on trees in woods at Leamy's Lake, near Hull ; on black ash in a swamp near Hintonburgh, April 18th, 1896.

391. **Biatora fusco-rubella**, (Hoffm.)

Near the base of black ash trees in Stewart's Bush near Canada Atlantic Railway, April 12th, 1895 ; on balsam poplar bark in woods south of the Aylmer Road west of Hull ; on beech trees in woods at Buckingham, Que., May 14th, 1896 ; on black ash east of Beechwood Cemetery, and west of Hull Station ; on the base of young maples in woods, Rideau Park, April 19th, 1897.

392. **Biatora suffusa**, Fr.

On the base of black ash trees in Stewart's Bush near Canada Atlantic Railway, April 12th, 1895 ; on bark of black ash, Aylmer Road, west of Hull ; on basswood bark, Dow's Swamp ; on beech trees in woods near Leamy's Lake ; on black ash bark in the swamp west of Hull Station, Que., April 24th, 1897.

393 **Biatora Schweinitzii**, Fr.

On spruce, pine and beech trees in woods at Rockcliffe Park, April 17th, 1895 ; on white cedar in Dow's swamp ; on old fence rails along the Richmond Road west of Hintonburgh, April 18th, 1896 ; on cedar bark in a swamp at Stittsville ; on spruce trees in woods west of Hull, Que., May 7th, 1892.

394. **Biatora sanguina-atra**, Fr.

On moss on the base of trees in Dow's Swamp; May 2nd, 1896 ; on earth at the base of trees along the cliff in Rockcliffe Park, April 22nd, 1896 ; on moss in woods west of the Beaver Meadow, Hull, Que., Oct. 20th, 1884.

395. **Biatora varians**, Fr.

On bark of young maples at Casselman ; and at Aylmer, Que., May 5th, 1891 ; on alder bark in Dow's Swamp, May 2nd, 1892.

396. **Biatora oxyspora**, (Tul.)

On *Parmelia Borreri* in McKay's Woods, near the Lake, April 23rd, 1891.

397. **Biatora Laureri**, (Hepp.)

On the bark of dead and living beech trees in woods near McKay's Lake ; on beech trunks, "Pine Hill," Rockcliffe Park, April 16th, 1896.

398. **Biatora sphæroides**, (Dicks.)

On roots of trees at Ottawa, 1884 ; on the bases of trees in woods at Carleton Place, May 12th, 1892 ; on moss on rock at Rockcliffe Park, May 7th, 1896,

399. **Biatora hypnophiba**, Turn.

On moss on rocks or rails. On moss on damp rocks, Rockcliffe Park, April 16th, 1891 ; also on moss on an old log in Beechwood Cemetery, April 14th, 1896.

400. **Biatora Macounii**, Eckfeldt. (N. sp.)

On granite boulders in woods at Rockcliffe Park, April 17th, 1895 ; also on boulders in woods south of the Aylmer Road, Hull, Que., April 27th, 1895.

XXIX. HETEROTHECIUM, Flot.

401. **Heterothecium pezizoideum**, (Ach.) Flot.

On moss on the base of a tree at Carleton Place, Oct. 21st, 1891.

XXX. BUELLIA, De Not.

402. **Buellia parasema**, Ach.

Not uncommon on the bark of growing pine trees. In McKay's Woods and "Pine Hill," Rockcliffe Park, April 20th, 1891 ; on young

pines, along the Ottawa River west of Hull, Que. ; on pines, at King's Mountain, near Chelsea, Que ; on ash trees in a swamp north of Beechwood Cemetery, April 27th, 1892 ; on trees in a swamp at Stittsville, May 14th, 1897.

403. **Buellia myriocarpa,** (DC.)

On old fence rails ; doubtless common. On stones in fields near Britannia. April 20th, 1895 ; on old fence rails in McKay's Woods, quite common. April 23rd, 1891 ; on old rails at Stittsville, May 14th, 1897 ; also at Buckingham, Que ; on old fence rails near Hintonburgh, April 18th, 1896.

404. **Buellia papillata,** (Sommerf.) Tuck.

On moss on old fence rails at Carleton Place, Oct. 11th, 1889.

405. **Buellia Pertusaricola,** Willey.

On the bark of aspen poplar, but parsitic on *Pertusaria communis* n woods by the Beaver Meadow near Hull, Que., Oct. 16th, 1889.

XXXI. GRAPHIS, Ach.

406. **Graphis scripta,** (Ach.)

Very commom on trunks of all kinds in woods around Ottawa. On black cherry, beech, maple and oak bark at Aylmer, May 6th, 1891 ; on butternut, birch and beech at Hull, Que., April 28th, 1891 ; on maple, basswood and ironwood in Beechwood Cemetery, April 26th, 1892 ; on balsam fir at Stittsville, May 14th, 1897 ; on blue beech at Leamy's Lake, Hull, Que. ; also abundant on trees at King's Mountain, Chelsea, Que., May 22nd, 1897 ; on alder trunks in Dow's Swamp ; also in Rideau Park, April 19th, 1897.

407. **Graphis recta,** Humb.

Not uncommon on the bark of yellow and canoe birch in woods. In woods along the Beaver Meadow, Hull, Que., May 16th, 1896 ; also on the same at Buckingham, Que., May 14th, 1896.

XXXII. OPEGRAPHA, Humboldt.

408. **Opegrapha varia,** Pers.

On butternut bark in woods along the Aylmer Road west of Hull, Que., April 23rd, 1891 ; also on cedar bark at King's Mountain, near Chelsea, Que., May 22nd, 1897 ; on cedar bark in Dow's Swamp, May 2nd, 1897.

XXXIII. ARTHONIA, Ach.

409. **Arthonia astroidea,** Ach.

On bark, quite common in woods around Ottawa. On bark of *Juglans cinerea* in woods along the Aylmer Road west of Hull, Que., April 28th, 1891 ; on *Abies balsamea* and young pines in Dow's Swamp, April 23rd, 1892 ; in woods near Aylmer, Que.

410. **Arthonia Swartziana,** Ach.

Not uncommon on oak and ironwood trees near Aylmer, Que., May 6th, 1891 ; on maple trees at King's Mountain, near Chelsea, Que., May 22nd, 1897.

411. **Arthonia lecideella,** Nyl.

On various young trees and shrubs. On *Acer spicatum* at Aylmer, Que., May 6th, 1891 ; quite common on young *Acer rubrum* in Stewart's Bush and Rideau Park ; on young maple trees at Buckingham, Que., May 14th, 1896 ; on young red maples near Hintonburgh, April 18th, 1896.

412. **Arthonia spectabilis,** Flot.

On thick bark of old trees ; common. on basswood and sugar maple bark at Carleton place, May 7th, 1882 ; on bark of *Carya amara* in woods west of Hull, Que., September 21st, 1889 ; on old maples at Casselman ; on *Juglans cinerea* at Aylmer, Que., May 6th, 1891 ; on maple trees in Rideau Park, near Billings' Bridge, April 19th, 1897.

413. **Arthonia tædiosa,** Nyl.

On young beech and maples, at Buckingham, Que., May 14th, 1896.

414. **Arthonia dispersa,** (Schrad.) Nyl.

On bark of young sugar maples at Ottawa. Collected in Beechwood Cemetery, April 16th, 1892.

XXXIV. MYCOPORUM, (Flot.) Nyl.

415. **Mycoporum pycnocarpum,** Nyl.

On oak bark in woods by the lake near Aylmer, May 6th, 1891 ; also on bark of young *Acer rubum,* at Britannia, April 20th, 1895.

XXXV. CONIOCYBE, Ach.

416. **Coniocybe furfuracea,** (L.) Ach.

On the roots of trees in woods. On earth on pine roots in woods north of Ironsides, Que., Sept. 16th, 1891 ; on roots of trees in Dow's Swamp, Oct. 12th, 1887.

XXXVI. CALICIUM, Pers.

417. **Calicium subtile,** Fr.

On dead cedar stump in Dow's Swamp, Sept. 26th, 1891.

XXXVII. ENDOCARPON, Hedw.

418. **Endocarpum, fluviatite,** DC.

On stones in the Beaver Meadow Brook below the C. P. Ry. bridge near Hull Station, Que., April 24th, 1897 ; on rocks in a brook

at Meeche's Lake, near Chelsea, Que., Sept. 23rd, 1893 ; on limestone rocks, close to the Ottawa River, Gatineau Ferry, Rockcliffe, Nov. 12th, 1896.

XXXVIII. TRYPETHELIUM, Spreng.

419. **Trypethelium virens**, Tuck.

On beech trunks on "Pine Hill" in Rockcliffe Park, and Beechwood Cemetery, April 26th, 1891 ; on beech trees at Casselman, and at King's Mountain near Chelsea, Que., May 22nd, 1897.

XXXIX. PYRENULA, (Ach.)

420. **Pyrenula punctiformis,** (Ach.)

On bark of trees at Carleton Place, May 12th, 1892 ; on maple trees near Hintonburgh, April 18th, 1896 ; on trunks of sugar maple, "Pine Hill," Rockcliffe Park, April 16th, 1896.

421. **Pyrenula gemmata**, (Ach.)

On old maple trunks in McKay's Woods near the lake, April 16th, 1891.

422. **Pyrenula mamillana**, (Ach.)

On bark of maple trees in old woods, Carleton Place, May 12th, 1892.

423. **Pyrenula nitida**, Ach.

Quite common on beech trunks around Ottawa. On beech trees in Rockcliffe Park and McKay's Woods, April 26th, 1891 ; on beech trees at Moose Creek and Casselman, Sept. 6th, 1891 ; on trees at Aylmer, Que., May 6th, 1891.

424. **Pyrenula thelena**, Ach.

On canoe birch in woods along the Beaver Meadow, Hull, Que. April 24th, 1897.

425. **Pyrenula fallaciea**.

On bark of young maples at Chelsea, Que., May 15th, 1891.

426. **Pyrenula cine**.

On young maple trees at Ottawa, May 7th, 1892.

VEGETATATION IN THE BEMUDAS.—PART. I. TREES

By H. B. Small, Esq., Ottawa, Canada.

Bermuda, locally called the "Land of the Lily and the Rose," presents an aspect of shelving cedar, sloping hills green with verdure, and shimmering under a southern sun, with a misty haze of violet hovering over all. For the horizon there is a sea of emerald hue, shading at times to turquoise blue, whilst purple patches show the coral shoals and reefs, with ever and anon the white sails of a fishing boat flashing in the sunlight. It may be styled a land of sleep, of rugged gorge, of sheltering valley. Vegetation is profuse, and its growth is maintained by the very heavy dew nightly occurring, and which is so saturating that at sunrise it may be seen dropping from the foliage like rain. As a consequence trees, shrubs and plants attain a luxuriance unknown in more northern climes. The most abundant and universal tree is the Juniper (*Juniperus Bermudiensis*), known in the islands only as the Cedar. Its abundance everywhere makes it almost wearisome to the eye in its sombre monotony. It varies in size according to soil and situation. The wood is very durable and fragrant. The earliest records of parties wrecked, as far back as 1593, speak of the cedar, palmetto, mulberries and wild olives, "infinite store, with divers other unknown by name and nature." But there is in fact no reliable data or report respecting the arboreal or floral vegetation of these islands between these early records and the beginning of the present century. Helmsley, whose report on the botany of Bermuda in connection with the "Challenger" expedition is the best work of reference, says the botanical history of the islands really began in 1806, when Micheaux visited them. Helmsley thinks the native plants may be put down at from 140 to 150, and that a parallel is offered on the other side of the Atlantic by the flora of the Azores. He places the endemic flora of Bermuda as eight species, and adds to this that "weeds and chance species brought out in seed packages naturalize with facility, and

perhaps few places of so limited an area offer a greater variety, or so much to gratify a botanical observer."

The most abundant tree, next to the cedar, is the Fiddle-wood (*Citharoxylum Quadrangulare*), ornamental in its growth, its trunk or larger branches being cylindrical, valuable as a timber tree, and not unlike our beech, but of a more graceful growth. The Poinciana (*P. Regia*), originally a native of Madagascar, is one of the most graceful trees to be found on the islands. Its far and wide-spreading branches, peculiarly smooth and bare, closely resembling an elephant's trunk, with leaves one foot long, composed of from 12 to 18 pairs of leaflets, must be seen, rather than described, to be admired. It attains a height of some thirty feet. The Tamarind (*Tamarindus Indicus*) is another tree of striking appearance, attaining a large size, and with far spreading branches densely clothed with bright green leaves. The Galba (*Calophyllum Calaba*) is largely distributed, a tree with blunt, leathery, dark green leaves, very glossy. Although as a tree it attains a height of 30 feet, it has the peculiarity when trimmed young of branching from the ground and is sometimes grown as a hedge or wind brake. Very similar in appearance is a tree known as "White Cedars" a most misleading name as it has nothing in common with the Cedar family. It is the *Tecoma Pentaphylla*, and makes a handsome and ornamental tree in large grounds. The Loquat (*Eriobotrya Japonica*), bearing a small edible fruit is a handsome middle sized tree of dark green foliage, with blossoms very similar to our horse-chestnut. It is abundantly grown not only for its beauty as a flowering tree, but also for its fruit, somewhat resembling the smooth yellow tomato. The Seaside Grape, (*Coccoloba Uvifera*) another misnomer as it has nothing to do with the grape vine—is a tree from 10 to 30 feet high with large smooth shining leaves, almost round or heart shaped from 3 to 6 inches long and often broader, and of a very massive appearance. It probably takes its name from the fruit which is the size of and not unlike a grape and of a pleasant taste and purplish hue. The Alligator or Avocado Pear (*Persea Gratissima*)

forms a very handsome tree when standing out alone. The Pride of India, (*Melia Azedarach*) a large massive tree with lilac pendulous flowers flanks many houses, and is planted on the streets. But being deciduous, its leafless state and dried, and withered berries in contrast with the foliage all round, give it the appearance of a dead tree from November till March. The Mangrove (*Rhizopora Mangle*) is abundant along the lagoons, sending out from every branch secondary limbs which form new trunks and consequently dense thickets. The Mulberry (*Morus Rubra*) the Ailanthus, Banyan, Mahogany, and Calabash, with a variety of others are to be found, but with the exception of the Mulberry have been imported. Palms of every kind abound, and the row of Royal palms (*Oreodoxa Oleracea*) at Pembroke Hall some 70 feet high with a graceful feather-like plume of leaves at the summit are an object of admiration to all. The Palmetto (*Sabal Umbraculifera*) grows indigenous everywhere, some old specimens rising 20 and 30 feet in damp valleys, whilst on the rocks it is completely dwarfed. Its fruit or seed was used by the early settlers and the wild hogs fed largely thereon; the leaves were used as thatch for houses, and were woven into baskets; but with the exception of a few fans made from its bleached leaves the palmetto is now neglected. The Rubber Tree (*Ficus Elastica*) is not uncommon and presents a remarkable growth, branching out from the root with numerous sturdy branches clothed with long thick leathery leaves, the young buds of which are tipped with a reddish brown tinge. It attains a great height and covers a large expanse of ground with its spreading boughs. Although scarcely ranking as a tree, the Bamboo may claim the rank, as in sheltered places it (*Bambusa Arundinacea*) raises its rodlike stems 30 and 40 feet high, attaining at their lower joints the thickness of a man's thigh. The stem has slender branches of *solid growth* which bear leaves about six inches long. The cane terminates in a large tawny plume or panicle, which sways with every passing breeze.

With the exception of two or three species, there are no trees that may be called deciduous on the islands. Although not

evergreen in the true sense in which that term is applied in the North, they retain such a proportion of foliage during the winter season, that the leaves they shed are scarcely noticed. The Rubber Tree, although always green, sheds a large portion of its leaves in March, perhaps more noticeable from their size than with other trees ; but the new growth either forcing off the natural leaf, or supplying its place before the latter is shed, fills up the gap. Northern trees, which require by nature a period of rest, such as the apple, do not thrive, and degenerate very quickly. I omitted to mention above the Tamarisk (*T. Gallica*) which thrives along the shore, and is a favourite in exposed situations. It is never injured by the salt spray in storms, which quickly tells on other trees, and is used as a wind break largely along the North shore. The False Mangrove (*Aricennia Nitida*) is easily distinguished from the true Mangrove, with which it is is much intermixed, by its darker foliage. The two species form the Mangrove swamps, a well known characteristic of the tropics.

I have copious notes on the flowering shrubs and flora generally of Bermuda, which are reserved for a future article.

BIRD NOTES FOR JULY.

Edited by W. T. MACOUN.

The only notes for this month are those sent in by Mr. F. A. Saunders. In "Birds' Nests and Breeding Places" for June, "Yellow-bellied Flycatcher" should read Yellow-bellied Sapsucker. The only additions to the birds recorded this year were the Brown Creeper, July 3rd, and the Field Sparrow, July 4th ; seen by Mr. Saunders.

BREEDING NOTES.

Blackburnian Warbler.—Seen July 2nd and 3rd. Breeds commonly back of Low.

Magnolia Warbler, Parula Warbler.—July 2nd. Breed commonly back of Low.

Olive-backed Thrush.—July 2nd. Commonest thrush back of Low.

Field Sparrow.—July 4th. Near Kazabazua. Does not usually breed so far north.

NOTES ON THE FLORA OF LONG POINT ISLAND, LAKE ERIE, PROVINCE OF ONTARIO, CANADA.

By Leroy J. Boughner.

I arrived here about the middle of May and took up my residence at "the Bluffs." This is the most central part of the Point, and is situated on dry land. The island is about twenty miles long, the upper part of which is almost entirely marsh, while the eastern part is covered by dense forests of cedar and birch. These two trees are the most common on the island, although red cedar is a close second. Oak is very abundant and pine was originally, but was removed about thirty years ago. There are no hickory nuts, no chestnut, and but one tree each of beech and butternut. There is also a single representative of the nettle-tree, on Ryerson's Island. I am preparing a catalogue of the summer and autumn plants of the island which I shall send in the fall. Meantime my botanical notes will be brief. The commonest plant on the island is Indian Puccoon, *Lithospermum canescens*, Lehm. *Convolvulus sepium*, L., is also very common, principally about "The Cottage." *Epiphegus Virginiana*, Bart., is not infrequent and in abundance is about equalled by *Pogonia ophioglossoides*. *Calopogon pulchellus*, R. Br., is common on the southern side. *Utricularia vulgaris*, L., is of course common, but not so much as *U. Cornuti*, Michx. An ordinarily rare plant, Pin-drops, *Pterospora Andromedea*, Nutt., is so frequent on the island as to be almost termed common. I have found one specimen each of *Cypripedium parviflorum*, Salisb., and *C. arietinum*, R. Br. *Sparganium eurycarpum* and *Pontederia heteranthera* are very common, and I have found in great numbers flowers of *Lemna perpusilla*. I have observed carefully one remarkable fact of the island which seems to me to be such a remarkable instance of the adaptation of plants to insure cross-fertilization as to well merit the notice of the Club. On my arrival I perceived that the staminate flowers of the Common Meadow Rue, *Thalictrum dioicum*, were growing higher on the ridges and more to the eastward than the *pistillate*. The only explanation I could offer was that afforded by the winds which are almost invariably from the east when the Meadow Rue flowers.

A LITTLE BIRD EXPEDITION.

By F. A. SAUNDERS.

On July 16th the writer, in company with some hundreds of other excursionists, left Ottawa for Ste. Anne de Beaupré, not in the hope of being relieved of any bodily ailment, but for the prosaic reason that the trip was cheap, and would bring a lover of nature very easily to a part of the country where the fauna is more northern in character than ours at home. After a visit to that famous place of some few minutes duration only, the road east was taken, with shank's mare for a conveyance, and in due time the picturesque village of St. Joachim de Montmorency came in sight, standing just opposite the lower end of the Island of Orleans, and giving a fine view of both Mt. Ste. Anne and Cap Tourmente, the mountains which are visible down the river on a clear day from the terrace at Quebec, the latter being the first of the Laurentians below that point whose base is washed by the tides, and the one which, with the little chapel and cross on the summit, is so well seen from the deck of a passing steamer.

The next day was spent in climbing to the top of this hill, and the writer was so fortunate as to miss the main path and get entangled in a swamp in which there was such an abundance of bird life, and all of it so interesting that one knew not which way to turn or which bird to look at first. Here was surely the place where they make up those tourist parties of warblers that are at the same time such a delight to see and such a vexation to sort out in the fall migration. Blackburnian, Magnolia and Parula Warblers, and many commoner species came up from all sides to see who the intruder was,—a mutual inspection in which the birds had much the worst of the bargain, as they are perfect gems of colour and were that day in their very best Sunday plumage, which the writer certainly was not.

The climb proved to be a comparatively easy one after all, and repaid the climber in many ways, but chiefly by the view from the top, which was most impressive. Except for the mountains near by, and those bounding the horizon to the south (in

Maine) the whole country was spread out like a carpet under foot, the Citadel of Quebec itself seeming little higher than a footstool though forty miles away, and here with the eye delighted by the silent ships passing over the great blue floor of the St. Lawrence, and the ear greeted by a chorus of Olive-backed Thrushes and White-throated Sparrows, a very memorable hour was spent. The descent, though the good path deprived one of the pleasure of pioneering one's own way through unknown forests, proved interesting on account of the birds. Here were met mixed flocks of both kinds of Kinglets (the Golden-crested much the commoner of the two however) with the usual accompaniment of Nuthatches and Chickadees, and at one point an uncanny black-eyed owl fluttered clumsily from one branch to another, peering with much curiosity and a very human expression at the strange field-glass-eyed creature that confronted him, and the interest on the other side was even greater, as he proved to be a Barred Owl, a rarity almost anywhere, and like most owls very seldom met with in broad daylight. When his feelings became too much for an owl to bear, he relieved them with a yell not unlike the unearthly whining that greets the ear morning and evening from a siren-whistle in Hull, but with a human quality that made it seem the voice of some wild departed spirit,—a sound quite capable of making the chill run up a strong man's back, if he heard it at night and alone, not knowing its source. According to the books this is but one of the many calls of this owl, but neither my derisive imitation (though he eventually had the grace to answer it) nor any other noise I was capable of producing could induce him to express himself otherwise, nor could any jests change the expression of pained self-importance on the bird's face.

On the following day the writer tramped to Bay St. Paul over the road used daily by the mail wagon. This road goes up-hill for nearly seven miles from St. Joachim until, on turning around the shoulder of a high cultivated hill, a wide view is obtained both forward and behind, the latter being almost as fine as that from Cap Tourmente in the same direction. Then after crossing a great valley we plunge into unbroken forest from which we emerge after ten or twelve miles in a nearly straight line, up hill and down dale, and then travelling about as far

again, almost continually down hill, we enter the village of Bay St. Paul in the middle of its beautiful valley. This proved the most interesting day of the whole trip from an ornithological point of view, 52 species being observed. As soon as the forest was reached Pine Siskins and Kinglets became common, and a wild and varied canary-like song was, after much trouble, traced to the White-winged Crossbill which was found to be not uncommon throughout all that region, though difficult to identify on account of its preference for the highest perch available. A few warblers were singing, and of these the Black-throated Green, Magnolia, Blackburnian, Mourning, Nashville, Canadian and Black-throated Blue were the most prominent, while the rest of the warblers seemed to have already formed into mixed flocks, amongst which were found the Bay-breasted and Myrtle Warblers. A little group of Yellow-bellied Flycatchers answered readily to an imitation of their simple call-note (not unlike the Wood Pewee's); at one place a Blue-headed Vireo displayed great anxiety when the chirp of a young bird was imitated, and at a couple of others Hudsonian Chickadees were found and showed themselves to be the same little busy-bodies as their commoner cousins. This district would doubtless repay a long study, as the Canada Grouse, Canada Jay, Blackpoll warbler, the Three-toed Woodpeckers, and perhaps the American Crossbill might reasonably be expected to breed here, and there is always in addition the chance of some great rarity that every naturalist has one eye open for; and if the birds are so northern as this, no doubt the other branches of natural history would yield equally interesting results to collectors. The writer was on the lookout for the Gray-cheeked thrush also, but the only thrushes found were the Olive-backed, the Hermit and the Veery, the first-named being twice as common as both the others put together, and though every thrush that was convenient was coaxed into good view none were seen that had any trace of gray in the cheeks.

The rest of this short trip included walking as far as Murray Bay, but no furthur bird records of value were obtained. Kinglets, White-winged Crossbills and Pine Siskins were to be heard and seen about the hotel there quite often and we were treated regularly to a concert by the Olive-backed Thrushes, but the time of song was nearly over, and when the visit came to an end the deep silence of midsummer held the woods all day, broken only by the faint chirp of some warbler wandering through the tree-tops, or at night by the hoarse bark of the Night Heron passing overhead to his feeding grounds uncovered by the falling tide.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, SEPTEMBER, 1898. NO. 6.

VEGETATION IN THE BERMUDAS.—PART. II.

FLOWERING SHRUBS.

By H. B. SMALL, Esq., Ottawa, Ont.

The greater part of the trees, shrubs and plants of Bermuda are not as a rule indigenous, but they have become so spread and scattered in every direction that it is a difficult matter to distinguish what may be called wild from the cultivated. The mildness of climate, abundant sunshine, moist atmosphere, and varied soil all conduce to luxuriant growth. Only the most striking shrubs can be alluded to in a short article, and that only in a cursory manner, but sufficient enough to attract the attention of the reader.

Foremost amongst the shrubs is the "Match-me-if-you-can" (*Poinsietta pulcherrima*), a handsome growth of from 5 to 7 feet high, with branches not unlike those of the Sumach, and which terminate in clusters of greenish red and yellow flowers, surrounded by a whorl of large leaf-like brackets of the brightest scarlet from 6 to 10 inches in diameter. To see one of these shrubs in full bloom in the late autumn and early winter almost dazzles the eye with their bright hues.

The Hibiscus (*H. mutabilis*) grows from 10 to 15 feet high, or sometimes more. Its leaves are of a bright green, heart-shaped, and the shrub is covered with large scarlet flowers 4 inches in diameter, occasionally changing to pink or pinkish white. It keeps in full bloom nearly all the year round, bud succeeding bud as the season advances.

The Oleander (*Nerium Oleander*) is a bushy evergreen shrub from 4 to 20 feet high, thickly branched from the base. Introduced into Bermuda years ago, it is now one of the most striking features of the landscape. From early spring until

December the hedges which line the lanes and roadways, and separate the fields are dazzling with the profusion of its lovely blossoms, while the air is redolent with their fragrance. The colour varies from pure white—the rarest—through every shade of pink and red to a deep scarlet, a charming relief to the monotony of the ubiquitous Cedar. Probably locality and soil may have something to do with its varied hues. So abundant has this shrub become from the distribution of its seeds that it is looked upon as a nuisance by the agriculturists, and it is regularly used as fuel. The more, however, it is cut, unless the roots are extracted, the more bushy it grows. In its native growth in Bermuda, the cultivated specimens of more northern climes sink into insignificance. It is said to possess poisonous qualities, and fowls have been known to die from drinking water that stood under its leaves. A shrub very easily mistaken for the Oleander from the similarity of its foliage, is the *Dodonæa Burmanniana*, a branching shrub with green flowers.

The Myrtle (*Myrtus communis*) although a garden shrub, is found abundantly escaped from cultivation, and another shrub very easily confounded with it, the Bermuda or Surinam Cherry (*Eugenia Ugni*), grows abundantly by the wayside. Its fruit is about the size of, and not unlike a red cherry, five-angled, of a delicate waxy texture, and pleasant taste, much sought after by children. Its flowers are white like those of the myrtle, for which it can be very easily mistaken.

The Laurestinus (*Viburnum Tinus*), a compact little evergreen with showy clusters of white flowers, is a garden shrub, but has escaped. I found it in abundance flourishing on the rocky side of a lane leading to Hungary Bay.

The Orange (*Citrus*) and the Lemon (*C. Limonum*) may be seen here and there outside of and on the edge of gardens and shrubberies, but are by no means in a healthy condition, owing to insect ravages. Their brilliant smooth shining leaves are thickly interspersed with dead wood, and present an air of neglect and decay. Years ago Bermuda was famed for the fruit of these trees, but the scale insect and a blight of some descrip-

tion attacked them, and their cultivation has been mostly abandoned. The Lime (*C. Limetta*) seems less liable to disease and fruits well.

The Pomegranate (*Punica granatum*), between a shrub and and a tree, bearing large showy crimson flowers, is abundant everywhere. During the winter months it is deciduous, presenting an appearance of dead wood. But with the approach of spring its lance-shaped leaves and handsome flowers make it a conspicuous object. It grows more frequently in hedges than as a single shrub.

The Papaw (*Carica Papaya*) is a straight unbranched tree-like shrub from 10 to 25 feet high, and is ubiquitous. Its leaves on the summit of its stem, which is naked, are from one to one and a-half feet in diameter, on long stalks, and the fruit round, orange-yellow when ripe, and of the size of a large orange lying on the stalk in rotation one above another below the leaves, presents the idea of oranges both ripe and green fastened on the bare stem. It may be described as semi-cultivated, for there is scarcely a waste patch of ground on which the papaw has not secured a foothold. The fruit, rather mawkish, is eaten as a desert, and in its green state is valued in cookery for the peculiar property it possesses of softening animal fibre and assisting digestion. From its juice Pepsin is manufactured, an industry about to assume large proportions.

The Dog-bush (*Baccharis heterophylla*), an erect bushy shrub from 3 to 6 feet high with leathery leaves and white blossoms, growing on the edge of marshes, is one of the chief decorations for houses and churches at Christmas, and it has the property of keeping green and ornamental for months. I have seen it in March still retaining its decorative effect, although placed in position at Christmas.

The Datura (*D. Metel*), rather an arborescent plant than a shrub, although attaining a height of from 5 to 12 feet, is of a beautiful growth, with large bell-shaped drooping flowers, 6 inches long, and of a pure white. It is allied to the Datura or Thorn-apple of northern climes.

The Pigeon Berry (*Duranta Plumieri*) is abundant, growing everywhere. It is from 6 to 12 feet high, with smooth glossy leaves, and its blue flowers merge into long stalks drooping over with wax-like yellow berries, the size of a pea, very ornamental, but highly poisonous. It is abundant on cuttings through hills on the roadside, drooping over gracefully.

The Sage Bush (*Lantana crocea*), a handsome shrub with yellow or orange-coloured flowers, one and a-half inches in diameter, has taken possession of most of the wayside waste gsound, and along the old stone walls where it mostly flourishes. It is a greenhouse flower in the north, but is so common in Bermuda as to be thought nothing of. A kindred bush (*Lantana Odorata*), is very common and is used for cleansing kitchen utensils after fish, a few sprays of it taking away all traces of previous cooking, when boiled for a short time. It has nothing in common with the pot herb Sage, nor with the Sage bush of the American desert (*Artemesia*).

The Snuff Plant (*Buddleja Americana*) is a very showy shrub, 6 to 10 feet high, branched from its base, with a woolly down on its foliage, the leaves being 3 or 4 inches long. Its blossoms hang in drooping clusters of from 4 to 6 inches, of a yellow colour, presenting a pretty appearance. Its drooping growth is not unlike that of the weeping willow.

The Wild Acacia (*Lucæna glauca*) is common on waysides and in hedges. Its flowers are in dense globular white heads, and the seeds which hang in the pods are used for making necklaces, under the misnomer of *Cassia* seeds.

There is a straggling sea-side shrub, 2 to 3 feet high, with fleshy leaves and small pinkish flowers, followed by a black fruit, the size of a cherry, not edible. It is the *Scævola Plumieri*, but I could find no common name by which it is known. It is very abundant fringing sandy bays.

The Bay Berry (*Myrica cerifera*) a bushy shrub, bearing brown catkins, followed by berries in dense clusters, half the size of a pea, coated with white fragrant wax used in America for candles, is abundant in marshy valleys. The Elder (*Sambucus niger*) is

seen here and there, but does not appear to fruit as it does north, the berries either falling off before maturity, or being eaten by birds. Its white flowers are larger than in Canada.

The Seaside Lavender (*Suriana maritima*), an erect bushy shrub from 3 to 4 feet high, with yellow flowers scarcely one inch in diameter, grows abundantly along rocky shores, and on sand banks. It is said by the negro population to possess many medicinal qualities, and is in great request amongst them.

The Castor Oil Plant (*Ricinus communis*) attains in Bermuda a height of from 10 to 15 feet or more, branching out like a shrub. It is common on waste land, and revels in disused quarries.

The Yucca or Spanish Bayonet (*Y. aloifolia*) with massive thick spear-shaped leaves, from 4 to 6 feet high, with a sharp spine terminating each leaf, grows abundantly on rocky ridges, and is sometimes used as a live fence. It is closely allied to the Aloe (*A. vulgaris*), very similar in growth but more fleshy and substantial, which is also well distributed.

The Century Plant (*Agava Americana*) is another shrub not unlike the foregoing in growth and appearance. It throws up a flowering stem from 15 to 25 feet high, with orange yellow blossoms on alternate branchlets. This plant was formerly supposed not to bloom till 100 years old, but this is incorrect.

There are many other shrubs of a less showy description, but which this sketch can scarcely notice.

There is, however, a class of shrubby plants of profuse growth and size in Bermuda, viz., the Cacti, which assume proportions unknown in the north. The Night-blooming Cereus (*Cactus grandiflorus*), whose long snake-like stems either hang over walls, or ascend trees to a considerable height, unfolds after sunset one of the most magnificent flowers in the whole vegetable kingdom, 8 or 9 inches in diameter, wax-like and fragrant, but closing with or soon after daybreak. A large plant on the outskirts of Hamilton on the turn to Prospect had two years ago between 200 and 300 blossoms.

The many other Cacti familiar to horticulturists grow abun-

dantly and to a great height, but probably the only indigenous plant of this family is the Prickly Pear (*Opuntia vulgaris*), very common on barrens and sandy shores, with a prostrate massive fleshy stem thickly studded with awl-shaped spines. Its flower is yellow, followed by an edible crimson fruit which must be peeled before eaten.

The porosity of the coral rock sublying all the islands, and retaining like a sponge a certain amount of moisture, doubtless tends to the prolific growth of shrubs and plants, many of the latter assuming arborescent conditions. Plants will constitute the subject of the next article.

H. B. SMALL.

OBITUARY.

JAMES HALL, PALÆONTOLOGIST.

James Hall, the father and prince of palæontologists in America, has passed away at Echo Hill, Bethlehem, N.H., full of years and honour. For sixty years he has been most active and constantly engaged in the field of geological research in America, and in more particular detail in the State of New York, having held the position of State Geologist since the early years of the establishment of that renowned State Survey. The accuracy of the work performed in pointing out the economic resources of this enterprising State, the indefatigable labours and numerous obstacles and prejudices which he had to encounter in the beginning only stimulated him to greater effort and more pronounced achievements. Indeed, many of the valuable geological resources which have made New York State so famous, have been pointed out by him in his reports or by the reports of members of his staff. His successes as State Geologist and as Palæontologist were both marked. In guiding the affairs of the Geological Survey of New York State he combined both economy and sound judgment, and in Palæontology, won

a reputation of world-wide fame. The learned societies of Europe and America have showered upon him all the honours possible, by electing him an honorary or corresponding fellow, and by granting him awards of merit and medals of honour, such as few distinguished men ever have shared.

In Canada, the name of Hall is a household name among geologists and students of science. His works are classic. They bear the impress of a master-mind. It is easy to read in them the progress of scientific thought and trend of discoveries in the broad field of palæontological enquiries the world over, from the thirties to these the closing years of this century. So great an impress did the New York State Survey produce on the geology of America that its nomenclature has been practically adopted as a standard for over fifty years.

The magnificent State Museum at Albany, the library of royal quarto volumes on the Geology and Palæontology of New York State, together with a vast amount of preliminary and final reports in Reports of the Regents of the University of New York—besides the nucleus of the fine typical collection of fossil remains in the American Museum of Natural History, Central Park, New York City, are standing monuments of the labour, pen and mind of James Hall, whom the world of geological science now mourns, not as one who died prematurely—but as one who passed away to his rest, having accomplished much, encouraged many and won for himself laurels that fade not easily—and glory in the annals of American geological history.

In a future number we hope to give a more comprehensive and detailed account of Prof. Hall's writing, especially with reference to their bearing upon Canadian Geology.—THE EDITOR.

ON SOME FOSSIL CEPHALOPODA IN THE MUSEUM OF THE GEOLOGICAL SURVEY OF CANADA, WITH DESCRIPTIONS OF EIGHT SPECIES THAT APPEAR TO BE NEW.*

By J. F. WHITEAVES.

A.—From the Cambro-Silurian rocks of the Provinces of Quebec, Ontario and Manitoba.

NANNO AULEMA, Clarke.

Nanno aulema, Clarke. 1897. Geol. Minn., Final Rep., Vol. III, pt. 2, p. 770, pl. 47, figs. 4-11.

Several specimens in the Museum of the Survey, that are obviously referable to this species, were collected by the late Alexander Murray in 1854, from the Black River limestone at Western Manitou Island (now called Macdonald Island), Lake Nipissing, and similar but silicified specimens have been noticed in an old collection of the fossils of that formation from Paquette's Rapids.

ORTHOCERAS TENUISTRIATUM, Hall.

Endoceras proteiforme, var. *tenuistriatum*, Hall. 1847. Pal. N. York, vol. I, p. 209, pl, 45, figs. 1, *a-b*; and pl. 47, figs. 1, *a-b*, and 2, *a-e*.

Orthoceras tenuistriatum, Clarke. 1897. Geol. Minn., Final Rep., vol. III, pt. 2, p. 788, pl. 55, figs. 5 and 6.

An unusually well preserved specimen of this species, collected by Mr. G. Sutherland in the winter of 1872-73, from the Trenton limestone exposed in excavations for the foundation of the Post Office at Ottawa, was presented to the Museum of the Survey by Mr. W. R. Billings in 1879. The maximum length

*Communicated by permission of the Director. It is intended to publish illustrations of the new species described in this paper, in one of the Survey publications

of this beautiful fossil is eighty-eight millimetres, or nearly three inches and a half. Its maximum diameter is twenty-six mm. at the larger end and about twenty mm. at the smaller. Its surface markings consist of numerous and densely crowded, but not very regularly arranged, transverse striæ, or minute impressed lines, which are crossed by still more minute longitudinal raised ridges, that are not visible without the aid of a lens. The minuteness of this reticulation gives quite a silky sheen to the exterior of the specimen. Its siphuncle is apparently central or very nearly central.

A large example of *O. tenuistriatum*, with the test preserved, in the same Museum, from the Trenton limestone at Hull, P.Q., was purchased from a quarryman by Dr. Ami and the writer in May, 1889. It is fully seven inches and a half in length, by about fifteen mm. in diameter at the smaller end, and thirty eight at the larger. Its surface also is very minutely reticulated and has a peculiar silky appearance.

A fragment not quite two inches in length and about three quarters of an inch in its maximum breadth, collected by Mr. T. C. Weston in 1866 from the Trenton limestone at the Mile End, Montreal, is also probably referable to this species. The surface of this specimen, which although well preserved is not silky in texture, is finely reticulate by densely crowded and very minute transverse striæ, crossed by equally minute and close set longitudinal raised lines and by rather larger and comparatively distant longitudinal ridges, which are from half a millimetre to one mm. and a half apart. It is only these latter that are sufficiently large to be visible to the naked eye.

ORTHOCERAS WESTONI. (Sp. nov.)

Shell medium sized, longicone, straight, increasing very gradually in thickness and slightly but perhaps abnormally compressed. Surface marked by very oblique and rather distant flattened annulations, about a millimetre broad and separated by flat spaces from four to five mm. wide. Internal structure not very well shewn in the only specimen collected, but the siphuncle, as

exposed in a transverse fracture, is eccentric and so large that it may be moniliform.

Trenton limestone, Mile End, Montreal, T. C. Weston, 1866; one specimen about four inches and a half in length.

The writer has much pleasure in associating this singular species, which seems to be well characterized by its distant and very oblique flattened annulations, with the name of its discoverer.

ORTHOCERAS BEAUPORTENSE. (Sp. nov.)

Shell rather below the medium size, longicone, straight and tapering so gradually that the few specimens which the writer has seen are almost cylindrical. Surface marked by low, rounded, narrow transverse annulations, with numerous minute and close set, transverse thread-like raised lines between and upon them, all of which are crossed by small and narrow but comparatively distant longitudinal ribs or ridges. The transverse annulations average from two and a half to three millimetres apart, at their summits, and are separated by shallow depressions nearly twice as wide as themselves. The longitudinal ribs or ridges are equidistant, uniform in size, and, on an average, about one millimetre and a half apart. The crossing of these ribs by the transverse annulations makes a very regular and rectangular reticulation, which is plainly visible to the naked eye, but the crowded transverse raised lines cannot be well seen without the aid of a lens. Internal structure and shape and relative position of the siphuncle unknown.

Trenton limestone at Parent's quarry, Beauport, near Quebec City, D. N. St. Cyr, 1888 : one well preserved testiferous specimen not quite two inches in length and with a considerable portion of its surface buried in the matrix. A similar specimen, but with the whole of the outer surface visible, from the same locality, has been lent to the writer by the authorities of Laval University.

This finely sculptured shell seems to be closely allied to the *O. pseudocalamiteum* (Quenstedt) Barrande,* but to want the

*Systeme Silurien de la Bohême, Vol. II, Texte 3, 1874, p. 261, pl. 217, fig. 8 ; pl. 222, figs. 11, 12 ; pl. 228 ; pl. 236, figs. 11-16 ; and pl. 361, figs. 15-17.

intermediate longitudinal ridges characteristic of that species. Both clearly belong to Barrande's "Group 6" of the genus *Orthoceras* and to Hyatt's genus *Dawsonoceras*.* The surface ornamentation of *O. Beauportense* appears to be decidedly different from that of any of the small annulated species of *Orthoceras* from the Trenton limestone of the State of New York described and figured by Hall in the first volume of the Palæontology of that State. *O. bilineatum*, Hall, is a much larger and more robust species, with coarser annulations and two series of longitudinal ridges or linear elevations. In *O. clathratum*, Hall, the longitudinal markings are very minute and crowded, and are said to consist of "sharp elevated lines distant $\frac{1}{48}$ of an inch," or very little more than a half a millimetre apart. There are, also, no comparatively coarse and distant longitudinal ribs or ridges in *O. textile*, Hall, and in that species the transverse annulations are represented as both prominent and angular.

TRIPTEROCERAS LAMBII.

Gonioceras Lambi, Whiteaves. 1891. Trans. Royal Soc. Canada, Vol. IX, sect. 4, p. 86, pl. XI, figs. 1, and 1 *a-b*.

Triptoceras Lambi, Clarke 1897. Geol. Minnesota, Final Rep., Vol. III, pt. 2, p. 793, pl. 56, figs. 1 and 2.

Tripteroceras Lambii, Whiteaves. 1897. Geol. Surv. Canada, Palæoz. Fossils, vol. III, pt. 3, p. 213.

The type of this species is a well preserved specimen of the septate portion of the shell, rather more than ten inches in length but imperfect at both ends, collected in the Galena—Trenton limestone at East Selkirk, Manitoba, by Mr. J. B. Tyrrell in 1890. Until quite recently, the only other specimen that the writer had seen is the badly preserved but otherwise similar cast collected at Wekusko Lake, in the District of Saskatchewan, by Mr. Tyrrell in 1897 and referred to on page 214 of the third volume of "Palæozoic Fossils" published by the Geological Survey of

*It seems to the writer that it would be more euphonious and more in accordance with classical usage to write *Dawsoniceras* and *Barrandiceras* rather than *Dawsonoceras* and *Barrandeoceras*.

Canada. This specimen, which is also imperfect at both ends, is about a foot in length, and seven inches and three quarters in breadth at the larger end.

In the fall of 1897, however, a specimen from East Selkirk, collected by the late Professor J. H. Panton in 1884 and belonging to the Provincial Museum at Winnipeg, which is obviously referable to this species, was lent to the writer by Mr. J. P. Robertson, at the suggestion of Mr. Tyrrell. This fossil is a badly preserved cast of the interior of the shell in a slab of building stone, and only the ventral surface is exposed. It is of interest as being much the largest specimen of the species that has yet been found and as having a considerable portion of the body chamber preserved. As measured along the middle of the exposed surface longitudinally, its length is twenty-three inches, the septate portion being twelve inches in length and the non- septate eleven. Its maximum diameter or breadth is seven inches and three quarters at the smaller end, and nine inches and a quarter at the larger. About twenty-eight septa can be counted in the septate portion, and they are from a quarter of an inch to a half an inch apart at the surface. The specimen is slightly imperfect at both ends and must have been more than two feet in length when entire.

According to Professor J. M. Clarke (op. cit. p. 793) the *Orthoceras ziphias*, *O. hastatum* and *O. servile*, of Billings, are referable to Hyatt's genus *Tripteroceras*. To these may be added, as Canadian representatives, the present species and possibly *O. semiplanatum*, nobis.

CYRTOCERAS QUEBECENSE. (Sp. nov.)

Shell elongate conical, increasing very slowly in thickness and not much curved ; dorsum slightly compressed, venter and sides rounded. Siphuncle large, cylindrical, dorsal and marginal ; septa apparently rather closely approximated.

Length of the only specimen collected, which is imperfect at both ends, about seventy-five millimetres, or three inches ; thickness of the same about eleven mm. at the smaller end, and nearly thirty at the larger.

Levis limestone at Pointe Lévis, opposite Quebec City, T. C. Weston ; a single specimen, which seems to be quite distinct from all the species of *Cyrtoceras* from that locality, described by E. Billings in the first volume of "Palæozoic Fossils."

BARRANDEOCERAS SUBCOSTULATUM. (Nom. prov.)

Shell consisting of about two gyroceran volutions which are coiled loosely on the same plane, but nowhere in close contact, and gradually becoming more eccentric, the outer one slightly compressed both above and below, so that the outline of a transverse section near the aperture would be broadly elliptical, and the dorso-ventral diameter a little greater than the lateral.

Surface of the test distinctly costulate, though in the only specimen that the writer has seen the ribbing is most clearly defined on the inner volution where it consists of rather distant but irregularly disposed, small, thin, acutely angular and slightly flexuous, transverse ribs or ridges, which are generally much narrower than the very shallow depressions between them, and marked with numerous minute striations parallel to the ribs. Sutures of the septa not clearly indicated ; shape and relative position of the siphuncle unknown.

Black River limestone at Wolfe Island, near Kingston ; a fine specimen fully four inches in its maximum diameter, which was presented to the Museum of the Survey by Professor James Fowler in 1888.

According to Hyatt, *B. convolvans* (the *Lituites convolvans* of Hall but apparently not of Hisinger), of the Black River limestone of the State of New York, has a smooth shell, though its shape appears to be essentially similar to that of the specimen from Wolfe Island.

LITOCERAS VERSUTUM, Billings. (Sp.)

Nautilus versutus, Billings. 1865. Geol. Surv. Canada, Palæoz. Fossils, Vol. I, p. 259.

Litoceras versutum, Hyatt. 1883. Genera of Fossil Cephalopods (Proc. Boston Soc. Nat. Hist., Vol. XXII) p. 268.

Litoceras Whiteavsi, Hyatt. 1894. Phylogeny of an Acquired Characteristic (Proc. Amer. Philos. Soc., Vol. XXXII) p. 475.

On page 475 of the paper last cited Professor Hyatt writes as follows, in reference to his genus *Litoceras*. "The type of this genus, when it was first described, were the specimens in the Geological Museum at Ottawa identified as *Nautilus versutus* of Billings, but these appear here as *Litoceras Whiteavsi*, since there is every reason for supposing that they are not the species described by Billings under the name of *versutus*." A few lines farther on, Professor Hyatt makes the following remarks upon his *Litoceras Whiteavsi*. "Having examined the so-called originals of this species" (i.e., of *Nautilus versutus*, Billings) "so far as they exist in the Geological Museum at Ottawa, I have found that none of them came from Billings' locality, Bonne Bay, and none of them agree with Billings' description. Billings' species had ten septa to the inch; this species has the sutures about one-quarter of an inch apart, a difference shewing essential distinction." These statements are unfortunately based upon such grave misapprehensions of the facts of the case as to call imperatively for some explanation. When Professor Hyatt visited the Museum of the Survey there were, and are still, five specimens of nautiloid shells from the "Quebec Group" of Newfoundland on exhibition in one of the upright cases. One of these then had, and still has, two labels attached to it, one printed and the other written. The printed label reads,—"Newfoundland. Bonne Bay, East Arm, S.-W. side. 1861. J. R."—and the written one,—"*N. versutus*, type." Moreover, notwithstanding Prof. Hyatt's statement to the contrary, this specimen does agree with Billings' description and measurements of the type and only known specimen of *Nautilus versutus*, and it clearly has about ten septa to the inch. Of the other specimens, three are labelled as having been collected at Point Rich by Mr. James Richardson in 1861. These, in the writer's judgment, are most probably the types of *Nautilus insolens*, Billings, and apparently also of *Lito-*

ceras biangulatum, Hyatt. The fifth specimen, which was collected at Table Head by Mr. Richardson in 1861, is a small specimen of *Lituites Pluto*, Billings, but clearly not the type of that species.

B.—From the Silurian (Upper Silurian) rocks of Manitoba.

TRIPLEUROCERAS ROBSONI. (Sp. nov.)

Shell large, robust, longicone, straight and increasing very slowly in breadth and thickness, flattened in the broad siphonal and presumably ventral region, but rounded and much narrower at the sides: characters of the antisiphonal side and nature of the surface markings unknown. Sutures of the septa broadly and concavely arched on the venter, nearly straight where they pass over the sides; the three or four next to the body chamber closer together than those which immediately precede them. Siphuncle marginal, presumably ventral, large, expanded between the septa and apparently nummuloidal.

Three imperfect and badly preserved casts of the interior of shells of this species, from Stonewall, Manitoba, were presented to the Museum of the Survey in the fall of 1897, two by Mr. W. H. Robson, of Lethbridge, Alberta, and one by Mr. Donald Gunn of Stonewall. The whole of the antisiphonal and presumably dorsal region of each of these specimens is buried in a very hard dolomitic limestone, so that it is doubtful whether they are referable to Hyatt's genus *Tripleuroceras* or not. The two presented by Mr. Robson are septate throughout, and the larger one has a nearly cylindrical, septate but possibly adventitious object, like a cast of the interior of the shell of a small *Orthoceras*, some two inches in length and fully half an inch in thickness, exposed in the middle of its siphuncle posteriorly. The one presented by Mr. Gunn has a considerable portion of the ventral side of the body chamber preserved, but the lateral margin on both sides is very imperfect.

The species seems to differ from the "*Orthoceras (Actino-*

ceras) Beloitense" of Whitfield,* from the Trenton limestone of Wisconsin, which it resembles in some respects, in its more flattened venter, more concavely arched septa in the ventral region, and in its proportionately larger and apparently nummuloidal siphuncle.

TROCHOCERAS INSIGNE. (Sp. nov.)

Shell, or rather cast of the interior of the shell, rather large and attaining to a maximum diameter of fully five inches, dextral, and consisting of two slender, closely contiguous volutions that are coiled on very nearly the same plane, and slightly compressed both above and below, so that the outline of a transverse section of the outer volution would be broadly elliptical, with the dorso-ventral diameter a little greater than the lateral. Surface of the test unknown, that of the cast marked by large, transverse rib-like plications, which are moderately prominent on each of the sides, but obsolete on the periphery or venter,—and by very small, acute, thread-like spiral ridges. The transverse plications are rather distant, slightly flexuous and somewhat sigmoidal on each side of the outer volution, where they are separated by wide and shallowly concave depressions. The small spiral ridges are numerous, comparatively close together, through not very regularly disposed, and in one specimen, at least, rather larger and more prominent on the periphery of the outer volution than on its sides. Sutures of the septa concavely arched on both of the sides, where each suture intersects one, or rarely two, of the transverse plications. Shape and position of the siphuncle unknown.

The first specimen of this shell that the writer had seen was given to the late Chief Justice Wallbridge by a quarry man at Stonewall and presented to the Museum of the Survey by Prof. E. J. Chapman in 1895. The exact locality from which this specimen was obtained was for a long time doubtful, but there is now every reason for believing that it came from the quarries at Stonewall. At any rate, in the fall of 1897, two specimens

* Geology of Wisconsin, Vol. IV, p. 226, pl. 8, fig. 1; and pl. 10, figs. 9, and 10.

which are known to have been collected at Stonewall were presented to the Museum, one by Mr. John Gunn, and the other by Mr. W. H. Robson. At the same time, also, Mr. Tyrrell obtained a characteristic fragment of a specimen of this species, *in situ*, at the Stonewall quarries. By far the most perfect of the specimens yet received is the one presented by Mr. Gunn. It has two entire volutions preserved, which are gyroceran rather than nautilian in their mode of coiling, but very slightly asymmetrical. The inner volution is openly coiled, the apex or initial point being widely eccentric, and there is a large central perforation about an inch and a quarter in diameter.

These specimens seem to indicate a previously undescribed species, which is here referred provisionally to *Trochoceras* rather than to *Lituites*, until the shape and relative position of its siphuncle be ascertained, when it may have to be transferred to *Plectoceras*, *Peismoceras* or *Discoceras*. It differs from *Lituites Bickmoreanus* Whitfield, (from the Niagara limestone of Indiana) which Hyatt says is a *Plectoceras*, in its more openly coiled inner volution, in its broadly elliptical and not subquadrate cross section, and in its closer transverse plications, which are quite obsolete on the periphery. Professor Whitfield, who has kindly compared two of the best specimens from Stonewall with the types of his species, thinks that the two forms are quite distinct.

C.—From the Devonian rocks of Ontario.

ORTHOCERAS WALPOLENSE. (Sp. nov.)

Shell small, longicone, straight, slender and increasing very slowly in thickness, slightly and perhaps abnormally compressed. Test unknown ; surface of the cast marked by thin acute, transverse, annular ridges, which are much narrower than the grooves between them. Septa, and shape and position of the siphuncle unknown.

The largest specimen known to the writer was collected many years ago by J. DeCew in the Corniferous limestone of Lot 6, Concession 14, of the Township of Walpole. It is about

eighty-four millimetres (3¼ inches) in length, by six mm. in thickness at the smaller end and about fourteen at the larger. Near the smaller end there are about ten annulations and near the larger end about six, in a length of ten mm. The only other specimen that the writer has seen, is a fragment about an inch and a half in length, from the same formation and labelled Lot 42, Concession 1, Cayuga, which is probably referable to this species. It has about eight annulations in a length of ten mm., at the larger end.

O. Thestor, Hall,* is described as having proportionately finer annulations, and *O. Idmon*, Hall,† judging from the figure, is almost cylindrical.

ORTHOCERAS HAGERSVILLENSE. (Sp. nov.)

Shell of medium size, straight, longicone and increasing slowly in thickness. Surface markings consisting of a fine rectangular reticulation caused by the crossing of numerous equidistant and continuous, minute and close-set, longitudinal ridges, by transverse but otherwise similar ridges. In the only specimen that the writer has seen, the longitudinal ridges are rather less than a millimetre apart at the smaller end, and about a millimetre apart at the larger ; while the transverse ridges are slightly closer together, especially towards the larger end. Septa, and shape and position of the siphuncle unknown.

Corniferous limestone at Hagersville, collected by the writer in 1890 ; a slightly distorted specimen, about three inches long and an inch broad at the larger end, with a considerable portion of its surface buried in the matrix.

The species seems to be well characterized by the minute reticulation of its surface, though its internal characters are unknown.

* Palæontology of the State of New York, Vol. v, pt. 2, p. 302, pl. 82, fig. 18.
† Ibid., p. 302, pl. 43, figs. 11 and 12.

GOMPHOCERAS EXIMIUM, Hall.

Gomphoceras eximium, Hall. 1861. Fourteenth Reg. Rep. N.Y. St. Cab. Nat. Hist., p. 109.

" " " 1876. Illustr. Devon. Fossils : Cephalopoda, pl. 44, figs. 1 and 2.

" " " 1879. Pal. N. York, vol. V, pt. 2, p. 329, pl. 44, figs. 1, 2 : and Supplement (1888) p. 32, pl. 120, figs. 1-3 ; and pl. 121, figs. 1 and 2.

In the Museum of the Survey there are two good specimens of this species, from the Corniferous limestone of St. Marys, one presented by Mr. Blackader, of Montreal, about the year 1879 or 1880, and the other obtained through Mr. David Boyle, of Toronto, in 1884.

GYROCERAS NUMA, Billings.

Gyroceras Numa, Billings. 1874. Canad. Nat. and Geol., N.S., vol. VII, p. 238.

The type and for many years the only known specimen of this rather obscurely defined species, is a very imperfect cast of the interior of the shell, which is said to be "about 10 inches" in its maximum diameter, from the Corniferous limestone at Kilworth, collected by E. or J. DeCew. In 1884 a somewhat more perfect and rather smaller but otherwise essentially similar specimen, from the Corniferous limestone of Pelee Island, was presented to the Museum of the Survey by the Rev. W. Minter Seaborn. This specimen, which is about seven inches in its maximum diameter, shows that the sutures of the septa are flexuous, and sigmoidally curved on each side of the shell. The surface markings, and the shape and relative position of the siphuncle of *G. Numa* are still unknown.

Ottawa, July 28th, 1898.

OTTAWA FIELD-NATURALISTS' CLUB.

TREASURER'S STATEMENT FOR YEAR ENDING MARCH, 10TH, 1898.

RECEIPTS.			EXPENDITURE.		
1897.					
Mar. 18.	Balance	$ 25 60	Printing 12 number of *Ottawa Naturalist*, including wrapping and postage	$274 67	
	Subscriptions	145 00	Authors' extras	11 85	
	Government Grant	200 00	Miscellaneous printing (circulars, programmes, post-cards, etc	20 85	
	Advertisements	12 00	Lecture expenses	25 00	
	Extras of *Ottawa Naturalist* sold	30 00	Excursion expenses	6 90	
	Profit of Excursions	3 22	Postage	6 00	
			Telegrams	65	
			Balance on Mar. 11th, 1898	69 90	
		$415 82			$415 82

JOHN CRAIG,
Treasurer.

Audited and found correct.

J. BALLANTYNE,
R. B. WHYTE, } *Auditors.*

April 26th, 1898.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, OCTOBER AND NOVEMBER, 1898. NOS. 7 & 8.

CHANGE OF FUNCTION IN FISHES' FINS.

By Professor E. E. PRINCE,
Dominion Commissioner of Fisheries, Ottawa.

In the OTTAWA NATURALIST, of October last year, a book notice appeared of the nature of a brief review of that highly interesting subject the life-histories of fishes. It included amongst other new and important statements the affirmation that in young fishes "the breast fins, and in some species the hind pair of fins, become enormously developed, and project like wide-spread fans from the sides of the body. These, no doubt, are effective for protection rather than locomotion." Having watched young fishes half an inch to one or two inches in length, when schooling at the surface of the sea in calm summer weather, I have repeatedly noticed that the enormous paired fins, often deeply coloured, black and white in the Rockling (*Motella*), orange red in the Gurnard (*Trigla*), ochre yellow in the Ling (*Molva*), or gleaming white in the American Hake (*Phycis*), are of little or no use in outward locomotion: but hang helplessly by the side of the body. Projecting like richly tinted fans when expanded, or like stout spines and rods when closed, they must effectively deter many enemies eager to make a mouthful of the tender young fish; and thus serve a purpose similar to the points and projections of caterpillars or the spines of the porcupine, and the like. As I ventured to point out many years ago, the theory put forward by Dr. Albert Gunther, of the British Museum, that they were simply instrumental in balancing the fish is wholly inadequate, and certainly a large number of minute larval fishes (*e.g.*, the cod and mackerel), which would appear to need them most, do not possess these large (supposed) balancing organs.

Upon a recent visit to Cape Breton, I observed vast numbers of American Hake (*Phycis chuss*, Walbaum) 3 in. to 4 in. in length, hovering around the wharves at the various harbours which were included in my tour. Like most species of the genus *Phycis* the American Hake retains when adult extremely elongated ventral fins, which, as already stated, are characteristic of the young or the advanced larval condition of many of the family *Gadidæ*. These long fins of the hake are of an opaque white colour and they are used in a most unexpected and interesting way. The little fish were observed by me foraging about the weed-covered piles, moving over sunken logs, and all the time nibbling zoophytes and other food upon the stones at the bottom. Thousands of them could be observed, each stretching forward a large pair of white hands, so to speak, with long fingers probing amongst moss and weeds. These, which I have described as white hands, with slender fingers, were nothing more nor less than the huge hind pair of fins ¾ of an inch in length (in fishes about 3 inches long), and instead of being allowed to hang downward or backward as is usual in fishes, these ventral fins were turned so far forward as to extend along each side of the head. They exactly resembled a pair of chalk-white hands. It was an odd sight to see schools of these dark coloured infant fishes feeling about amongst the weeds, and actually creeping up stumps and piles under water, by means of these actively moving limbs. M. H. Perley in his account of the fishes of New Brunswick says of the hake : " It has one barbule under the chin ; the ventral fins are simple rays, divided or forked, one of the divisions longer than the other." The rays or rods, forming each fin, are three in number, and united by a fin-membrame for a short distance, beyond which the rays are separate and free, like attenuated fingers, capable of considerable varied movements, These fins appear indeed to have wholly changed their original purpose and in the young stages of the hake are no doubt sensory organs, and used like fingers in feeling for food. A minute histological study of these fins would no doubt show that the sensory nerve supply is unusually largely

developed. If the pleyic fins in fishes really represent the legs and feet of higher animals, while the pectoral fins are homologous with the arms and hands, the change of function described is of great interest, for the hind limbs in this case have not only lost their principal locomotor purpose, but have assumed the complicated functions of the fore-limbs. Mr. H. Charles Williamson, an able expert officer of the Scottish Fishery Board, published in 1893 a thorough research upon the free fin rays of the gurnard's pectoral fin, and described in detail the bones, myology, and nerve supply in the finger-like rods of the breast fins in that fish,* illustrated with nearly a hundred figures, and his conclusion is that, in view of their abundant sensory nerve supply, and the remarkable structure of their tips, and apart from any mechanical uses they may have, the free rays of the gurnard's fins are primarily extremely sensitive organs of touch. Mr. Williamson points out that it is generally agreed that the fin-rays in these cases are sensitive, "but one zoologist, Deslongchamps, has maintained that they also have a mechanical action. He had the opportunity of watching some gurnards, which were confined by means of a net in shallow water. He states that he observed the gurnards marching about on the fin rays, and also stirring up sand by means of these structures. Bloch, according to Tiedmann, suggested that the free rays may be lures to attract prey." The use of such rays as lures, or for digging or other mechanical purposes is questionable, when we find it proved that they are extremely sensitive. In the case of the Goose-fish (*Lophius*), which uses its breast fins as legs, or the still more remarkable Jumping Goby of Ceylon and Fiji we have a change of function scarcely inferior in interest. Moseley describes the latter extraordinary fish as follows :—"Hopping about on the mud, beneath the mangroves on the (Fiji) shore was the *Periophthalmus*, at which I had often been astonished in Ceylon. This little fish skips along the surface of the water, by a series of jumps, of the distance of as much

*11th Ann. Rep. Scottish Fishery Board, pp. 322-332.

as a foot, with great rapidity, and prefers escaping in this way to swimming beneath the surface.....The fish are very nimble on land and difficult to catch. They use their muscular pectoral fins to spring with, and when resting on shore the fore part of their body is raised and supported on these." Other fishes instead of using the paired fins for movement may use them as anchors like some of the shore gobies, the lump-fish, and the suckers (*Liparididæ*) whose ventral fins unite to form a broad sucking disk under the body, enabling them to adhere to rocks and stones with the firmest tenacity.

A study of the nerve-supply and myology of the American hake's hind pair of fins has not yet been made, but it would yield some valuable results. Williamson's research on the gurnard and Harrison Allen's account of the microscopic study of the free rays in the Atlantic sea-robin (*Prionotus*) have shown that these separated rays in the breast fins function as tactile organs, and are really fingers. As I watched, some months ago, the young hake pushing forward their ventral fins like long fingers, poking into crevices with them, and touching particles of food, or climbing over stones, and resting quietly upon these fins just as a dog rests his head upon his paws, the conclusion was irresistible that total change of function had taken place with the change of form in these fins. It is necessary to add that the eyes of these small hake are unusually large and prominent, and the remark of Williamson does not apply in this case that "in many fishes which have comparatively broad heads, and in which the eyes are situated high up on the head, some of the fin-rays of either the pectoral or pelvic fin are filamentous. From the position of its eyes, the fish is unable to see objects of prey close to itself. It therefore depends on organs of touch for aid in the capture of its food."

These fishes illustrate, indeed, a change precisely the reverse of that seen in the bat, for their wing-like fins have been converted into a kind of hand with separated fingers, extremely sensitive as organs of touch, whereas the fingers of the bat have been elongated and united by membrane to form a fin-like wing.

LIST OF SPECIES OF MAPLES GROWING AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

By W. T. Macoun.

The maple is an interesting tree to most people, and the following notes are published in order that more may know how many species and varieties can be grown in this district, whence they come, whether they are hardy, half-hardy, or tender ; and which of them are the most ornamental.

Only 5 species and 1 variety of maple are growing wild in the vicinity of Ottawa, namely, *A. pennsylvanicum*, L. ; *A. spicatum*, Lam. ; *A. saccharinum*, Wang. ; *A. saccharinum nigrum* ; *A. dasycarpum*, Ehrhart ; *A. rubrum*, L. In cultivation the only foreign kinds noticed are the Norway Maple (*Acer platanoides*, L.), Wier's Cut-leaved Maple (*Acer dasycarpum laciniatum, Wieri*) and Schwedler's Maple (*Acer platanoides Schwedleri*). In the Arboretum at the Central Experimental Farm there are 19 species and about 65 varieties which have lived through from one to eight winters. Some of these are quite hardy.

In the following list, of species only, the nomenclature is according to the "Hand-list of Trees and Shrubs grown in Arboretum, Royal Gardens, Kew," which, with few exceptions, is the same as the "Index Kewensis."

When a tree is not killed back one-sixth of its growth it is called *hardy* ; when it is killed back one-half, *half hardy* ; when to near the ground or to the ground, *tender*.

A. campestre, L.—Common Maple. Europe, West Asia. Planted 1896. Half hardy until last winter when it proved hardy. A small slow-growing tree. Fairly ornamental.

A. circinatum, Pursh.—Vine Maple. Western North America. Planted 1894. Hardy. Some specimens of this maple have not proved hardy. It is a very pretty native species with drooping branches and vine-like foliage which becomes brightly coloured in autumn.

A. cissifolium, C. Koch.—Japan. Planted 1894. Half hardy. This has finely cut foliage, and if it continues to stand our winters will probably prove very ornamental.

A. dasycarpum, Ehrh.—White or Silver Maple. Eastern North America. Planted 1890. Hardy. This is a large rapid growing native tree, but should not be planted for shade where the sugar maple will succeed.

A. glabrum, Torr. and Gray.—Smooth Maple. Western North America. Planted 1891. Hardy. A very pretty shrub, with glossy deep green foliage. It is a native of British Columbia.

A. Heldreichi, Orph.—Eastern Europe. Planted 1896. Hardy. As yet there is nothing to recommend this as an ornamental tree, but it has made good growth and seems quite hardy.

A. insigne, Boiss. and Buhse.—Northern Persia. Planted 1896. Tender. This tree has been killed to the ground during each of the past two winters.

A. japonicum, Thunb.—Japanese Maple. Planted 1897. Hardy. It is too soon yet to say whether this will succeed here or not. One specimen received from Tokio last year proved quite hardy. It is a beautiful little maple with finely cut foliage.

A. Myabei.—Japan. Planted 1896. Hardy. This maple is not recorded in the Index Kewensis. The specimens at the Experimental Farm were procured from the Arnold Arboretum, Boston. It is not very ornamental at present, but is a strong growing species.

A. monspessulanum, L.—Montpellier Maple. Mediterranean region. Planted 1896. Half hardy. A small tree with three-lobed leaves, the lobes being equal and entire. Rather ornamental. Some specimens of this tree have proved quite hardy.

A. Negundo, L.—Box Elder, Manitoba Maple. Canada, United States. Planted 1890. Hardy. This is a very rapid growing tree, and fairly ornamental, but it is seldom that symmetrical trees are formed and often they are disfigured by the limbs being broken off by the wind, as the wood is soft. This tree should only be planted in the coldest parts of the country where few trees will grow, as there are so many other trees of greater merit that will succeed in climates as severe as that of Ottawa.

A. pennsylvanicum, L.—Striped Maple. Eastern Canada and United States. Planted 1890. Hardy. It is surprising that this handsome little tree is not more used for ornamental purposes. Its pretty greenish flowers in long drooping racemes, deep green leaves, and beautifully striped bark, give it a unique appearance.

A. platanoides, L.—Norway Maple. Europe. Planted 1890. Hardy. The Norway Maple is being planted more and more every year as a shade tree in Canada. It certainly is a tree of great merit Our hard maple has, however, a good record for longevity, and should be planted in preference wherever it will succeed. The leaves of the Norway maple remain on the trees about two weeks longer than those of the sugar maple, but do not assume the bright tints of the latter.

A. Pseudo-platanus, L.—Sycamore. Central Europe, Western Asia. Planted 1890. Half hardy. It is not advisable to plant this tree with hopes of much success here.

A. rubrum, L.—Red or Swamp Maple. Planted 1890. Hardy. As its name indicates, the habitat of this maple is swampy or moist soil. Is it any wonder that so many of these trees are dying throughout the city, where granolithic pavements and permanent roads are excluding the much needed rain and air? The red maple is a beautiful tree, especially in the autumn, when it is all aglow with charming tints; but it should not be used either for shade or ornament unless there is plenty of moisture in the soil.

A. saccharinum, Wang.—Sugar or Rock Maple. Canada, United States. Planted 1889. Hardy. The sugar maple is well known. It is the most satisfactory maple for shade purposes and will grow in a diversity of soils, but succeeds best in a rich sandy loam, and does poorest in wet soil.

A. spicatum, L.—Mountain Maple. Canada, United States. Planted 1890. Hardy. This is a native shrub and is fairly ornamental.

A. tataricum, L.—Tartarian Maple. Eastern Europe. Planted 1890. Hardy. A small, ornamental tree. The bright red fruit

at the beginning of August makes this tree very attractive at that time of year. A variety of this, *A. tataricum Ginnala*, is far more ornamental. It has deeply cut foliage which in autumn rivals in brillancy that of the red or sugar maples.

A. Volxemi, Masters.—Caucasus. Planted 1897. One specimen proved nearly hardy and the other died. This is said to make a fine tree.

ON THE REMAINS OF MAMMOTH IN THE MUSEUM OF THE GEOLOGICAL SURVEY DEPARTMENT.

By LAWRENCE M. LAMBE, F.G.S.

Previous to 1898 the only remains of the mammoth in the museum of the Survey were as follows :—

1. The right ramus and symphysis of a lower jaw, a symphysis, a fragment of a large tusk, part of a smaller tusk, portions of two scapulæ and several fragments of other bones, found at Burlington Heights near Hamilton, Ont., in 1852, and presented to the museum by Mr. R. Benedict then Chief Engineer of the Great Western Railway. The lower jaw and the smaller tusk were described by Mr. T. Cottle of Woodstock, Ont., in the Annals and Magazine of Natural History for 1852, 2nd series, vol. 10, p. 395, and in the American Journal of Science and Arts for 1853, 2nd series, vol. 15, p. 282. The then Palæontologist to the Survey, Mr. E. Billings, mentions the discovery of these bones in the Canadian Naturalist and Geologist for 1857, vol. 1, p 380, and later, in 1863, in vol. VIII of the same publication, p. 135, describes them at length and refers them to *Elephas Jacksoni*, Briggs and Foster, at the same time remarking that Mr. Cottle "was the first to announce the discovery of mammoth remains in Canada" (*i.e.*, what was then called Upper and Lower Canada). In his communication to the American Journal of Science and Arts, Mr. Cottle refers the bones to *Elephas primigenius*, Blumenbach, with a query.

2. Three well preserved teeth from Norton Sound, Alaska, and a tooth, tusks, limb-bones with a few ribs and vertebræ from

the Yukon River, Alaska, forty miles below the mouth of the Tanana River ; collected previous to 1886, and forming part of the Mercier* collection acquired by the Survey in 1886.

3. A molar from St. Catharines, Ont., purchased for the museum by Mr. Whiteaves in 1887 ; this specimen was found whilst an excavation was being made for a sewer under the Opera House on Queen Street.

4. A molar from near Nulato, on the Yukon River, Alaska, presented in 1894 by Mr. C. Constantine, North-west Mounted Police.

5. Part of a tooth from the drift about six miles above Edmonton, Alberta, and presented by Mr. James Gibbons of Edmonton, in 1895.

6. A cast of a molar, the original of which is in the Provincial Museum, Victoria, B.C. and is said to be from the shore of Shuswap Lake, B.C. ; received for the museum in 1895.

On behalf of the department the writer visited Muirkirk, Ont., in September last, and purchased the remains of a mammoth (presumably *Elephas primigenius*, Blumenbach) found there by a farmer named Charles Fletcher on his farm about a mile and a half north-east of the village. The bones were discovered about three years ago in a field that had a short time previously been burnt over and was being ploughed for the first time. A surface layer of peat from two to three feet in depth had been removed by the fire, leaving exposed a brownish-gray clay holding small pebbles, known as the Erie †clay that in this region has an extensive development. The bones were found just beneath the surface, lying horizontally, partly embedded in the clay and scattered over an area of about two rods square. The ploughshare first struck and broke in two one of the tusks that proved to be eight feet and a half long, a second tusk ten feet in length was found near the other, and in the immediate vicinity the following remains were unearthed—nearly all the limb-bones, an almost complete lower jaw with teeth in place, portions of the upper jaw with the teeth, fragments of the upper part of the cranium, some of the ribs, the remains of a few vertebræ and a number of the bones of the feet. The two hind legs are almost entire, some of the bones of the feet only being wanting.

* Quarterly Journal of the Geological Society of London, 1894, vol. L, p. 1, "Notes on the occurrence of mammoth-remains in the Yukon District of Canada and in Alaska," by George M. Dawson, C.M.G., LL.D., F.R.S., &c.

† *Vide* Geology of Canada for 1863, p. 896.

DEPARTURE OF SUMMER BIRDS,

By F. A. SAUNDERS.

Yellow Warbler, Aug. 17th ; Redstart, Aug. 21st , Nighthawk, Aug. 25th ; Cliff Swallow, Aug. 27th ; Kingbird, Aug. 27th ; Barn Swallow, Aug. 28th ; Purple Martin, Sept. 2nd ; Chimney Swift, Sept. 2nd ; Wood Pewee, Chestnut-sided Warbler, Canada Warbler, Red-headed Woodpecker, Olive-backed Thrush, Warbling Vireo, Sept. 10th ; Yellow Palm Warbler, Sept. 18th ; Oven-bird, Magnolia Warbler, Wilson's Thrush, Sept. 19th ; Black-throated Blue Warbler, Black and White Warbler, Sept. 21st ; Maryland Yellow-throat, Black-throated Green Warbler, Nashville Warbler, Sept, 25th ; Catbird, Sept. 27th.

FALL ARRIVALS.

Blue-headed Vireo, Philadelphia Vireo, Sept. 10th; Golden-crowned Kinglet, Sept. 17th ; Black-poll Warbler, Bay-breasted Warbler, Sept 19th ; Pine Siskin, Sept. 20th ; Ruby-crowned Kinglet, White-crowned Sparrow, Sept. 21st ; Rusty Blackbird, Tree Sparrow, Sept. 25th. The Philadelphia Warbler was seen a second time on Sept. 19th.

DEPARTURE OF SUMMER BIRDS.

By GEO. R. WHITE.

Tree Swallow	2	July	Virginia Rail	10	Sept.
Whip-poor-will	7	Aug.	House Wren	18	"
Short-eared Owl	14	"	Black-throated Green		
Hummingbird	16	"	Warb'er	18	"
Kingbird	19	"	Swamp Sparrow	21	"
White Eave Swallow	5	Sept.	Barn Swallow	21	"
Sand Martin	5	"	Eave Swallow	21	"
Swift	5	"	Blue-winged Teal	21	"
Sora Rail	5	"	Scarlet Tanager	25	"
Fish Hawk	5	"	Goldfinch	25	"
Wilson's Tern	5	"	Golden-winged Wood-		
Night Hawk	6	"	pecker	25	"
Sparrow Hawk	7	"	Wood Duck	27	"
Spotted Sandpiper	9	"	Greater Yellow-legs	28	"
Night Heron	10	"	Red-headed Duck	28	"

Solitary Sandpiper	28	Sept.	Green-winged Teal	18	Oct.
Savannah Sparrow	29	"	Ring-necked Duck	18	"
White-headed Sparrow	30	"	Pintail Duck	18	"
Woodcock	2	Oct.	Wilson's Snipe	18	"
Pigeon Falcon	2	"	Bittern	18	"
Myrtle Warbler	4	"	Hooded Merganser	18	"
Catbird	7	"	Pied billed Grebe	18	"
Ruby-crowned Kinglet	8	"	Goosander	18	"
Bluebird	9	"	Kingfisher	23	"
Phœbe	9	"	Song Sparrow	20	"
Meadow Lark	9	"	Black Duck	1	Nov.
Vesper Sparrow	9	"	Mallard	1	"
Junco	14	"	Horned Lark	1	"
Purple Grackle	14	"	Blue Heron	1	"
White-throated Sparrow	16	"	Herring Gull	1	"
Golden-crowned Kinglet	16	"	Red-winged Blackbird	1	"
			Robin	2	"

Robins and Prairie Horned Larks still here, Nov. 8th.—W.T.M.

BOOK NOTICES.

AGRICULTURE.—By C. C. James, 200 pp. Toronto, 1898.—It has been the lot of few authors to accomplish so satisfactorily what in their preface they state to have been their object as Prof. James has in preparing the 200 hundred page Manual of Agriculture which has lately been given to the farmers of Canada. The author has had special opportunities which he has made the most of, of learning not only what was needed by the intelligent farmers of the Dominion, but what was the best way of presenting this information to them. Both as Professor of Chemistry at the Ontario Agricultural College and as Deputy Minister of Agriculture, Prof. James has been brought into close contact with the leading and rising farmers of Ontario. The new Manual will fill a decided want, which is none the less from the fact that this want may not have been noticed by some until their attention was drawn to it by seeing how well it has been filled.

The purpose of the book it said to be "to aid the reader in acquiring a knowledge of the *science* of agriculture, as distinct from the *art* of agriculture, that is, a knowledge of the 'why,' rather than a knowledge of the 'how.' The science of agriculture may be said to consist of a mingling of chemistry, geology, botany, entomology, physiology, bacteriology, and other sciences, in as far as they have a bearing upon agriculture. The aim has been to include but the first principles of these various sciences and to show their application to the art of agriculture. . . . An intelligent understanding of the science underlying the art of agriculture will add much interest to what is otherwise hard work, and as a natural consequence. the pleasure of such work may be greatly increased."

Every day the fact is being recognized more and more that the elements of those sciences which underlie all progress in every branch of agriculture *must* be taught in the Public and High Schools of the country. Already simple nature studies and the first steps in chemistry and geology are taught in the schools of Manitoba and Ontario, and these studies have proved to be not only of use and attractive to the students, but a ready means of creating a bond of sympathy between the teacher and his pupils; more especially has this been the case with those energetic and restless souls too often now called "bad boys" more. perhaps, from lack of understanding or skill in management on the part of the teacher than from a superabundance of of real badness on the part of the taught. Boys play truant because they find more to interest them outside the school than at their desks. If therefore the things which appertain to out-of-doors can be brought inside the schoolroom without robbing them of too much of their outside flavour, they will be a sure bait to catch the attention of all bright healthy boys and girls. Their study will arouse interest at once and the habits of concentration, power to observe and compare, and the necessary development of the faculties of exact thought and accurate description will be available for all other branches of study with which the pupil is engaged.

This book may be used as a text-book in High Schools and Public Schools. It would be well indeed for Canada if its use were made compulsory in every school in the land. The great truths laid before the reader are presented in a simple straightforward manner intelligible to all. The subjects are so skilfully arranged and concisely stated that a surprising amount of accurate information is given in this small octavo of 200 pages. The value of this simple knowledge to practical men is not, I believe, overstated when I aver that if all the farmers in Canada would read this little work, as they most certainly should, its appearance would mark an epoch in the history of the Dominion, which would be made manifest to all by an enormous increase in the crops and wealth of the whole country.

The scope of the work is shown by the following brief epitome of subjects : Part I. treats of the Plant, its development, structure, food and functions ; Part II., Soil, its nature and treatment ; Part III., Crops of the Field ; Part IV., The Garden, Orchard and Vineyard ; Part V., Live Stock and Dairying ; Part VI., Bees, Birds, Forests, Roads and the Home.

In these different sections the insect and fungous enemies of crops are treated at some length. This little volume is bound in cloth and well got up; although some of the illustrations are rather roughly executed, it is on the whole most excellent and for the price, 25c, is a marvel of cheapness.

THE WINTER FOOD OF THE CHICKADEE, Bulletin 54, New Hampshire College of Agriculture, by Clarence M. Weed.—There is something particularly charming about those confiding little feathered denizens of the woods which brave our cold northern winters and stay to cheer us at a time of the year when there is so little animated life. The Chickadee or Black-capped Tit-mouse (*Parus atricapillus*) is at once one of the most cheerful as well as one of the most useful of our common native winter birds. What a bright, busy, happy sight is presented by a flock of these little friends; for they are all friends these little balls of black satin and grey down, they are far too busy and well employed to waste

time in fighting. Satan has a hard time of it in "some mischief finding" for these little fellows to do, for their hands are never idle, as they hurry through the woods, running up or around the trunks of trees or hanging head downwards from a slender twig, never still for more than an instant, as they peer into every tuft of moss, every crack or cranny in the bark, along the twigs, under the bud scales of deciduous trees or among the leaves of evergreens, talking cheerfully to themselves and each other all the time as they carry out their useful mission in clearing the trees and shrubs of countless insect enemies: woe to the luckless caterpillar, chrysalis, spider, or beetle which comes within the range of their sharp black eyes. Nothing comes amiss to these insatiable hunters, from the minute, shining black eggs of an aphis to the fat chrysalis of a Cecropia Emperor Moth; with deft blows the hard sharp beak soon penetrates the thick silken cocoon and in a very short time the marauder is away looking for another victim. Dr. Clarence Weed publishes in this interesting bulletin the results of some careful investigations which he has carried out as to the winter food of the chickadee. He shows that more than one half of the food of this bird during the winter months consists of insects, a large proportion being in the form of eggs. Vegetation of various sorts made up a little less than a quarter of the food, and two thirds of this quarter consisted of the buds or bud scales which were believed to have been accidentally eaten along with the eggs of plant-lice. These eggs made up more than one fifth of the entire food and formed the most remarkable element of the bill of fare. This destruction of myriads of eggs of the plant-lice which infest fruit, shade and forest trees is probably the most important service which the chickadee renders during his winter residence. More than 450 of these eggs are sometimes eaten by one bird in a single day as well as the eggs of many other kinds of our most important insect enemies of the forest, garden and orchard. Dr. Weed figures in his bulletin some twigs of various trees, upon which the eggs of insects have been deposited. Among these are represented the egg masses of the tent caterpillars and the Fall

Canker-worm, both of which are favourite foods of those useful little birds. In addition to eggs of insects, many caterpillars and other stages in the development of insects are destroyed. One interesting figure shows the winter cases of a small caterpillar, closely hidden behind apple buds ; these are, in all probability, those of the Eye-spotted Bud-moth, sometimes one of the most troublesome and destructive enemies of the fruit-grower. This bulletin shows much careful work in a field which has been, to a large extent, neglected by entomologists, and Dr. Weed should receive the thanks of all lovers of birds for the proofs which he furnishes of the real benefits we receive from these little favourites. It was pleasing for some to know and most people to think that these birds were useful, but it is now possible to prove it to all who are willing to learn.—J. F.

NOTES AND REVIEWS.

NATURAL HISTORY IN NEW BRUNSWICK,—The sixteenth annual bulletin of the Natural History Society of New Brunswick has just been issued. Like its predecessors, it is full of interest to all students of the natural sciences in the Maritime Provinces. Prof. L. W. Bailey gives a sketch of Dr. James Robb, a pioneer of agricultural science. John Moser gives a list of New Brunswick mosses. S. W. Kain gives an annotated catalogue of earthquakes which have been felt in New Brunswick, and Dr. G. F. Matthew records some recent discoveries in the rocks about St. John. A good map in connection with the article shows the formations in the Kennebeccasis valley about Torryburn, Rothesay, etc. Prof. W. F. Ganong has ten short notes on botanical, zoological and physiographic subjects. These are of considerable general interest. Dr. Philip Cox gives a list of New Brunswick batrachians with notes on their distribution. The appendix contains a report on the work done at a summer camp held at Quaco last summer. It consists of reports by P. G Hall, Dr. G. F. Matthew, President G. U. Hay, and Professors Duff and

Ganong. The zoological report shows considerable activity in the study of birds, fishes and insects of the Province. Other items are a meteorological abstract for 1897, mean sea level at St. John, by E. T. P. Shewen, and reports of committees.

MOULDING MARBLE UNDER PRESSURE.—Experiments have been carried on at McGill University, Montreal, under the direction of Professor Adams, of the Faculty of Arts, and Professor Nicholson, of the Faculty of Applied Science, which show that marble may, under certain conditions, be moulded like clay. Without going into technical details, the experiments may be said to consist of placing miniature columns of pure Carrara marble, or granite, in sheaths of iron, and submitting them to long-continued but gradual pressure, with the result that the marble shortens and expands laterally, so as to swell the iron sheath. The iron is then cut away ; the marble is altered greatly in shape, but remains as solid and brittle as before. The difference between the deformed marble and the original rock is that the former is said to have a dead white colour, the sparkling cleavage faces of calcite being no longer visible. Although not quite so hard as the original, it is still firm and compact, especially when its deformation has been carried out slowly. No accurate measurements as to its strength have been received, but it was found to withstand a very sharp blow, and fragments of it weighing ten grammes, were allowed to fall from a height of 8ft. on to a wooden platform, from which they rebounded without breaking. Thin sections of the deformed marble when examined under the microscope showed that the calcite individuals composing the rock had in many cases been twisted and flattened. It is stated that the moulded marble when microscopically examined presented many striking resemblances to certain natural rocks whose peculiar cleavage it has hitherto been difficult to explain. But the recent experiments at McGill show that however brittle a rock may seem to be it is in reality a plastic substance capable of flowing into new shapes as surely as putty or dough.

Dr. Adams has not as yet published any full account of these experiments because they are incomplete, in fact they can now be said to be only beginning. A second machine is being built so that the work which is necessarily very slow, may be carried forward more rapidly. The best account of Dr. Adams's discovery is that in the *Scientific American* of April 23rd, 1898.

ORNITHOLOGY.

Edited by W. T. MACOUN.

A SWALLOW ROOST.—About a mile west of London, on what are called the Cove Flats, there are fifteen or twenty rows of willows, very thick-set, about 75 yards long and 15 feet high—evidently the relics of an ancient nursery, plainly showing what kind of tree was the most difficult to sell.

Passing these on the evening of August 4th of this year, I was attracted by the large number of Barn Swallows circling near it, which, as the night drew on, became more and more numerous, until I judged there were about 5,000 birds,—almost all Barn Swallows—in the flock. They flew at random until about 8 o'clock, only a few alighting in the roost before that time, but at 8.04 my note-book records them "falling like leaves," and by 8.05 half were settled. Their manner of descent was both interesting and beautiful, especially of those from the upper strata, for they were flying at all elevations from those just skimming the ground, to those so far up that they could with difficulty be seen, and these latter, in descending at an angle of only 20 degrees from the perpendicular, performed the most beautiful aerial evolutions it has been my fortune to witness. Setting their wings for the drop, they would waver from side to side as they came, much as a leaf wavers, but of course with many times greater speed. A few Purple Martins could be heard, and a few Bank Swallows; once or twice I thought I could detect the Cliff Swallow's note, and next morning I found

a single Tree Swallow on a wire with them, but all the remainder of this vast host were Barn Swallows.

Within five minutes of the time of the first general movement, barely a tenth remained in the air, and their voices, which are so liquid and soft when heard singly, became one of the harshest dins imaginable—English Sparrows could be no worse—and it certainly sounded as if they were all talking at once.

At 8.12 only a few are recorded as remaining, and at 8.19 the last one went in. That evening a beautiful cream-coloured specimen was noted, but later search failed to reveal him again. I visited the roost many times in August, and found the numbers gradually waning as the month wore on. All were gone on September 3rd and none had been notedby the boys near by for two or three days.

After the roost was once known, it was easy to notice the Barn Swallows—no matter in what direction one happened to be—between 7 and 8 p m., flying toward this roost, and indeed such large numbers must drain a vast area, at least five miles in diameter.

I had read of only one such roost before, reported by Mr. Widmann of St. Louis, where the Barn Swallows come by thousands to the islands in the Mississippi, but doubtless many would be found throughout the country if they were searched for.—W. E. SAUNDERS, London, Ont.

BOTANICAL NOTES.

One of the largest collections of plants ever brought into the herbarium of the Geological Survey by a private collector was that made by Mr. William Spreadborough while with Mr. McEvoy of the Geological Survey staff in his recent exploration of the approaches to and the mountains in the vicinity of the Yellow Head Pass. The flora of this region has not before been thoroughly worked up, no botanist having collected there since Drummond's time (1826). Though Mr. Spreadborough does not profess to be a botanist, his keen naturalist's eye enabled him

to detect many species that would have been overlooked by a less trained observer. More than 500 species of flowering plants were collected and though a hurried examination of the specimens discloses no new species the known range of many Rocky Mountain species has been extended northward and several species were collected of which there were no Canadian representatives in the herbarium of the Geological Survey though they were known to occur in Canada.

Altogether, Mr. Spreadborough's collection is one of the most valuable ever made by a non-professional and adds much to our knowledge of the distribution of Rocky Mountain species.

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Though the flora of Cape Breton Island was pretty well known in a general way, no systematic botanical exploration of the Island was made until this year, when Prof. Macoun spent the months of July and August in thoroughly exploring the Island. Over 1000 species were collected of which about 700 were flowering plants. These show that no part of the Island is so cold as the so-called barren region was supposed to be. No arctic plants were found. Those collected in the coldest part of the Island were identical with the species found at the Mer Bleue near Ottawa.

Several European plants not known to have become naturalized in America were collected by Prof. Macoun; nearly all of these were so thoroughly naturalized that it is possible that many of them are escapes from the gardens of the original French settlers, especially at Louisburg.—J. M. M.

HONEY BEES ACCLIMATISED.

By P. H. SELWYN.

It has been a matter of considerable doubt as to whether the Honey Bee (*Apis mellifica*, L.) when in a wild state can survive the cold of the ordinary Canadian winter as experienced in the vicinity of Ottawa Personal observations lead to the conclusion

that even under moderately favourable conditions as to location, the honey bee can and does winter successfully in hollow trees, and possibly in other self-chosen abodes.

In this connection the following may be of some interest to to the readers of THE OTTAWA NATURALIST.

On the 1st of July, 1897, a strong colony of bees (first swarm) absconded from the apiary of Mr. S. Short, near Rockcliffe, and took possession of a hollow tree some quarter of a mile distant. All efforts of the owner to dislodge them proved futile, as the tree, a giant basswood, is some 70 or 80 feet in height and the cavity in which they had located is within 20 feet of the top. After clearing out the decayed wood they settled down to business in their lofty abode, and it may reasonably be supposed that the winter found them fairly comfortably established, with abundance of honey.

Being much interested in the question as to whether they would survive the intense cold of our climate, I visited the tree early this spring and to my satisfaction I found them apparently as vigorous and strong as ever, judging from the hundreds of bees to be seen passing in and out.

This condition of affairs still exists, and if the cavity is sufficiently large they have doubtless accumulated a large quantity of honey during the past very favourable season, and will therefore be in a better position to withstand another winter.

That many colonies which have escaped from their owners do perish during the winter months seems almost certain, but in most cases probably from causes with which the climate has comparatively little to do, viz.: The abode too small to accommodate both brood and stores in sufficient quantity ; small second swarms too weak numerically to gather surplus stores for winter ; loss of queens ; and possibly ravages of the bee moth grub (*Galleria mellonella*, L.)

NOTE ON THE PHYSIOGRAPHY AND GEOLOGY OF KING'S COUNTY, NOVA SCOTIA.*

By H. M. Ami, Geological Survey, Ottawa.

King's County, Nova Scotia, is bounded on the north by the Minas Channel and Minas Basin (eastern extension of the Bay of Fundy), on the east by the Basin of Minas and Hants County. on the south by Lunenburg County, and on the west by the County of Annapolis. It is traversed in a north-easterly and south-westerly direction by three principal ridges, viz :

(1) *The North Mountain*, an eruptive axis from six to eight miles in breadth and extending from Cape Blomidon to Brier Island at the southern entrance to the Bay of Fundy, referred by geologists to the Triassic System.

(2) *The Ridge*, on and near which the town of Wolfville is built, consists of an axis of sedimentary rocks of Devonian and Silurian age overlaid unconformably, in its eastern extremity, by a series of granitic sandstones, shales and limestones holding plant and fish remains, referable to the Horton division of the Carboniferous system. This "Ridge" extends west through Kentville and Canaan to Nictaux in Annapolis County.

(3) *The South Mountain*—Formed by a belt of granite, in contact with the Silurian slates, sandstones, &c., of the Gaspereau Valley the latter being unconformably capped by rocks of the "Horton Series."

The Cornwallis Valley.

Between the "North Mountain" and "The Ridge" lies the beautiful and fertile Triassic Valley of the Cornwallis river, the largest and most southerly of the four streams which flow east into the Basin of Minas. The other streams are : the Canard, the Habitant and the Pereau rivers—the latter sometimes called the Canning river. "Look-off," on the North Mountain, is a favourite spot from which the beautiful and broad valley or the Cornwallis river, with its numerous dykes and orchards, can be seen to advantage, as well as the extensive meads of historic "Grand

Pré," besides portions of four other counties of Nova Scotia, viz :— Cumberland, Colchester, Hants and Annapolis. North Mountain is well clad with a forest of conifers and hard wood trees ; and though 700 feet above the level of the Bay, has sufficient soil on its flattened top to make good farming land.

THE GASPEREAU VALLEY.

Between "The Ridge" and the "South Mountain" flows the Gaspereau river, which finds its source in the picturesque and beautiful Gaspereau lake. This is a narrow but charming little valley, very fertile, abounding in orchards on both sides. The Duncan, Angus, Trenholm and Wall Brooks flowing from the South Mountain fall into the Gaspereau, have furnished fine exposures in the rocks of the Horton formation where Sir J. Wm. Dawson, Sir Charles Lyell and the late Professor C. Frederick Hartt obtained interesting series of fossil plants. In the district around the head-waters of the Gaspereau Valley and in many other places down to its mouth, are dense forests of spruce and hemlock and hard wood trees. The Gaspereau river enters the Basin of Minas near the mouth of the Avon River.

LONG ISLAND.

Over one mile in length and about half a mile across, situated four and a-half miles from Wolfville, is a favourite resort for many kinds of birds. It is formed by a mass of red Triassic sandstones, which have withstood the action of the denuding atmospheric agencies in times past. These sandstones are now being washed away rapidly and large masses frequently fall down from the bluffs on the north-western extremity of the Island and are carried away to sea by the powerful tides and tidal action of the Basin which is connected with the Bay of Fundy by a narrow but swift channel between Cape Split King's County and Cape Sharp, below Parrsboro', in Cumberland County.

NEW SPECIES OF CANADIAN VIOLETS.

We are pleased to announce for our next issue a paper on some new species of violets, which will be hailed with great satisfaction by Canadian botanists. This paper is now being prepared by Mr. James M. Macoun, Assistant Botanist of the Geological Survey Department, and is the result of a critical study of the whole group of several species, which up to the present time have passed under the name of *Viola cucullata*, Ait. In the last number of "Pittonia" (24th Sept., 1898), the editor, Dr. Greene, who has described the new species, speaks in the following complimentary terms of Mr. Macoun's careful work :—

"Whatever of value these notes may contain is largely, if not chiefly, due to abundant living specimens and very copious and intelligently made field-notes, which have been forwarded to me by Mr. Macoun, whose modesty alone seems to have stood in the way of his publishing them himself ; for all the new species here described were so carefully studied by him, that independently of my own opinion, he regarded them as undescribed."

Mr. Macoun has grown all of the species referred to, and studied them at every stage of their growth. We hope to publish with this paper figures illustrating the salient characters by which they may be recognized.

Excursion No. 2 to Chats Falls.

Notwithstanding the threatening aspect of the weather a very large number attended the excursion to the beautiful Chats rapids of the Upper Ottawa on June 25th. The route taken was by electric cars to Aylmer and thence by the comfortable steamer *G. B. Green* to the falls. Unfortunately owing to the lowness of the water in the Ottawa, it was impossible to land at our original destination, Fitzroy Harbour. The party accordingly disembarked at Moore's wharf some two miles below the above point. As this was a new district it was full of interest to our naturalists, and the members of the Camera Club, many of whom we were pleased to have with us on the expedition, found

ample opportunities of adding many a scenic gem to their collections.

In the matter of botany, Professor Macoun was a host in himself, and despite the almost continuous down-fall of rain during the afternoon, he made several very successful foraging sorties into the woods, coming back laden with numberless floral treasures, which he exhibited and described to the delight of everybody. The success of this excursion under somewhat adverse circumstances was distinctly due to the energy and good management of Mr. F. T. Shutt, of the Executive Committee.

EXCURSION NO. 3 TO AYLMER.

On Saturday afternoon the 24th of September, a small party of twenty-five visited Blueberry Point, Aylmer. The weather was overcast, but no actual rain fell, and a most instructive afternoon was spent. Prof. Macoun collected about 75 species of toadstools and mushrooms, the qualities and characters of which he explained to all who accompanied him through the woods. Miss Marion Whyte returned with her band of botanists and, notwithstanding the lateness of the season, showed a collection of over 20 plants in blossom. Addresses were given by the President, Professor Prince, by Principal Pollock on the geological formation of the locality, by Prof. Macoun on edible and poisonous fungi, and by Messrs. Sinclair and Fletcher on the general teachings of Nature, showing that this charming book lay open for all who would learn.

EXCURSION NO. 4 TO CHELSEA.

One of the most enjoyable outings of the whole season was held on the 1st of October to Gilmour's Grove, Chelsea, when nearly a hundred ladies and gentlemen, chiefly students from the Normal School, took advantage of the opportunities afforded by the Club of visiting the above charming locality under the guidance of the leaders of the different branches of the Club. The addresses were delivered around a roaring bonfire on the bank of the Gatineau River, the speakers being Messrs. Sinclair, Shutt, Fletcher and Bryson.

VEGETATION IN THE BERMUDAS.—PART. III

PLANTS AND FLOWERS.

By H. B. SMALL.

If after the fall of man any truant flowers of Eden escaped its bounds their seeds must have found a kindly soil in Bermuda. Plants and flowers there attain a daring loveliness which stamps them on the memory of even the transient visitor. The island group may well be called "the Land of the Lily and the Rose" for each of these attains a perfection far beyond the conception of a dweller in the north. The many and beautiful varieties of the garden rose—both bush and standard—bloom in profusion all the year round, and the air is literally laden with their perfume. Bermuda is a botanists' paradise, but how many pluck every striking flower they see, only to toss it carelessly aside, regardless of its loveliness or its brillliancy. The Passion-flower, Narcissus, Geranium, Heliotrope, Verbena, Violet, Wistaria and a Creeper known as *Bougainvillea*, one of the handsomest adjuncts to a wall or verandah that the world produces, are all remarkable for their luxuriance. The Bougainvillea was introduced from Gibralter by Governor Lefroy in 1874, and has now so established itself as to be seen gracing the majority of private buildings.

There are two species of Passion-flower, one remarkable for its blossoms (*Passiflora cærulea*), the peculiar formation of which representing the emblems of Christ's Passion has given rise to the name, the other (*Passiflora minima*), a wild species covering roadside banks and old stone walls in profusion, but the flower of which is far less conspicuous than its congener. Of the Narcissus two species are abundant, one (*N. Tazetta*) bearing a cluster of numerous white flowers with a yellow eye, the other (*N. jonquilla*) with two or three deep yellow fragrant flowers. These plants are abundant on some hillsides along the edge of the cedar groves or beneath the Oleander shade, and in the glades in the valleys. There are two Honeysuckles (*Caprifolium sempervirens*) and (*Lonicera Japonica*), which cover the walls or trail along

the road-sides, lending a fragrance all their own, suggestive of English lanes and road-side hedges. The Morning Glory (*Convoluolus major*) is abundant both wild and cultivated, and its purple flowers two or three inches in diameter are produced in profusion all the year round. Many a rugged corner or way-side copse is festooned with this beautiful creeper, and its graceful hangings of nature's tapestry hide many an unsightly corner or debris of a ruin.

The most important flower, and cultivated to a very large extent for exportation, is the Easter Lily (*Lilium Harrisii*), and a dwarf species (*L. longiflorum*) both bearing numerous large flowers of the purest white. A specimen of the latter grown by the late Harvey Trott, Esq., at Waterloo in Pembroke parish produced on one stem 145 flowers. This was exhibited in May 1883 at the St. Nicholas Hotel, New York, and an illustration of it appeared in the London *Graphic*. A field of several acres in extent planted with these lilies presents a strikingly beautiful appearance, not only when in full bloom, but when maturing their buds; the latter are carefully cut and boxed for shipment, blossoming after arrival at their destination, and keeping fresh for some days. Besides the Easter Lily, the Blue Lily (*Agapanthus umbellatus*) and the Egyptian Lily, or more properly Arum (*Calla Ethiopica*) grow luxuriantly, and where escaped they seem to flower better than in cultivation. The Cane Shot (*Canna coccinea*) from 3 to 5 feet high, with showy flowers two or more inches long, yellow, red and with lip variegated with yellow, has taken well to waste places, and with its leaves 10 inches long and 4 wide it is a very noticeable plant. A lily species known as Elephant's Ears (*Caladium*) remarkable for its large-sized leaves, is abundant in moist valleys.

A very abundant and attractive plant miscalled Heath, (*Russelia juncea*) with rush-like pointed branchlets and long scarlet tubular flowers, giving the idea of brilliant red coral, grows by the way sides and edges of private grounds, delighting in stony and rocky localities. The Poppy (*Papaver dubium*) with scarlet flower, and (*P. somniferum*) are common on waste

ground and the edges of fields. The Stock (*Matthiola incana*) with purple blossoms is abundant along the sandy margin of the bays, and in sea shore nooks and crannies. A plant known as the Stinging Thistle (*Argemone Mexicana*) with yellow blossoms, and easily mistaken for a yellow poppy, is common at all seasons in old worn out grounds and waste places. The flower itself reminds one of the *Eschscholzia*.

There are four species of Evening Primrose, the (*Œnothera longiflora*) with yellow flowers three inches in diameter, not uncommon in waste land, (*Œ. sinuata*) with smaller yellow flowers, common in fields and roadsides, (*Œ. rosea*) with rosy flowers three-quarters of an inch in diameter, found in grass-lands, and (*Œ. humifusa*) with Orange yellow blossoms, found on the sea shore. The Four o'clock plant (*Mirabilis Jalapa*) opens its brilliant flowers at four p.m., and closes early next morning. Although red is its prevailing colour, other varieties are by no means uncommon, as white, yellow, and white with a red centre. Its blossoms are profuse, and continue unfolding all through spring and summer. The Golden Rod (*Solidago sempervirens*) is as elsewhere in America a very common plant along the shore, by waysides and fence walls, always showy from its long, compact panicle of golden yellow flowers. Two Salvias (*S. splendens* and *S. purpurea*) with respectively scarlet and purple flowers, are cultivated, whilst (*S. coccinea*) with very showy scarlet flowers, three-quarters of an inch long, is common on dry hills and wayside banks, and (*S. serotina*) clothed with a whitish pubescence, and bearing white flowers a quarter of an inch long, is found in similar localities. Both of these blossom from April to October.

The Barbadoes Fence (*Poinciana pulcherrima*) with its orange-red flowers and long stamen and style keeps in full bloom from November to April, with straggling blossoms all through summer, is very pretty and showy, and being almost a shrub, forms a charming hedge when cultivated. The Red Justicia (*J. lurida sanguinea*) is common, although originally

escaped from gardens, in wild corners of fences, and (*J. alba*) also grows occasionally with the former.

What appears to be the most universally spread plant in Bermuda is the Life Plant (*Bryophyllum calycinum*), locally known as "Floppers," a name attributable to the cracking noise produced by pressing the buds before they are fully open. Every old wall or rocky road margin is literally covered with its growth, the large fleshy leaves tending to make it conspicuous, and its pendulous flowers, of a green and purple hue with a bladder-like appearance, on stalks eight or ten inches high, all through the winter season at once attract attention. The leaves or leaflets when placed on a moist surface, produce rootlets and young plants at the marginal creases, a peculiarity which appears to render the usual methods of propagation unnecessary, as its seeds are said not to mature. One leaf will sometimes shew when lying detached from the parent plant, a dozen young plants forming around it.

From the prolific display of the whole flora of Bermuda, mention of any one more than another seems almost invidious, and in the enumeration of the above-mentioned plants, imagination must supply the reality to those who have not visited that flower land. Before closing, I must mention three plants, more of a commercial than botanical value. First is the Dwarf Banana (*Musa Cavendishii*) of which family there are several kinds, viz., the common one (*M. sapientum*), the Red (*M. rosacea*), the Fig (*M. spicatum*), and the Plantain (*M. paradisiaca*). The Dwarf is the kind most frequently grown, bearing heavy bunches of choice fruit, consequent probably on this variety being more easily sheltered from the wind, which when blowing heavily tears the exposed parallel-veined leaves of the taller varieties to shreds. A large reddish-brown or chocolate-colored drooping flower pendent from each bunch of fruit is a curiosity in itself, and is not unlike the closed bloom of a water lily or Night-blooming Cereus. The graceful palmlike appearance of the large feathery leaves and tree-like stems adds not a little to the tropical appearance of the landscape, for there is

scarcely a house without its Banana plantation beside it. The Cassava (*Jatropha Manihot*), from which is prepared tapioca, is cultivated to a limited extent. It is a smooth shrubby plant three or four feet high, producing tubers or roots not unlike those of the dahlia, but much more massive and of a harder texture. Amongst the colored population a Christmas dinner is not complete without a Cassava pie, a poor substitute however for the plum pudding of the north. The third plant is the Arrowroot (*Maranta arundinacea*) growing three or four feet high, with large spear-head-shaped leaves, and bearing root-like tubers which mature in February. From these a starch is manufactured which, after going through several processes, is known as Bermuda Arrowroot and holds a high place in the market, but its place has been lately taken by the article now produced all through the West Indies, in Australia, and in the Fiji Islands.

There is a plant which I have been unable to place, neither can I find any description corresponding with it in the few botanical papers bearing on the flora of Bermuda. I am inclined to think it is a *Sanseveria*. Its leaves are from 18 to 24 inches long, and about three inches wide, smooth, leathery, of a dark green mottled with purple spots, like some of the Orchis tribe. The under side is purplish. When the leaves dry off they turn a greenish brown with the spots still showing, and are not unlike the back of a snake. It grows in shady places, about rock cuttings or disused quarries, preferring shade to the open. It was not in blossom during my stay.

Owing to the extreme moisture in the air, vegetation is always luxuriant, growth being sustained by the heavy dews and the great evaporation at night. These conditions approach the description of Eden, where "a mist went up from the garden and watered the face of the earth." The coral rock too is favorable to growth, and vegetation of all kinds flourishes apparently out of the face of the rock wherever fissures allow the roots to penetrate.

NOTES AND COMMENTS.

DONATION TO THE LIBRARY.—It will be remembered that last year the Club's library was enriched by a valuable donation from Madame Ville, of Paris, France, who presented to us, through Mr. Shutt. twelve handsomely bound volumes containing the record of the labours of her husband, the late Professor Georges Ville, the eminent agricultural chemist. During the past month a further volume has been received from the same donor. Its title is "*Le dosage de l'Ammoniaque de l'air et l'absorptson de l'Azote de l'air par les Plantes*," and contains an account of the chief work undertaken by this scientist. The thanks of the Club have been forwarded to Madame Ville for her valuable gift.

DR. ADOLF LEHMANN, a member of the Club, and a contributor to the OTTAWA NATURALIST, who for years was Assistant Chemist at the Experimental Farm, Ottawa, has been appointed Agricultural Chemist for the district of Mysore, India. This is an important position, and we offer him our heartiest congratulations, wishing him all success in his new and distant field of labour.

Since his return form Leipsic Dr. Lehmann has been at Queen's College, Kingston, as Demonstrator and Lecturer in Organic Chemistry. Dr. Lehmann will leave in Canada many warm friends, and we trust that from time to time we may be able to inform them of the good work and good health of our erstwhile co-labourer.

AMERICAN PUBLIC HEALTH ASSOCIATION—This important Society, with its membership extending over the United States, Mexico and Canada, held its 26th annual meeting in Ottawa, September 27th to 30th. There was an attendance of about two hundred visiting members, including a party of six from the City of Mexico. A goodly number of Canadians were present, and Ottawa, as might be expected, was well represented.

The deliberations of this association include all subjects relating to public hygiene, and papers and discussions upon

the disposal of sewage and garbage, the pollution of water supplies, disinfection, quarantine and kindred matters occupied the attention of the members throughout the three days during which the society was in session.

Three papers were presented by Ottawa gentlemen. The first was by Thos. Macfarlane. F.R.S.C., Chief Analyst of the Inland Revenue Dept., "Upon the disposal of refuse in some European cities." This was an exhaustive account of how sewage is disposed of in many cities and towns of Great Britain and the Continent, and comprises the carefully recorded observations made by the author in person on a recent tour made purposely for that object. It is a most valuable paper for reference, since it contains in concise form useful information not hitherto collated. Mr. Macfarlane emphasized the use of "moss litter" as an absorbent and deodorizer and stated that the experience of all who had tried it for this purpose showed it to be entirely satisfactory.

"The Interpretation of the Chlorine number in Well Waters" was the title of a paper read by Mr. A. McGill, B.Sc. The author claimed that most valuable data would be obtained if the chlorine content of the ground waters throughout a district were determined and tabulated according to locality. Such results would materially assist in the diagnosis of rural well waters.

A paper on a closely allied subject was given by Mr. Frank T. Shutt, M.A., Chemist of the Dominion Experimental Farms. It was entitled "The Farm Well." Since the institution of the Experimental Farms the useful work of examining well waters for farmers has been done, free of charge to the agricultural public, and the writer stated that in this way the water from more than 1,000 wells had been analysed. The results, as regards the general quality of the waters were far from satisfactory, the chief cause of pollution arising evidently in the majority of cases from the proximity of the well to the barn yard or a similar source of contamination. It was pointed out that life was being jeopardized for the sake of convenience in too many farm homesteads. The paper concluded with a use-

ful set of rules to be followed by the farmer for the procuring and preservation of a pure water supply.

The Local Committee of Arrangements, with Sheriff Sweetland as Chairman, and Mr. Thos. Macfarlane as Secretary, are to be congratulated on the success that attended their labours both before and during the convention. The visiting members agreed that their reception had been most cordial and that the hospitality they had received and the entertainments and excursions provided had made their short sojourn in Ottawa a most pleasant one.

A BLACK SQUIRREL AT OTTAWA.—A fine Black Squirrel was shot recently on the property of Mr. George Holland on the Richmond Road. The specimen was in good condition and has been well stuffed by Mr. Dupuy, of Hintonburgh. It is now in the possession of Mr. Holland. The Black Squirrel, which is a melanic variety of the Gray Squirrel (*Sciurus Carolinensis*), is very rare at Ottawa. There are only one or two records of its having been seen here.

SOIREES.

The usual Evening meetings will be held during the coming winter for Lectures, the reading of Papers and Short Notes, and the reception of the Reports of the various Branches. It is hoped to make the *exhibition of specimens* and *informal discussions* conspicuous features of next winter's meetings. Members of the Club who are desirous of submitting papers are invited to communicate with the Soirée Committee or with any member of the Council as soon as possible, so that the programme may be arranged without delay.

The names of the members of the Council are printed on the last cover of each number of the OTTAWA NATURALIST.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, DECEMBER, 1898. NO. 9.

CONTRIBUTIONS TO CANADIAN BOTANY.*

By JAMES M. MACOUN.
Assist. Naturalist Geol. Survey of Canada.

XII.

RANUNCULUS INAMŒNUS. Greene, Pittonia III, p. 91.

Green, and appearing as if glabrous, but sparsely hairy, the the stoutish stems 6 to 12 inches high ; radical short-petiolate leaves obovate-flabelliform, at summit either crenate-toothed or 3-lobed, the cauline usually quite sessile and once or twice ternately divided into oblanceolate segments ; peduncles short and slender, often 3 to 5 together and subumbellate ; corolla 3 to 5 lines broad, the 5 petals obovate-oblong ; head of small pubescent achenes ovoid or short-cylindraceous, the linear receptacle white-hispid.

Banff, Rocky Mountains, 1891 ; from several localities in the foot-hills, i.e., Jumping Pond Creek, Herb. No. 18,039 ; Bragg's Creek, Elbow River, Herb. Nos. 18,037 and 18,038, and Moose River, Elbow River, Herb. No. 18,040. (*John Macoun.*)

An excellent species well separated from all forms of *R. affinis* to which it has at various times been referred.

AQUILEGIA FLAVESCENS, Wats.

Not rare on mountain-sides on both sides of the summit at Yellow Head Pass, Rocky Mountains, Lat. 52° 50′, 1898. (*W. Spreadborough.*) Northern limit.

NASTURTIUM SYLVESTRE, R. Br.

Naturalized along the road in front of Ball's Mills, Lincoln Co., Ont. (*W. C. McCalla.*) New to Canada.

CARDAMINE ANGULATA, Hook.

Spring House Cove, Dawson Harbour, Queen Charlotte Islands, B.C., June 26th, 1897. (*Dr. C. F. Newcombe.*) New to

*Parts I-XI of these contributions appeared in the "Canadian Record of Science" during the years 1894-98.

Canada. Collected on the banks of the Columbia by Douglas and Scouler, and in many parts of Oregon and Washington in recent years, but never on Vancouver Island or the B. C. coast, where it doubtless occurs.

DENTARIA CALIFORNICA, Nutt.

Cardamine angulata, Macoun, Cat. Can. Plants, vol, I, p. 41.

Dentaria tenella, Macoun, Cat. Can. Plants, vol. I, p. 39.

Common on Vancouver Island.

DENTARIA GEMINATA, Wats.

Rich woods, Burnaby Lake, near New Westminster, B.C., 1889. (*J. M. Macoun.*) New to Canada. Agrees in every respect with specimens collected in the upper valley of the Nesqually River, Washington, by Mr. O. J. Allen.

ARABIS DREPANOLOBA, Greene, Pittonia, vol. III, p. 306.

Prennial, the several stout decumbent stems 8 to 12 inches high ; herbage seemingly glabrous and glabrous, but the small oblanceolate lowest leaves sparsely stellate hairy ; the oblong sessile auriculate cauline ones like all the remaining parts of the plant glabrous ; corollas red, ¼ inch long or more ; fruiting raceme 2-5 inches long, the broad spreading and slightly falcate-recurved pods 2 inches long including the short pedicel, about 1½ lines wide, abruptly acutish, the stigma sessile ; valves with with a manifest nerve at base only ; seeds in two rows under each valve, flat, obovoid, narrowly winged.

Collected in August, 1891, by Prof. John Macoun at Devil's Lake, Banff, Alberta, and distributed as *A. Lemmoni*, to which it is indeed related, yet easily distinguishable by its larger dimensions, much less pubescent lower leaves, and especially by its pods, which are twice as broad and with two rows of seeds.

ARABIS NUTTALLII, Robinson.

High dry slopes of mountains at Crow's Nest Pass, Rocky Mountains, alt. 7000 ft., Aug. 2nd, 1897. Herb. No. 18,162. (*John Macoun.*) New to Canada. The habitat of this plant is stated by Dr. Robinson to be "chiefly on low grounds in [mountain] valleys." The habitat as given by Nuttall "lofty dry hills,"

seems the better one. Nuttall's description of the root "thick crowned with vestiges of former leaves and stems," well describes Prof. Macoun's specimens.

ALLIARIA OFFICINALIS, Andrz

Sisymbrium Alliaria, Scop. Can. Rec. of Science, Nov., 1894.

Alliaria Alliaria, (L.) Britt.

At the Cove, Quebec, Que. (*Mrs. Brodie.*) Not before recorded from province of Quebec.

SISYMBRIUM ALTISSIMUM, L.

S. Sinapistrum, Crantz.

Ballast heaps, North Sydney, Cape Breton Island, N.S., 1898. (*John Macoun.*) Not before recorded from Nova Scotia. Okanagan Landing, B.C. (*J. R. Anderson.*) Western limit.

CONRINGIA PERFOLIATA, L.

Erysimum Orientale, R. Br. Can. Rec. of Science, Nov., 1894

Now represented in our herbarium from many localities in the North-west and from Snelgrove, Ont. (*Jas. White.*) and Stamford, Ont. (*R. Cameron.*)

PARRYA MACROCARPA, R. Br.

Summit of Father Mt. alt. 6,000 ft. Yukon District, July 3rd, 1898. (*J. B. Tyrrell.*) Not before collected in that region.

DRABA HIRTA, L.

Crevices of rocks, Big Intervale, Margaree, Cape Breton Island, N.S, 1898. (*John Macoun.*) Not before recorded from Nova Scotia. Northern Labrador. (*A. P. Low.*)

DRABA PRÆALTA, Greene, Pittonia, vol. III, p. 306.

Annual, very erect and strict, mostly quite simple, 10 to 15 inches high, subcinereous throughout, even to the pods, with short stellate hairs; rosulate basal leaves oblong-lanceolate, ½ to ¾ inch long, entire or with two or three pairs of sharp teeth the two or three cauline similar; flowers white; the loose fruiting raceme often 5 or 6 inches long, the almost lanceolate pods ½ inch long or more, erect on ascending pedicels nearly as long,

acute, rather turgid, not contorted, a channel-like depression marking the line of the mid-vein from its base to near the middle.

This is a plant which by its annual root and large size would be taken for a relation of *D. nemorosa*, but for its very strict habit, narrow leaves and white flowers. Common everywhere in the Rocky Mountains between 4,500 ft. and 6,000 altitude. Our our herbarium specimens are from Banff, Rocky Mountains, 1891 (type locality); Kicking Horse Pass, Rocky Mountains, 1885; Crow's Nest Pass, Rocky Mountains, 1897. Herb. No. 18,136. (*John Macoun.*) Yellowhead Pass, Rocky Mts., 1898. (W. Spreadborough).

LESQUERELLA ARCTICA (DC.) S. Wats.

Vesicaria arctica, Rich.: Macoun, Cat. Can. Plants, vol. 1, pp. 54, 490.

Athabasca River near Lac Brulè, northern Alberta, July, 1898. (*W. Spreadborough.*) Specimens collected by Mr. Spreadborough do not differ in any respect from those collected by Drummond in the same latitude and distributed from the British Museum as *Physaria didymocarpa.*

EUTREMA EDWARDSII, R. Br.

Northern Labrador, 1897. (*A. P. Low.*) Not before recorded from Labrador.

DIPLOTAXIS TENUIFOLIA, DC.

Bank of the new Welland Canal north of St. Catherines, Ont. (*W. C. McCalla.*) Not recorded west of Nova Scotia.

MYAGRUM PERFOLIATUM, L.

On Gallow's Hill, Quebec, Que. (*Mrs. Brodie.*) Introduced from Europe. Not before recorded from Canada.

POLYGALA VERTICELLATA, L.

On the open prairie on the ridge near the Insane Asylum, Brandon, Man., 1896. Herb. No. 12,336. (*John Macoun.*) Recorded from but one other locality in Manitoba.

STELLARIA GRAMINEA, L.

Near Niagara, Ont. (*R. Cameron.*) Western limit in Canada.

ARENARIA ARCTICA, Stev.

A single specimen of this species was collected in Northern Labrador by Mr. A. P. Low in 1897. According to Dr. Robinson this specis is confined to Alaska and adjacent coasts and our other herbarium specimens are all from that region, but there can be no doubt about the identity of Mr. Low's plant.

ARENARIA CAPILLARIS, Poir., var. FORMOSA Regel.

A. capillaris, var. *nardifolia*, Macoun, Cat. Can. Plants, Vol. I, p. 70, in part, and vol. I, p. 496.

Common in the Rocky Mountains and British Columbia. All our specimens with the exception of those from Sproat, B.C., are this variety. The specimens collected at Sproat are much larger, with larger flowers (petals more than twice the length of the calyx), and much longer spreading pedicels. The whole plant is glabrous, but is not certainly referable to either *A. capillaris* or the var. *nardifolia*.

HYPERICUM NUDICAULE, Walt.

H. Sarothra, Michx. Macoun, Cat. Can. Plants, vol. I, p. 85.

In sandy fields at Sandwich, Ont. Herb. No. 18,317 (*John Macoun.*) This is the only Canadian locality from which we have specimens of this plant.

HELIANTHEMUM CANADENSE, Michx.

Our only specimens of this species are from Rice Lake Plains, Ont.; Sandwich, Ont. (*John Macoun.*); and Niagara Falls, Ont. (*R. Cameron.*)

HELIANTHEMUM MAJUS, B. S. P.

H. Canadense, Macoun, Cat. Can. Plants, vol. I, p. 60, in part, and vol. I, p. 492.

Apparently more widely distributed than the last in Canada. Our specimens are from Kingston, N.S. (*John Macoun.*); London, Ont. (*Dr. Burgess*), High Park, Toronto, Ont. (*Jas. White.*) Lake of the Woods, Ont. (*Dr. G. M. Dawson*).

LECHEA INTERMEDIA, Leggett.

All the references under *L. minor*, Macoun, Cat. Can. Plants,

vol. I, p. 61, are *L. intermedia* as far as they are covered by our herbarium specimens. We have no Canadian specimens of *L. minor*.

LECHEA JUNIPERINA, Bicknell.

First collected by Dr. C. A. Hamilton in 1891 on dry sterile roadsides, south of Mahone Bay, N.S., and in adjacent pastures, more particularly along the Fauxbourg road. New to Canada.

ANODA LAVATEROIDES, Medick.

In cultivated grounds at St. Catherines, Ont. (*W. C. McCalla.*)

GERANIUM PRATENSE, L.

In fields at Quebec, Que. (*Mrs. Brodie.*) Only other Canadian record is from New Brunswick.

CEANOTHUS VELUTINUS, Dougl., Macoun, Cat. Can. Plants, vol. I, pp. 96 and 503.

C. velutinus var. *lævigatus*, T. and G; Macoun, Cat. Can. Plants, vol. I, pp. 96, in part, and 504.

Common in the Rocky Mountains and throughout British Columbia. All the references under var. *lævigatus* in Macoun's catalogue with the exception of Menzies' from Nootka go here.

CEANOTHUS VELUTINUS, Dougl. var. LÆVIGATUS, T. and G.

Our only specimens of this plant were collected by Prof. Macoun in 1887 at Horne Lake, Vancouver Island, not far from Nootka, where it was first collected by Menzies.

RHAMNUS FRANGULA, L.

In a thicket in North London, Ont., 12 to 15 feet high and 3 to 5 inches thick at base. Collected by Mr. J. Dearness, July 1st, 1898. Well naturalized. Not before recorded.

TRIFOLIUM INVOLUCRATUM, Willd.

West coast of Queen Charlotte Islands, 1897. (*Dr. C. F. Newcombe.*) Northern limit.

ANTHYLLIS VULNERARIA, L.

First noticed in clover fields about New Durham, Oxford

Co., Ont., in the summer of 1897, and again in 1898. Communicated by Dr. T. J. W. Burgess.

LESPEDEZA VIRGINICA (L.) Britt.

In thickets at Leamington, Ont., 1892. (*John Macoun.*) New to Canada.

LESPEDEZA FRUTESCENS, Britt.

L. Stuvei, var. *intermedius*, Gray. Man. Ed. VI. p. 147.

L. reticulata, Macoun, Cat. Can. Plants, vol. I, pp. 119 and 511.

Not rare in sandy woods and thickets from Niagara to Sarnia.

LATHYRUS MYRTIFOLIUS, Muhl.

L. palustor var. *myrtifolius*, Gr.; Macoun, Cat. Can. Plants, vol. I, p. 122.

In thickets at Brandon. Man. Herb. No. 12,528. 1896. (*John Macoun.*) Western limit.

PRUNUS AVIUM, L.

Along a creek bank west of Niagara-on-the-Lake, Ont. (*J. Fearness.*) Not before recorded in Canada.

SPIRÆA LOBATA, Jacq.

Escaped from cultivation and naturalized at Boylston, N.S. (*Dr. C. A. Hamilton.*) Not before recorded in Canada.

SPIRÆA SORBIFOLIA, L.

Along roadsides near Baddeck, Cape Breton Island, N.S., 1898. (*John Macoun.*) Escaped from cultivation, but not before recorded as well naturalized.

POTENTILLA NEMORALIS, Nestler; Macoun, Cat. Can. Plants, vol. I, p. 142.

Discovered many years ago at Ste. Ann's, Cape Breton Island, N.S., by Dr. Lawson. Collected in 1898 by Prof. Macoun between Ste. Ann's and Baddeck Bay, Cape Breton Island.

RIBES FLORIDUM, L'Her.; Macoun, Cat. Can. Plants, vol. I, p. 163.

Collections of recent years have shown this species to be more widely distributed west of Manitoba than was supposed.

We have it from Old Wives Creek, Assa., and Medicine Hat, Assa. (*John Macoun.*) Maple Creek, Assa. (*J. M. Macoun.*) and Ste. Anne, west of Edmonton, Alta. (*W. Spreadborough*)

SEDUM DIVERGENS, Wat.

Mountains at Yellow Head Lake, Rocky Mountains, Alt. 6,000 ft. July 17th. 1898. (*W. Spreadborough.*) Not before recorded from Canada though some Vancouver Island references to *S. Oregonum* may be this species.

EPILOBIUM LUTEUM, Pursh.

By springs on the mountain side, west of Henry House, Athabasca River, Lat 53°, Alberta. Alt. 5,500. Aug. 30th, 1898. (*W. Spreadborough.*) Not before collected on east side of Rocky Mountains, and not so far north anywhere in Canada.

ANGELICA SYLVESTRIS, L.

Meadows and old fields at Louisburg, Cape Breton Island, N.S. 1898. (*John Macoun*) Probably introduced by the French in the 17th Century, Not before recorded.

SCABIOSA SUCCISA, L.

In an old field at the head of the bay at Louisburg, Cape Breton Island, N.S. 1898. (*John Macoun.*) Probably introduced by the French in the 17th Century.

GRINDELIA MACROPHYLLA, Greene, Pittonia, vol. III, p 297.

Stout erect herbaceous, 3 feet high, corymbosely branched at summit, wholly glabrous, or with a few scattered short hairs on the pedunculiform branches; leaves thinnish, the radical a foot long or more, lanceolate, scarcely petiolate, incisely serrate ; the cauline oblong or spatulate oblong, 2-4 inches long, sessile and clasping by a broad base, coarsely serrate, or the uppermost reduced and entire ; involucres large, hemispherical, scarcely glutinous, their narrow bracts with a long slender spreading acumination ; rays many, an inch long or more.

Described from specimens collected by Dr. Edw. L. Greene from the margin of a tide-water swamp near Vancouver, B.C., in July, 1890. Represented in the herbarium of the Geological

Survey by specimens collected by Prof. Macoun at Barclay Sound, Vaucouver Island, 1887, and Burrard Inlet, near Vancouver, B.C., 1889.

BIDENS CHRYSANTHEMOIDES, Michx.

Beautiful specimens of this species were collected in Lincoln Co., Ont., Sept. 16th, 1897, by Mr. W. C. McCalla.

CENTAUREA SOLSTITIALIS, L.

Collected on a farm about 8 miles S.E. of London, Ont. Communicated by Mr. J. Dearness.

CREPIS TECTORUM, L.

On lawns, introduced at Wingham, Ont., 1897. (*J. A Morton.*) Common in Woodland Cemetery, London, 1897 (*J. Dearness.*) Not before recorded in Canada.

HIERACIUM PRÆALTUM, Vill.

Don Valley, near Toronto, Ont., 1894. Covering about half an acre of the C. P. Ry. embankment. (*W. Scott.*) New to Canada.

LOBELIA SPICATA, Lam.

Well established at Holland Cove,entrance to Charlottetown. Harbour, Prince Edward Island. (*L. W. Watson.*)

ARCTOSTAPHYLOS MEDIA, Greene, Pittonia, vol. II, p. 171.

Near the Nanaimo River, Vancouver Island (*J.R.Anderson.*) Not before collected in Canada, and known only from Washington and the above locality. Mr. Piper who collected the specimens from which the species was described wrote of the plant as seen by him: "It is found sparingly on dry gravelly ground in Mason County, where both *A tomentosa* and *A. uva-ursi* are very abundant, and always in a position to indicate a hybrid origin. It is found most commonly in beds of *A. uva-ursi* with plenty of *A. tomentosa* near by, and is easily distinguished from *A. uva-ursi* by its larger size, merely procumbent (not prostrate) habit, and paler foliage." (Pittonia, vol. II. p. 171.) Mr. Anderson sends me the following note on the specimens collected by him: "Regarding the *Arctostaphylos*, Mr. Piper's description of

occurrence coincides exactly in every respect with mine, and from the fact of finding it surrounded by quantities of *A. tomentosa* and *A. uva-ursi*, I was also lead to believe it might be a hybrid." This note was written in 1897 ; in 1898 Mr. Anderson collected and sent to the herbarium of the Geological Survey a fine series of specimens, which clearly show that *A. media* is a hybrid.

ASCLEPIAS TUBEROSA, L.

Tarr Island, River St. Lawrence and below Rockport, Leeds Co., Ont. (*Rev. C. J. Young.*) Eastern limit in Canada.

GENTIANA FRIGIDA, Hænke.

Above the tree line, alt. 5,000 ft., Nishing River, Lat, 62°, Yukon District. Aug. 22nd, 1898. (*J. B. Tyrrell.*) Not before recorded from Canada. This plant differs in several important respects from Behring Sea specimens, agreeing more nearly with specimens from Colorado.

PHLOX RICHARDSONII, Hook.

Mountains by Selkirk Trail, west of Aishihik Lake, Yukon District, Sept. 7th, 1898. (*J. B. Tyrrell.*) Only known before from Arctic sea-coast.

PHACELIA PURSHII, Buckley.

Growing among clover at the Central Experimental Farm, Ottawa, Ont. (*Wm. T. Macoun.*) Introduced from the United States. Not before recorded in Canada.

PLAGIOBOTHRYS ECHINATUS, Greene, Pittonia, vol. III, p. 262.

Habit of *P. tenellus* and of the same size, rather more branching, the branches strict, densely spicate at summit ; the usual pubescence augmented by sparse spreading and rather hispid hairs ; nutlets rather more than ¾ line long, whitish, distinctly carinate on the back at least toward the apex, the transverse rugosities few, slender and indistinct, merely indicating the lines of numerous well elevated and sharp murications, the whole back thus appearing somewhat regularly echinate.

Cedar Hill, Vancouver Island, 16th May, 1887. (*John Macoun.*)

LINARIA MINOR, Desf.

Along the G. T. Ry., near the Cove Bridge, west of London Ont., June, 1898. (*J. A. Balkwill.*) Only one other Canadian record—St. John, N.B.

COLLINSIA VERNA, Nutt. ; Can. Rec. Sc., Jan, 1895.

In woods between Putnam and Ingersoll, Ont., 1896. (*J. Dearness.*) Second Canadian record.

MIMULUS MOSCHATUS, Dougl.

By a brook on the farm of Mr. Peter Cavanagh, Middle Settlement of Barney's River, Pictou Co., N.S. (*Miss Maria Cavanagh.*) Not before recorded from Nova Scotia. Though probably introduced or adventitious, the conditions under which it is growing make it appear possible that this species is indigenous in Nova Scotia. It is at any rate well naturalized. Miss Cavanagh writes : "I have seen it growing there for four or five years. Previous to that time I had no opportunity of examining the brook. It grows luxuriantly and in great abundance in an elevated region along the ridge of the watershed between the rivers flowing north and south. The place is too cold for plum trees"

STACHYS GERMANICA, L.

Well established near Guelph, Ont. Collected in two widely separated localities near that town. 1897. (*J. C. McCalla.*) New to Canada.

AMARANTUS CHLOROSTACHYS, Willd.

North of Leamington, Essex Co., Ont., 1892. (*J. Dearness.*) Not before recorded in Canada.

CHENOPODIUM VULVARIA, L.

Plentiful around waste heaps and along roadsides at Galt, Ont. (*William Herriatt.*) Probably introduced in foreign merchandise. New to Canada.

ACALYPHA VIRGINICA, L.

Among small stones and grass along roadsides at Clearland, N.S. (*Dr. C. A. Hamilton.*) Not recorded east of Quebec.

LARIX LYALLII, Parlat.

Mr. Walter D. Wilcox found this tree in 1898 on Mt. Hector, about 11 miles from Laggan, Rocky Mts. This station extends the limit of *P. Lyallii* some 3 or 4 miles further north than it was known to occur. Mr. Wilcox was also on the mountains at Glacier Lake, head of Saskatchewan River, and at the source of the Athabasca, but did not see this larch, so that its northern limit may now be considered to be definitely fixed.

CALAM VILFA LONGIFOLIA (Hook.) Hack.

Ammophila longifolia, Benth. and Hook.; Macoun, Cat. Can. Plants, vol IV, p. 208.

Not rare on sandy ground in the northern part of Lambton Co. and southern part of Huron Co, Ont. (*J. Dearness.*) Eastern limit in Canada.

ELYMUS ELYMOIDES, (Raf.) Sweezy.

One specimen collected by Prof. Macoun in 1897 on the side of a mountain at Crow Nest Pass, Rocky Mts. New to Canada.

NOTES ON THE BIRDS OF KING'S CO., NOVA SCOTIA.

By HAROLD TUFTS, Esq., Wolfville, King's Co., N.S.

Urinator imber (*Gunn*). LOON.

Fairly common, breeding on the Gaspereau Lakes. They are often left behind the shad seines by the falling tide, and being unable to rise from the ground are then easily taken by the fishermen. When brought to bay in this position they make a good fight before yielding and are really quite dangerous to tackle unless a gun be used against them.

Larus marinus (*Linn*) BLACK-BACKED GULL.

Common except in January and February. Two sets of eggs taken last May (1898) at the Gaspereau Lakes, are now in the museum at Ottawa There are many islands in the lakes, but only two or three of the smallest of these are used as nesting

sites. One island, upon which were two nests, was not more than 15 yards long by 10 wide, and at its highest point not more than 4 feet above the surface of the water. The birds left the nest when the canoe was several hundred yards distant, and settled in the water about 200 yards away, from which position they quietly watched the destruction of their nests, the only note of remonstrance being an occassional "kuc," "kuc."

Larus argentatus smithsonianus (*Coues.*) HERRING GULL.

Common except in mid-winter. Nests in large numbers at Cape Split.

Larus philadelphia (*Ord*) BONAPARTE'S GULL.

Occasionally seen during the latter part of September, during some heavy gale.

Oceandroma leucorhoa (*Vieill*). LEACH'S PETREL.

Occasionally observed in October in Minas Basin.

Phalacrocorax carbo (*Linn*.) CORMORANT.

Observed occasionally in Minas Basin in spring and fall.

Merganser americanus (*Cass.*) AMERICAN MERGANSER.

Not common. Most frequently seen in winter and spring.

Merganser serrator (*Linn.*) RED BREASTED MERGANSER.

More common than the preceding species. Breeds here.

Anas obscura (*Gmel.*) BLACK DUCK.

Very common throughout the year. They nest in all suitable places in the county.

Anas carolinensis (*Gmel*) GREEN-WINGED TEAL.

Fairly common during the fall mirgration. They are found mostly at the mouths of the streams emptying into Minas Basin. Towards evening they fly into the fresh water pools and sluggish streams with sedgy borders.

Anas discors (*Linn.*) BLUE WINGED TEAL.

Less common than the preceding species.

Dafila acuta (*Linn.*) PINTAIL.

Transitory and uncommon. Observed about the mouth of the Cornwallis River in September and October.

Aythya marila nearctica (*Stejn.*) SCAUP DUCK.
Transitory and rare.

Aythya affinis (*Eyt.*) LESSER SCAUP DUCK.
Rare fall migrant.

Branta canadensis (*Linn.*) CANADA GOOSE.
Often quite common during the spring migration from March till the middle of May. Are less common during the fall.

Branta bernicla (*Linn.*) BRANT.
A rare migrant.

Botaurus lentiginosus (*Montag.*) BITTERN.
Fairly common from May to October. They nest in June.

Ardea herodias (*Linn.*) GREAT BLUE HERON.
Common from May till October. Last May a small herony was found in a birch grove near one of the Gaspereau Lakes. The nests, to the number of five within the space of an acre, were inacessible, owing to the great size and nature of the trees selected for the nests.

Nycticorax nycticorax naevius (*Bodd.*) BLACK-CROWNED NIGHT HERON.
Uncommon. Shot one immature specimen October 22nd, 1898.

Porzana carolina (*Linn.*) SORA.
Fairly common, but rarely seen owing to their retiring habits.

Porzana noveboracensis (*Gmel.*) YELLOW RAIL.
One specimen taken near the mouth of the Cornwallis River, on Sept. 19th, 1895, is the only one that has come under my observation.

Crymophilus fulicarius (*Linn.*) RED PHALAROPE.
One taken in a small fresh water pond on the Grand Pre, October 17th, 1898, during a strong north gale.

Gallinula galeata (*Licht.*) FLORIDA GALLINULE.
One example was taken during the last week of September, 1898, on the Canard River.

Philohela minor (*Gmel.*) WOODCOCK.

Common from May till November. Nests in suitable localities.

Gallinago delicata (*Ord.*) WILSON'S SNIPE.

Common from May till November. Several of these birds spend each winter about a series of sheltered springs which remain open during the entire year and keep the ground soft even in the most severe winter weather.

Macorhamphus griseus (*Gmel.*) DOWITCHER.

A rare fall migrant.

Tringa canutus (*Linn.*) KNOT.

Rather rare fall migrant, passing here in August and September.

Tringa maculata (*Vieill*) PECTORAL SANDPIPER.

Common fall migrant. They frequent the salt marshes, but never the mud flats or the beach.

Tringa fuscicollis (*Vieill.*) WHITE RUMPED SANDPIPER.

Fairly common during the fall migration which occurs in September and October. They frequent the beach and salt marsh.

Tringa minutilla (*Vieill.*) LEAST SANDPIPER.

Abundant during the migrations, especially the autumn. Going northward they pass this locality in late April and early May. On the southward journey they are common from the middle of July till October. They frequent the mud flats and salt marshes.

Tringa alpina pacifica (*Coues.*) RED BACKED SANDPIPER.

A rather uncommon autumn migrant. Observed on the Long Island beach during September.

Ereunetes pusillus (*Linn.*) SEMI PALMATED SANDPIPER.

Very abundant during the migration. At the height of the fall migration, about August 15th, they are found in myriads on the sand beaches along Minas Basin. By the 1st of October all but a few scattered ones have moved southward.

Calidris arenaria (*Linn.*) SANDERLING.

Fairly common on the sand beaches during the autumn migration, from the middle of September till November.

Totanus melanoleucus (*Gmel.*) GREATER YELLOW LEGS.

Fairly common during the migrations. They pass here going north about the first of May and going south from the middle of July till November. About the middle of last June one was observed here.

Totanus flavipes (*Gmel.*) LESSER YELLOW-LEGS.

Not quite so common as the preceding, and are not seen so late in the fall.

Totanus solitarius (*Wils.*) SOLITARY SANDPIPER.

Quite common from the first of August till October. They frequent small ponds and puddles with soft muddy borders.

Bartramia longicauda (*Bechst.*) BARTRAMIAN SANDPIPER.

Rare. Several were observed on the Grand Pre, September, 1896.

Actitis macularia (*Linn.*) SPOTTED SANDPIPER.

Abundant from the middle of May till September. Frequent the shores of rapid streams and upland ponds.

Numenius hudsonicus (*Lath.*) HUDSONION CURLEW.

Rare fall migrant. Observed in early September.

Charadrius squatarola (*Linn.*) BLACK-BREASTED PLOVER.

A fairly common autumn migrant. August till November.

Charadrius dominicus (*Mull.*) GOLDEN PLOVER.

A few years ago this bird was very common during the fall migration. But the last few years they seem to have decreased rapidly. Not more than one is observed to-day, for every 20 that could be seen six or eight years ago. They frequent the salt marsh, sand beach and upland pasture.

Ægialitis semipalmata (*Bonap.*) SEMI-PALMATED PLOVER.

Quite common on the sand beaches from the middle of July till October. Do not nest here.

Arenaria interpres (*Linn.*) TURNSTONE.

Observed during August and early September on the sand beach at Long Island, in small numbers.

Somateria dresseri (*Sharpe.*) AMERICAN EIDER.

Large flocks are often observed during November and December in Minas Basin.

Oidemia americana (*Sw* and *Rich.*) AMERICAN SCOTER.

Large flocks make their appearance in October in Minas Basin.

Oidemia deglandi (*Bonap.*) WHITE-WINGED SCOTER.

Observed in Minas Basin from April till December. When moulting in July and August they are unable to fly and are then caught behind the seines, by the falling tide.

ORNITHOLOGY.

Edited by W. T. MACOUN.

ROBIN.—One specimen seen by Mrs. R. D. Brown, Ottawa East, on Nov. 23rd, it remained on the ridge-board of an out-building for more than half an hour, notwithstanding a clapping of hands of which it took no notice. One specimen was seen at the Experimental Farm on Nov. 21st.

PRAIRIE HORNED LARK.—Four birds seen at Experimental Farm on Nov. 22nd.

HENSLOW'S SPARROW (*Coturniculus Henslowi*).

By W. E. SAUNDERS, London, Ont.

Near the mouth of the Thames River, where it empties into Lake St. Clair, I had the good fortune to collect a specimen of Henslow's Sparrow on May 24th, 1898, being the first one recorded in Canada. The bird was in the grass on the low flats, near, but not in, the marshy places. While pursuing this specimen, which proved to be a female, we heard the syllables

"tseè-leêp" repeated at rather long intervals and without any musical tone whatever. A subsequent visit disclosed the author of these notes to be the male, of which several were heard and one secured on June 12th.

Near Sarnia there has been a small colony of Short-billed Marsh Wrens, and on July 2nd I had from 4 to 7.30 a.m. in which to visit them. Unfortunately their grounds have been ploughed and set in timothy, but what was my surprise to catch the note of the Henslow's Sparrow, here also. The place was thoroughly hunted, and but two males were secured. The females were doubtless on the nests and were not seen.

At both places, the habits of these birds combined in every way to make them exceedingly inconspicuous and the easiest of all birds to pass by. Their song, if it may be called such, has been described, and no more of it was heard; the chirp is a weak sparrow-chirp. The bird is small and not very confiding, seldom alights higher than three feet from the ground, on a weed-stalk, and when on the ground is usually invisible. What wonder then, that he has been missed? Nevertheless, after finding it so far apart—nearly 40 miles—I doubt if there are many suitable localities in the western counties where it is not found.

The Dickcissel and the Orchard Oriole breed commonly there each year; the Yellow-breasted Chat and Cardinal Redbird, are to be found by the earnest searcher and the Lark Finch occurs not infrequently; while at London, only 75 miles east, these birds are only casual, if found at all.

GEOLOGICAL SURVEY OF CANADA, (G. M. Dawson, C.M.G., LL.D., F.R.S., etc. Director). *Annual Report*, (new series) Vol. IX, Reports A, F, I, L, H, R, S, (1896), No. 655. Ottawa, 1898. Published by authority of Parliament.

This volume of reports and maps of investigations and surveys by the staff of the Geological Survey Department is the ninth of the new series of Annual Reports published by the survey, and forms No. 658 of the list of publications already issued by this useful and important branch of the service. It comprises 816 pages, and is accompanied by five maps and twenty plates, besides a number of figures and diagrams in the text. It opens with a "Summary report of the Department for the year 1896," by the director, in which is given the preliminary results of the year's investigations in British Columbia, North-west Territories and Keewatin, in Ontario, Quebec, the Labrador Peninsula and Nova Scotia.

The following Reports are also included in the volume:

TYRRELL, J. B.—*Report of the Doobaunt, Kazan and Ferguson Rivers and the North-west Coast of Hudson Bay*, 193 pages. Appendix I. *Chippeweyan names of places*, 4 pages Appendix II. *Vocabulary of words used by the tribe of inland Eskimos inhabiting the banks of Kazan and Ferguson rivers*, 9 pages. Appendix III.—*Plants* (exclusive of algæ and fungi). 14 pages. An interesting historical sketch, the description of routes travelled in 1894, the physical geography geographical summary and resources of that hitherto almost unknown territory are presented and discussed in an able and interesting, as well as practical and systematic manner, so as to make the report a most useful and indispensable guide to anyone entering the region described. The cuts illustrating this report are most interesting, and include two showing extensive herds of the Barren-Ground Caribou on the shore of Carey Lake.

BELL, ROBERT.—*Report on the Geology of the French River sheet, Ontario*, 29 pages. Describes the Archæan rocks of the sheet, the Huronian and Laurentian, the greenstones, arkose, clay slates and slate-conglomerates, the Huronian limestones; also the Cambro-Silurian areas included within the sheet, besides a dissertation on the surface geology of the region, closing with a chapter on the Economic Minerals kown to date. A geological map accompanies the report.

LOW, A. P.—*Report of a traverse of the northern part of the Labrador Peninsula from Richmond Gulf to Ungava Bay*; 43 pages. Describes the routes taken and the geographical as well as topographical features of the country, together with an interesting résumé of the various superficial deposits occurring in this region with special reference to the period of glaciation. Mr. Low's report is also accompanied by a map.

BAILY, L. W.—*Report on the geology of South-west Nova Scotia*, 154 pages. Contains the following: (*a*) Physical features and surface deposits, (*b*) Cambrian System, granites, (*c*) Silurian, Devonian and associate rocks, (*d*) Economic Minerals, (*e*) Appendix, giving list of glacial striæ. This report includes numerous lists of fossil organic remains from the Silurian and Devonian marine beds of the Nictaux-Torbrook iron-ore basin.

HOFFMANN, G. C.—*Report of the section on Chemistry and Mineralogy*, 53 pages. I. Coals and lignites. II. Miscellaneous Mineralogy. III. Mineralogical notes. IV. Rocks. V. Limestones (analyses). VI. Gold and silver assays from Nova Scotia, New Brunswick, Quebec, N.W. Terr., Ontario and Labrador. VII. Nickel and Cobalt. VIII. Natural waters. IX. Miscellaneous examinations. This report is of great value to the country.

INGALL, E. D.—*Section of Mineral Statistics and Mines*, 1896, 169 pages.—Gives the most reliable information and figures on the output and value of the ores and minerals of Canada.

This volume is made complete by the presence of an index for reference to subjects, places and economic resources mentioned in the text.

PROGRAMME OF SOIRÉES, 1898–1899.*

1898.

Dec. 14.—Meeting for the Exhibition of Specimens and Conversation.
"Inaugural Address," by Prof. John Macoun, M.A., F.L.S.
"*Notes on some Local Violets*," by Mr. James M. Macoun.
Report of the Botanical Branch.—Discussion.

1899.

Jan. 10.—Meeting for Exhibition of Specimens and Conversation.
"*The Minerals of the Ottawa Valley*," by R. W. Ells, LL.D., F.R.S.C.
"*Notes on an herbivorous Deinosaur from the Cretaceous of Western Canada*," by Lawrence M. Lambe, F.G.S.
Report of the Geological Branch.—Discussion.

Jan. 24.—CONVERSAZIONE AND MICROSCOPICAL SOIRÉE in the Assembly Hall of the NORMAL SCHOOL. Microscopical objects will be exhibited either under microscopes or projected on a screen, and several five-minute addresses will be delivered on specimens exhibited.

Feb. 7.—Meeting for Exhibition of Specimens and Conversation.
"*Some Native Herbaceous Perennials worthy of Cultivation*," by Mr. W. T. Macoun.
"*On the Burrowing Habits of Cambarus—the Cray-fish*, by H. M. Ami, M.A., F.G.S.
"*Notes on Fresh-water Polyzoa* by Mr. Walter S. Odell.
Report of the Ornithological Branch.—Discussion.

Feb 21.—Meeting for Exhibition of Specimens and Conversation.
"*The Archæology of Lake Deschenes*," by Mr. T. W. E. Sowter.
"*Extra Limital Insects Found at Ottawa*," by W. H. Harrington, F.R.S.C.
Report of the Entomological Branch.—Discussion.

Mar. 7.—Meeting for Exhibition of Specimens and Conversation.
"*Life-history of the Salmon*," by Prof. E. E. Prince, B.A., F.L.S.
"*Natural History in Art*," by Prof. James Mavor, Toronto University.
(Both papers illustrated by lime-light views.)
Report of the Zoological Branch.—Discussion.

Mar. 14.—The Annual Meeting for the reception and adoption of Reports from the Council, election of Officers, etc.

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*To be held on **Tuesday** evenings at **8 o'clock** in the Lecture Hall of the **Y. M. C. A.**, corner of Queen and O'Connor Streets, Ottawa, with the exception of the **Conversazione** on **Jan. 24th**, which will be held in the Assembly Hall of the **Normal School. Admission FREE.**

N.B.—At each meeting, various objects belonging to different departments of science will be exhibited, and at any meeting short papers may be read by members of the Club upon any Natural History subject, due notice of the same having been previously given to any member of the Soirée Committee.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, JANUARY, 1899. NO. 10.

NOTES ON SOME OTTAWA VIOLETS.

By JAMES M. MACOUN,

Assistant Naturalist, Geological Survey of Canada.

While "Manual" writers, the compilers of local lists and American botanists in general were satisfied to lump into one species—one variety in fact—the several forms of what for so many years had been known as *Viola cucullata*, or *V. palmata*, var. *cucullata*, Canadian botanists have for more than a quarter of century known that this "species" or "variety" included many species and made repeated attempts to induce the recognized "authorities" to at least differentiate a number of varieties. In this they were uniformly unsuccessful. Dr. T. J. W. Burgess made at London, Ont., a special study of the violets of the *cucullata* and *sagittata* groups, Dr. Jas. Fletcher at the same time studied the violets of this vicinity, and Prof. John Macoun thirty years ago noted on his herbarium sheets the characters upon which several of the new Canadian species are founded. Other Canadian botanists have done work on similar lines.

The trouble in Canada was, and is, that none of our libraries, public or private, contained all the necessary books, monographs and revisions. When Canadian botanists discovered what they thought to be a new species they had but one course to follow. The specimens must be sent to some botanist in the United States or Europe and his decision was final. New discoveries were almost without exception given the names of well-known species. There is but little doubt that in one or other of the herbaria of the older Canadian botanists most of the species recently described by Dr. Greene have been separated from *V. cucullata*.

However this may be, I have had no opportunity of examining these herbaria and whatever of value there may be in these notes is the result of my own work in the vicinity of Ottawa during the spring and summer of 1898. Realizing that without some rare works on violets to which I have not access, mistakes would certainly be made, I gladly availed myself of the willingness of my friend Dr. Edw. L. Greene to assist me in my work and sent him a full series of the specimens as they were collected. It was a great satisfaction to me to find that he entirely agreed with my separation of the local violets of the *cucullata* group into six species and his diagnosis of these from living material is in every respect satisfactory.

Mr. C. L. Poland in a recent paper on Acaulescent Violets, says: "At the outset I wish to emphasize the importance of unremitting field-work and the absolute uselessness of herbarium material unless one is fortified by previous familiarity with the growing plant." With this I heartily agree. Pronounced as the characters are upon which the species described in this paper are separated, great difficulty might still be experienced in determining dried specimens of one gathering, especially flowering plants before the appearance of the apetalous flowers. The method pursued in collecting the series upon which the following new species were described is, I believe, the only one which will insure satisfactory results. The early flowers were collected in May, the stations at which they were collected were carefully marked and visited again ten days or two weeks later, and then two or three times in June and July. The result was that with the complete series before him a child could separate the species.

Though much has already been done, this group of violets requires further study and I can confidently prophesy that at least one additional species will be added to the Ottawa Flora.

The beautiful and accurate drawings made by my friend Mr. Theodor Holm constitute the most valuable part of this paper. His work has been so carefully done that no collector need in the future experience any difficulty in determining any

of the five species here recorded as growing in the vicinity of Ottawa, and my only excuse for reprinting here the descriptions already published by Dr. Greene is that they and the figures of the plants described may be found under one cover.

VIOLA SEPTENTRIONALIS, Greene, Pittonia, vol. III, p. 334.

(Plate II, Fig. 3.)

Acaulescent, gregarious, low, 4 to 5 inches high at petaliferous flowering ; herbage rather light green, the leaves and petioles sparsely clothed with stiff straight spreading hairs, these most numerous beneath and along the veins; leaves from reniform in the lowest to round-cordate, strongly cucullate when young, lightly and very regularly crenate, all obtuse ; peduncles (about equalling the leaves) bibracteolate near the middle ; sepals small for the size of the flower, with prominent truncate auricles, the whole margin finely and closely ciliate ; corolla pale violet, rather large, 9 or 10 lines long and broad, all the petals broad, usually all obcordate, notched at the broad apex, the upper pair sometimes merely obtuse ; the odd or lower one amply expanded and as long and as broad as the others, this and the pair next to it hairy at base (on the claw), and sparingly so on the blade ; apetalous flowers aerial, but on very short slender and horizontal peduncles, their pods very short and nearly oval.

Rich soil in thickets and open woods, Billings's Bush, southeast of Billings's Bridge, Ottawa; in full petaliferous flower, 10th May, 1898, and in fruit from the apetalous flowers three weeks later. Distributed as Geol. Survey of Canada Herb. No. 18,561. Described from specimens collected at above locality but not rare in suitable situations elsewhere near Ottawa.

According to Dr. Greene its southern and eastern U. S. homologue is the plant called by him *V. obliqua*, Pittonia, vol. III, p. 142 ; " but it is also allied and by its foliage more nearly to *V. cuspidata* of the far-western lake and prairie regions, and is distinct enough from either by a redundancy of characters. If it has the hairiness of *V. cuspidata* it has quite another quality

of herbage, aerial apetalous flowers and fruits, and large obcordate petals instead of deeply coloured and cuspidately acute ones."

VIOLA MACOUNII, Greene, Pittonia, vol. III, p. 335.

(Plate 1, Fig. 1, a, b.)

Rather larger than the preceding; early leaves subreniform-deltoid, 1 inch long, 1½ inches broad, firm and rather fleshy, crenate, villous-hirsute beneath and on the upper part of the petiole, only sparsely hairy above, but the margin ciliate; pedicels bibracteolate in the middle; sepals broad, obtuse, ciliate, somewhat callous-tipped; petals lavender-colour, very deciduous or almost caducous, all remarkably narrow and elongated, the two upper rather smaller than the others, the odd one the largest, all sparsely hairy over almost the whole inner face, the claws more or less distinctly ciliate; peduncles of the late apetalous flowers slender, short, horizontal, buried under decaying leaves or twigs; their pods distinctly trigonous, short and thick, as broad as long, dark with numerous purple blotches, the shortly and obtusely lanceolate sepals and their auricles ciliate.

On dry limestone shingle, growing among grasses in the shade of cedars. Very abundant at the foot of the ledge of rocks that runs from the north-east corner of Rideau Hall grounds to the Ottawa River at Governor's Bay. The type locality. Distributed under Herb. No. 18,746. Collected by Prof. John Macoun west of the Beaver Meadows, Hull, Que., Herb. No. 18,900. First collected at the type station in 1884 and labelled "form 3" of *V. cucullata.*

VIOLA VENUSTULA, Greene, Pittonia, vol. III, p. 335.

(Plate 1, Fig. 2, c, d.)

Dwarf with light-green glabrous herbage; leaves cordate-ovate and deltoid-ovate, acutish, rather sharply and serrately crenate, cucullate when young, the blade less than an inch long, the slender petioles 1 to 3 inches long; earliest peduncles barely equalling the leaves, the later surpassing them; corolla large for the plant, often ½ inch or more in breadth, deep violet-blue;

petals broad, obtuse, the odd one well expanded, nearly equalling the others, truncate or retuse, only the two laterals bearded at base with clavellate white hairs ; earliest apetalous flowers on slender peduncles equalling the leaves, but all the later ones short peduncled and almost or altogether subterranean ; capsule very short and thick, roundish-obovate.

Type specimens were collected in the wet meadow between the Rockcliffe road and Governor's Bay, Ottawa. It grows on tussocks with *V. blanda* and except in May cannot be found unless the exact locality be known, grasses and other flowers hiding the smaller plant from view. Distributed as No. 18,565. Specimens of this species have been sent me from Charlottetown, P.E.I., by Mr. L. W. Watson.

VIOLA CUCULLATA, Ait.

(Plate v.)

This is the commonest blue violet in the vicinity of Ottawa, always growing on very wet ground, generally by rivulets and small creeks. Dr. Greene's note on this species (Pittonia, vol. III, pp. 143-4) includes all its important distinguishing characters and is here reproduced in part.

This is a very glabrous plant, of tender and succulent herbage, decidedly cucullate leaves, light green in colour, flowers very pale blue, the petals with a spot of darker violet just above the white basal part or claw. The cleistogamous flowers are borne on greatly elongated very slender peduncles which are strictly erect, both the growing and full grown ovaries being a half-foot or more above ground among the leaf-blades. The capsules are very long and quite prismatic, *i.e.*, of equal thickness from one end to the other, and distinctly though obtusely trigonous.

VIOLA CUSPIDATA, Greene, Pittonia, vol. III, p. 314.

(Plate IV and Plate III, Fig. 5.)

Acaulescent, low, at time of petaliferous flowering 3 or 4 inches high ; leaves round-cordate, cucullate, crenate-serrate

veiny and rugose, short-hirsute as to the petioles and along the veins beneath, sometimes also on the upper face, and the margins ciliolate ; sepals obtuse, ciliolate from the base to the middle ; corolla about 8 lines long and 9 in breadth, deep blue, the paired petals broad-obovate, abruptly acutish, the odd one nearly equalling those next to it, of oblong-obovate outline, fully expanding; the apex almost truncate but cuspidately pointed in the middle.

Very abundant in woods and thickets along the bank of the Rideau River from Billings's Bridge to the C. P. Ry. bridge. Distributed from the herbarium of the Geological Survey as No. 18770. Specimens of this species have also been received from Mr. J. M. Dickson, Hamilton, Ont.

VIOLA AFFINIS, Le Conte.

The specimens which are for the present doubtfully referred here were collected under over-hanging banks near the water's edge along the Rideau River above Billings's Bridge. The material collected was not sufficiently complete to allow of satisfactory determination of the species.

VIOLA POPULIFOLIA, Greene, Pittonia, vol. III, p. 337.

Plate III, Fig. 4.)

An acaulescent blue-flowered woodland violet akin to *V. cuspidata*, but smaller, the petioles of the early leaves densely villous-hirsute, the blade from broad-cordate in the very earliest and smallest to deltoid or deltoid-reniform in those accompanying the petaliferous flowers, notably broader than long, both surfaces but more conspicuously the lower, hirsute-pubescent, especially along the veins ; corollas large, rather light blue, all the petals broad and obtuse, the odd one like the others but a little longer ; sepals of the petaliferous flowers oblong, obtuse, hispidulous below especially the auricles ; apetalous flowers of summer and autumn very short-peduncled and horizontal or partly buried, but the peduncles slender ; sepals small, glabrous ;

pods triquetrous-ovoid, finely dotted, 4 to 5 lines long; late foliage nearly glabrous, but rather fleshy.

Collected by Mr. J. M. Dickson near Port Flamboro, Ont., May, 1898, and grown by Dr Greene and the writer. The growing plants are very easily distinguished from *V. cuspidata* to which it is closely related. Included in this paper in order to complete the enumeration of the Ontario species as far as they are known.

Ottawa, Dec. 1898.

REPORT OF THE BOTANICAL SECTION, 1898.

In the Botanical Branch there has been more than usual activity during the past season. At all the sub-excursions, of which there have been more than in any previous year, of the Club's history, the followers of the botanical leaders have always been by far the most numerous. Accounts of these sub-excursions have already appeared in THE OTTAWA NATURALIST, and need not be referred to here.

An unusual advantage to the Club during the past season has been the large proportion of the meetings at which Prof. Macoun has been able to be present. Unfortunately Mr. Robert Whyte is still unable to take an active part in the field work of the Club; but he has been well represented by Miss Marion Whyte a member of the Council of the Club who has been a constant attendant at the excursions throughout the season.

Several additions have been made to the local flora during the year. Since the completion of Prof. Macoun's "Cryptogamic Flora of Ottawa" published in THE OTTAWA NATURALIST eight species of lichens and six of mosses have been added by him to the local list. In September and October Prof. Macoun collected over 600 species of fungi in the vicinity of Ottawa. Of these, many were additions to the local flora, a few were new to America though found in Europe and several were new to science. Mr. Percy Saunders also made a special study of fungi

during the autumn months adding several species to the local lists.

A critical study of the acaulescent violets of the vicinity was made by Mr. J. M. Macoun, and six species were found to have been included in what has been generally known as *Viola cucullata*. Of these, three are new to science, and two had not been before recorded from this region.

What has been commonly known as *Antennaria plantaginifolia* has also been separated into many species by specialists and three of these have been found in the vicinity of Ottawa.

Several rare local species were again noted this year by members of the Club. Some of these are now nearly extinct in this district and for that reason it is thought well to draw attention to them.

Mention may be made of *Aralia quinquefolia* found at Beechwood and *Claytonia Virginica* near the outlet of Dow's Swamp. Two of the rarest plants in this vicinity were again seen—*Listera australis* at Mer Bleue and *Aspidium spinulosum* var. *Braunii* at Chelsea. *Botrychium Lunaria* a very rare fern was found by Mr. J. M. Macoun to be locally abundant on the railway embankment near Stittsville and is an addition to the local list.

Our botanists do not sufficiently appreciate the usefulness and value of the National Herbarium housed in the Geological Survey Museum. This herbariun now contains between 80,000 and 90,000 sheets of specimens which are available for study and reference by any one who cares to utilize them.

The Normal School collection of plants has been considerably enriched during the year by donations from members of the Club. Prof. Macoun has presented 100 sheets of Cryptogams and smaller collections have been presented by Drs. Ami and Fletcher. Members of the botanical section are requested to send in to the leaders any specimens of which they have duplicates so that this collection may be as complete as possible in

the species which grow wild near Ottawa and which therefore are more likely to be of value to the Normal School Students than species found in other parts of the Dominion.

Another public institution to which reference may again be made is the Botanical Garden and Arboretum at the Central Experimental Farm where there are now growing 2000 species of trees and shrubs and 1200 species of herbaceous perennials. These collections are available for reference by students at all times.

The leaders again call the attention of the botanists to the comparatively large proportion of the Ottawa district which has not yet been exhaustively examined and trust that during the coming season the activity shown this year will be continued.

Leaders: D. A. CAMPBELL, J. M. MACOUN, R. B. WHYTE.

ORNITHOLOGICAL NOTES.—W. T. MACOUN, Editor.

I. AN ALBINO EAVE SWALLOW.—By Geo. R. White, Esq., Ottawa.—On September 5th, 1898, I witnessed the flocking up, preparatory to migrating, of large numbers of the Cliff Swallow. The birds were arriving in flocks from all quarters of the compass, and by 9 o'clock a.m. there were over a thousand. With them were a few Barn and Bank Swallows with a stray Chimney Swift. This large flock kept flying up and down over a large stretch, nearly a mile of marsh land, never remaining in one place more than ten minutes at a time. This performance was kept up all day, and next morning the place was deserted; only a few odd birds were seen. While watching the movements of the swallows my attention was attracted by a white bird that kept with them. In the afternoon I was enabled after three hours' hard work to examine it, an Albino of the Cliff or Eave Swallow *Petrochelidon Lunifrons*. A short description of this specimen and of a full plumed male is as follows:

The Albino.—Bar across forehead, throat and upper tail coverts with a few odd feathers about head, pale rufous, re-

mainder of plumage pure white ; bill, black ; feet, pale brown; length, 5 inch ; extend, 12 inches.

A male in full plumage would be as follows : Back and top of the head with a spot on the throat, deep lustrous steel blue, that of the crown and back separated by a greyish nuchal collar, frontlet, white or brownish white; shorter upper tail covert, rufous; chin, throat and sides of head, intense rufous, sometimes purplish chestnut prolonged around the side of the nape ; under parts dull greyish brown with usually a rufous tinge and dusky shaft lines whitening on the belly ; the under tail coverts, grey, whitish edged and tinged with rufous ; wings and tail, blackish with slight gloss ; bill, black ; feet, brown ; tail, nearly square ; length, 5 inches ; extent, 12 inches.

One of the earliest notes on this notable swallow is by J. R. Foster, dated 1772. Audubon states he first observed Cliff Swallows in 1815. Sir John Franklin found them on his journey from Cumberland House to Fort Enterprise in 1821. Dr. Richardson states that the first appearance of this species at Fort Chippewyan was on June 25th, 1825. Mr. G. A. Boardman states that they were found at St. Stephen, New Brunswick, in 1828. Dr. Brewer notes them at Coventry, Vt., in 1837 In 1861 a large colony was found breeding on the cliffs of Anticosti. The swallow tribe is so constantly under observation that it is a wonder more instances of albinism have not been noted. Albinos of the following species have been recorded : Cotyle riparia, in the year 1859 ; Slate-coloured Chimney Swift, in 1863 ; Cream-coloured Sand Martin, in 1867; Barn Swallow (*Hirundo Horreorum*), in 1870; and in Bull. Nutt. Club for 1876, mention is made of albinos of the Purple Martin and Tree Swallow.

II. WHITE-THROATED SPARROW (*Zonotrichia albicollis*).—On the 8th of December, 1898, while at Russell, Ont., Mr. Lees observed a specimen of this bird. It seemed in good spirits notwithstanding the lateness of the season.

III. ROBIN (*Merula Migratoria*).—While snow-shoeing in the vicinity of Billings's Bridge on the 2nd of January, Mr. C. H. Young saw a robin flitting about near a running stream. Having identified the bird he continued his way; but on the following day in order to convince sceptical members of the Club he shot it. It proved to be a young male bird in fair condition. One of the legs, however, had a swelling at the first joint and was quite stiff, which may have detained him here when his fellows went south.

BERMUDA: LIFE BENEATH THE WATERS.*

There is probably no part of the globe in which a greater variety or more excellent quality of fish abounds, than in the waters bordering the shores of Bermuda. It is asserted that as many as 168 varieties have been observed there, most conspicuous amongst which for its beauty is the "Angel Fish," of a cerulean blue, peculiar shape, and at the same time esteemed as a table delicacy, tho' to a naturalist the idea of eating so beautiful a creature would be akin to cooking a Bird of Paradise. The "Yellow Tail" is pale azure on the back and pearly white below, with broad bands of yellow along each side. The "Spotted Snapper" also carries these yellow bands, but its body is white, fins rosy pink with an oval patch of black on each flank, whilst another variety has yellow fins and scarlet spots. The "Red Snapper," "Bream," "Grunt," "Rockfish," "Mullet," "Porgie," "Gruper," "Sennet," "Hogfish," "Amberfish," besides many others, are daily to be seen as the fishing-boats come in, and are well worthy of notice.

The large Aquarium on the Battery in New York City possesses numerous specimens of Bermuda fish, and there is every reason to hope that before long a Biological station may be established on the Bermudas similar to the institution now in operation at Wood's Hole Massachusetts, the joint action of which embracing as it would either side of the waters of the

*Extract from H. B. Small's "In the Bermudas."

Gulf Stream and the former getting the wash or outside eddy of the Sargossa Sea, could not fail to materially add to icthyological research.

Turtles, though not attaining the large proportions of those in more southern waters are taken of a fair marketable size, and always meet with a ready sale. They are kept in shallow wells or tanks close adjoining tidewater, so that the market may never be glutted with them. The "Green" and the "Hawksbill" are the two commonest species, although occasionally a rare visitant from further south is taken.

On a calm day it is not an uncommon sight to observe the skimming flight, if such it can be called, of the graceful little "Flying Fish," whose silvery sides flash in the sunlight like polished metal, but when a shoal of them is followed and attacked by great unsightly grupers (weighing from 12 to 18 pounds), beneath whose thick red lips lies a row of malicious looking teeth, there is an activity manifested that excites an intense interest in the scene. Hundreds of flashing sparklets of silver flying or skimming hither and thither in all directions, with the swirl caused by their pursuers affords a scene better witnessed than described. I have sat by the hour on the rocks frowning along the North Shore on a perfectly calm day watching such a scene, to which the alternate emerald and opaline tints of the water add an enchantment, till the eye never wearies of the spectacle.

Life under the waters is remarkably active and brilliant along those shores, with coral, sea-fans, sea-rods, sea anemones of all kinds and hues, and large masses of "brain-coral" teeming with life. Castle Harbour and Harrington Sound are the most favourable places for observation. Sea-weeds also of every hue, black, green, red, bronze, pink, yellow, sway gently back and forth, or in the deeper water silently grow in these veritable sea gardens.

The Pearl Oyster and Scallop are abundant, and several species of Cytherea or "clams" are available for the table.

These waters are also the paradise of the sea urchin (*Echinus*) and the great black "Sea Cucumber." (*Holothuria.*)

Crabs are abundant and of several kinds, but attain no size. I failed to find trace of Lobsters or Sea Crawfish. Along the shores, burrowing in the sand, and on the margins of fields near the shore there is a crab, that seems amphibious. It is a nuisance to the planter, as it burrows much like the mole.

In instructions to the "Governor of the Bermuda plantations," dated 1665, sharks were claimed and to be considered a royalty. Although an occasional shark is caught they are no longer numerous inshore, preferring to have their habitat along the outer boundary reefs.

An occasional whale is to be seen off the coast, but is now a rare visitant. Formerly whales were abundant and one of the earliest industries of Bermuda was the whale fishery. In a work published in London in 1613 by one Sylvanus Jourdan, being an account of the "Bermudas now called Sommer's Islands," he says, "there are plenty of whales which come so usually and ordinarily to the shore that we heard them oftentimes in the night abed and I have seen many of them near the shore in the daytime." Only two or three years ago a large whale was captured off the south shore, and was an object of interest for days, the "whale beef" being in great demand. The old trying out furnace and melting house, rudely constructed on a height of land adjoining one of the bays in Warwick parish is still in existence, and could be made use of again if required. In the early instructions to the Governor of the colony, allusion is made to the revenue to be derived from the whale fishery, and from the collection of Ambergris and Spermaceti, but what revenues were ever obtained therefrom do not appear in subsequent records. In a sequel to Jourdan's first report, he says "there are whales in great store from February until June. * * * * * * * * The *Octopus* finds a safe retreat in the crevices of the coral, and attains a large size. I saw a specimen whose tentacles were nearly three feet in length, washed up in a storm,

and its hideous glaring eye and formidable beak make it a most repulsive object.

Owing to the heavy surf beating on broken coral, shells in a perfect state are rare on the shore, the specimens for collection being dredged from among the reefs.

H. B. SMALL.

THE GEOLOGICAL SOCIETY OF AMERICA.

The *Eleventh Winter Meeting* of the *Geological Society of America* was held in New York City from December 28th to 30th, 1898. There was a large attendance of fellows, and more papers than could be conveniently read were presented. The Sessions were held in Shermerhorn Hall, Columbia University at Morningside Heights. An address of welcome by President Low of Columbia was followed by Reports of Council and declaration of vote for officers for 1899, which is as follows :— *President :* B. K. Emerson ; *Vice-President :* G. M. Dawson ; *Secretary :* H. L. Fairchild ; *Treasurer :* I. C. White ; *Editor :* J. Stanley Brown ; *Librarian :* H. P. Cushing, and *Council* of three.

The necrology of the late Prof. James Hall, well known to many members of the Club, by the retiring President, J. J. Stevenson, was a worthy tribute and memorial to so great an administrator, geologist and palæontologist.

The Presidential address by Prof. J. J. Stevenson was both a useful and practical retrospect in the work of early geologists as well aa a hopeful look forward into the future of " Our Society."

The following are some of the papers read and presented to the Society by Canadians.—

A Remarkable Landslip on the Riviere Blanche, Portneuf County, Quebec.

By DR. GEORGE M. DAWSON, Ottawa, Ont.

In this paper a brief account is given of the landslip that occurred on May 7th, last. It affected the thick deposit of Leda clay that floors this part of the St. Lawrence plain and serves to indicate that a clay of

this character may, under certain circumstances for a short time, behave almost as a liquid. This paper which proved most interesting, and instructive, was illustrated with lantern slides.

The Iroquois Beach at Toronto and its Fossils.

By PROF. A P. COLEMAN, Toronto, Canada,

The Iroquois beach north of Lake Ontario, was long ago mapped in outline by Prof. J. W. Spencer, but many details in this shore line remained to be filled in. Near Toronto, two bays are found, one near Carlton on the west, the other near York on the east, each had an area of several square miles and was cut off from the main lake by a gravel bar like the present Toronto island. Horns of caribou are common in the Carlton bar and teeth of the mammoth have been found in the bar near York. Fresh-water shells of four species, *Campeloma decisa* the most common, are found in beach gravels of Iroquois age near Reservoir park, Toronto. These are the first fresh-water fossils found without doubt in the Iroquois beach deposits. As the main Pleistocene beaches from Agassiz to Iroquois contain fresh-water shells, they must have been formed in lakes and not arms of the sea. The numerous marine shell-bearing deposits of the east of Canada cease before Lake Ontario is reached.

Outline of the Geology of Hudson's Bay and Strait.

By Dr. ROBERT BELL, Ottawa, Ont.

Dr. Bell described the Hudson Bay depression and contrasted the opposite sides of the same. The Archæan formations were described by him and he made general remarks on the nature of their distribution. The Laurentian, Huronian and associated Ausinikis and Nipigon series. The Galena-Trenton formations as noticed on the Nelson and Churchill in Ungava and Frobisher Bay consisted of some 900 feet of horizontal strata. This was followed by notes on the Silurian of Mansfield Island and the Devonian areas of Southampton Island, the Severn Region, the Missinaibi or James's Bay areas.

The highest mountains in Eastern America between 8,000 and 9,000 feet above sea level occur in the North-eastern portion of the Labrador Peninsula.

In the interesting discussion which followed Dr. Bell's paper it was brought out that in Amherst College are deposited the collections of Trenton and other palæozoic fossils from Frobisher Bay. The presence of a species of *Triarthrus* indicated the occurrence of the Utica formation. Prof. C. Schuchert's collection of Trenton fossils from Baffinland was stated to be in the Smithsonian Institution, Washington and that Silurian strata are recorded by Kendall from the South shore of the Cumberland Coast in the American Journal of Science.

The Gold-Bearing Veins of Bag Bay, Western Ontario.

By Mr. PETER McKELLAR, Fort William, Ontario, Canada.

The object of this paper was to show the peculiarities of the gold-bearing veins in the granite area of Bag Bay, Shoal Lake, west of the Lake of the Woods, Ontario. These veins are characterized by the smallness of the quartz fissures compared with the quantity of valuable ore they yield under development. This paper was presented and read by Dr. Bell.

Glacial Phenomena in the Yukon Territory.

By Mr. J. B. TYRRELL, Geological Survey Deptartment.

In this paper the author describes the direction of the glaciation which he noticed during the summer of 1898, together with notes on the various glacial deposits met with on Bonanza, Stewart, Eldorado and other creeks in the Yukon District of Canada.

Gold Mining in the Klondike District.

By Mr. J. B. TYRRELL.

This paper was illustrated with lantern views from photographs taken by Mr. Tyrrell during the past summer. It gave a most instructive view of the large amount and character of the gold placer mining carried on within Canadian territory in the Klondike.

Amongst other papers interesting to Canadians were the following :—

Pre-Cambrian Fossiliferous Formations.

By the Hon. Charles D. Walcott, Director of the U. S. Geological Survey, Washington, D.C.

This paper opened with a description of the pre-Cambrian formations which have yielded traces of life, including the announcement of the discovery of fossils indicating highly organised life in the pre-Cambrian belt terrane of Montana. One of the forms described has a strong resemblance and affinity to certain Silurian Eurypterids.

The Faunas of the Upper Ordovician in the Lake Champlain Valley.

By Theodore G. White, of Columbia University, New York City.

In this paper Dr. White gave the results of a detailed study of the consecutive faunas contained in each stratum at numerous localities through-

out the length of the valley. A complete section is afforded from the base of the Black River formation through the Trenton and terminating in the Utica. Species hitherto reported only from Canadian localities are found associated with those characteristic of the Trenton Falls type-province, showing the Champlain connection of Ordovician seas. Several zones characterized by restricted species are located, and also "conglomeratic zones." The fauna is very abundant and supplies a basis of comparison for similar detail study from other provinces. The occurrence of the Hudson River and Oneida groups in the region is questioned.

The repeated statement of many geologists that the Utica of the Lake Champlain Valley is everywhere found lying uncomformably over the Trenton is no doubt based on accurate local observation. It must not be argued however that the Utica is thus related to the Trenton. Dr. T. Sterry Hunt used to insist that the Utica and Trenton were not conformable to each other and connected by passage beds. If such be the case in the Lake Champlain region, such a view cannot for a be held in a basin like the Ottawa Palæozoic Basin. The occurrence, relative abundance or paucity of certain forms at different horizons in the Trenton of the Lake Champlain Valley showed considerable variation as compared with forms found by us in the Ottawa and St. Lawrence Valleys.

"Structure of the Iola Gas Field, Allen Co., Kansas."

By Prof. EDWARD ORTON, Columbus, Ohio.

The following is the abstract submitted by Prof. Orton, the most eminent authority on "Natural Gas."—Natural Gas is more widely distributed, geologically and geographically, and exists in larger quantity than any one would have claimed twenty or even ten years ago. Its productive horizons cover the entire palæozoic column of the country. Cities supplied, at least partially, with natural gas for fuel and light are no longer uncommon. Two distinct divisions can be made of gas accumulations, viz.: That which is *stored* in *impervious rocks* as shales, most limestones, etc, and that which is *found* in *porous rocks*. These divisions may be provisionally styled *Shale gas* and *Reservoir gas*; each having characteristics of its own. *Shale gas* occurs in comparatively small wells. Its wells lack uniformity of rock pressure. It does not occupy definite horizons; it exists independently of petroleum in many cases, has *staying* properties—does not depend on the structural arrangement of the strata that contain it. *Reservoir gas* is found in great wells; approaches uniformity of rock pressure in each subdivision of territory, occupies definite horizons, is accompanied by oil, its wells generally come to a sudden end—is entirely controlled by the structure of the rocks in which it is accumu-

lated. Two structural phases of rocks are specially important in this connection, the *anticline* and the *terrace*. The time has come for the acknowledgment of *structure* in reservoir gas fields even in advance of measurements. The Iola gas field is one of great promise. Its source is in a sandstone of the Cherokee Shales, or near the bottom of the Coal Measures. It proves to be a *terrace* of well marked character. For seven miles the top of the gas rock has an elevation of 131 feet above tide, rising at no point more than 45 feet above this. At this summit, the largest well of the field is located.

One feature brought out in this paper is the great value of natural gas as a fuel. Prof. Orton argues strongly in favour of legislation in order to compel, if possible, the use of natural gas only as a fuel for family or domestic purposes. He considers it too valuable an element altogether to be employed in the baser uses for manufactures.

The Mica Industry of the United States, New Mexico, the Rocky Mountains, and North Carolina.

By Prof. W. H. Holmes, presented his paper

which gave a great deal of valuable information on the mode of occurrence of this important industry.

The Newark System in New York and New Jersey—

By Prof. Henry B. Kümmel, of Chicago, described

a series of strata which are contemporaneous and probably similar in origin to the so-called "New Red" and "Triassic Sandstone" of the Minas Basin, Cornwallis and Annapolis valleys, and elsewhere in the province of Nova Scotia and in Prince Edward Island. Even the intrusive and extrusive trap sheets so characteristic of the New York and New Jersey series in the Newark system also occur in Nova Scotia, especially in the North Mountain region of Kings and Annapolis Counties and in Cumberland and Colchester counties as well.

The Archæan-Potsdam contact in the vicinity of Manitou, Colorado.

By Prof. W. O. CROSBY, of Boston, was of special intesest to Canadians. The peneplain mentioned by Prof. Crosby, in early times may apply to the region he describes in Colorado, but not in Eastern Ontario or Western Quebec, in Canada, where the underlying rocks of Laurentian and Huronian age are deeply cut and furrowed to hundreds of feet prior to deposition of the Potsdam. The question may be asked: Are the so-called Potsdam rocks of Manitou truly equivalents of the Potsdam of New York State and Canada?

H. M. AMI.

FIRST WINTER SOIREE.

The first winter meeting of the Ottawa Field-Naturalists's Club was held in the Y.M.C.A. Lecture Hall, December 14th. In the absence of the President, the Vice-President, Prof. John Macoun, delivered the Inaugural address. This address was almost wholly of a reminiscent nature. It was shown that from a very small beginning the Club had grown from year to year until it had become one of the most important institutions of its kind in Canada. Though the progress from year to year had not been great and it sometimes seemed that no progress was being made, one had only to compare what had been done in the early years of the Club's existence with what was being done now to realize that through its stimulating influence interest in natural science in all its branches had each year increased. The membership of the Club showed this. While the original members had continued their work with unabated energy, new members had been almost equally active.

The publication of local lists and notes was in the opinion of Prof. Macoun the most important work that had been done by the Club. By this means all that was worth preserving of each member's work had been put in an easily accessible form and was available for study and reference. In concluding his address, Prof. Macoun emphasized the fact that the young men and women of to-day spent too much of their time in an unprofitable way, and made an earnest appeal to the members of the Club to do all in their power to increase the interest that was already felt in its work.

A paper was read on "Some Local Violets," by Mr. J. M. Macoun, and the report of the Botanical Branch by Mr. D. A. Campbell. These are published in this number of THE NATURALIST. Dr. Jas. Fletcher gave an interesting account of a monstrous specimen of *Trillium grandiflorum* with green blotched flowers and long petioles collected by Mrs. Chamberlain at Lakefield and figured in THE OTTAWA NATURALIST for June, 1896. The root upon which the figured flower was

grown has been cultivated at the Experimental Farm and has gradually reverted towards the typical form ; the only variation last year being a narrow green stripe down the middle of each petal. A photograph of this *Trillium* was exhibited by Dr. Fletcher, and specimens and photographs of monstrous *Trillia* from other parts of Ontario were shown by the Curator of the herbarium of the Geological Survey.

NOTES, REVIEWS AND COMMENTS.

Transactions of the Ottawa Literary and Scientific Society, No. 1. Press of E. J. Reynolds, 127 Sparks Street, Ottawa, 1898. This volume of 87 pages contains, besides a brief introductory and historical sketch of the society by the president, the following papers :

The Name of Ottawa, by B. Sulte, pp. 21-23 ; *The Violinist*, by Archibald Lampman, pp. 24-26 ; *Place Names of Canada*, by George Johnson, F S.S., Dominion Statistician, pp. 27-62 ; *The Fur-Seal of the North Pacific*, by James Melville Macoun, Esq., Assistant Naturalist to the Geological Survey of Canada, pp. 63–74 ; " *The Yukon and its Gold Resources*," by William Ogilvie, Esq., D.L.S., &c., &., pp. 75–78, together with a Meteorological Chart Record for 1887—88, 1895, 1896 and 1897 (Partim). " *Utilisation of Moss Land*," by Thomas MacFarlane, F.R.S.C. pp. 79–87.

The above papers are all of interest and value. As in former years, the members of the Ottawa Literary and Scientific Society who read papers in Ottawa or elsewhere are invited to publish them in THE OTTAWA NATURALIST.

BOOK REVIEW.

ELEMENTARY BOTANY, by George F. Atkinson, Ph.B., Professor of Botany, Cornell University, 444 pages, illustrated; published by Henry Holt & Co., New York. Elementary Botany of to-day is vastly different from that of ten or fifteen years ago. This is largely due to the changed methods of presenting to the student the rudiments of botany. The old method introduced the pupil to the technicalities of systematic botany by way of the arbitrary rulings of the Manual. If he enjoyed puzzles of that kind he specialized in botany and the natural sciences and eventually obtained his reward by seeing the relationship of plants in a broad and comprehensive way; but if these analogies had been first observed it is probable that the "analysis" of the flower would not have appeared so tiresome. This work presented to the public generally, but to teachers particularly, marks an important step in the new direction. This newer method is, in the words of the author, "to study first some of the life processes of plants, especially those which illustrate the fundamental principles of nutrition, assimilation, growth and irritability. In studying each one of these topics, plants are chosen so far as possible from several of the great groups. Members of the lower as well as of the higher plants are employed, in order to show that the process is fundamentally the same in all plants. . . . . In this way the mind is centred on this process and the discovery of the pupil that it is fundamentally the same in such widely different plants, arouses a keen interest not only in the plants themselves, but in the method which attends the discovery of this general principle."

The volumn is divided into three parts. Part 1 is devoted to the life processes of the plant absorption, transpiration respiration, nutrition and the like. Part 2 discusses the morphology of the plant and the relationships of different families. Part 3, perhaps the most interesting section of the book, is devoted to Ecology or the study of plants in their mutual and environmental relationships. The author fitly points out

that "by a study of the life histories of plants and their habits of behavior under different conditions of environment, we shall broaden our concept of nature and cultivate our æsthetic, observational and reasoning faculties." How much more important this is to the student than to be possessed of a few stray and disconnected facts of natural history! Ecology means study in the field and is the kind of valuable nature study work so heartily and ably encouraged and fostered by The Ottawa Field-Naturalists' Club and the Natural History Society of Montreal Atkinson's Elementary Botany will be of great value to High School Teachers and to Teachers in Collegiate Institutes. It inspires the student by presenting the attractive features first and trains his mind in logical methods of induction, which, as the author observes, is of vast importance in its influence upon the character of the pupil. The book is well printed, beautifully illustrated and substantially bound.

J. C.

WHITEAVES, J. F.—*Contributions to Canadian Palæontology*, Vol. 1, Part V. 7. On some additional or imperfectly understood fossils from the Hamilton formation of Ontario, with a revised list of the species therefrom," pp. 362–436. Plates XLVIII to L, Geological Survey of Canada, Ottawa, 1898.

This palæontological report brings our literature and information on the Hamilton formation of Ontario up to date. So many radical changes have been deemed necessary in the classification and nomenclature of palæontology of late that the revised "list" given by Mr. Whiteaves, pp. 412—418 of this, the 659th contribution or publication of the Geological Survey Department, will prove of great value to all working geologists and palæontologists. A résumé of the various orders and families represented in the Hamilton formation of Canada include the following :—

	Genera.	Species.
Spongiæ	2 (?)	4
Alcyonaria	2	2
Zoantharia Rugosa	11	18
Zoantharia Tabulata	7	16
Hydroida	3	4
Crinoidea	9	11
Blastoidea	6	6
Asteroidea	1	1
Vermes	7	14
Polyzoa	22	40
Brachiopoda	35	61
Pelecypoda	35	61
Gasteropoda	6	13
Pteropoda	3	3
Cephalopoda	4	8
Ostracoda	3	4
Phyllopoda	1	1
Trilobita	3	4
Pisces	3 (?)	3 (?)
	141	225

It will thus be seen that from the Hamilton formation of Ontario there are no less than 225 species already reported upon in Canada, showing how varied the life was in those early seas. Comparing these results with those obtained in New York State across lakes Ontario and Erie, it can be readily seen that a great deal has already been done in Canada, also that future years will no doubt reveal a large amount of material as yet unrecorded in Canada. The remarkable similarity in the succession of life-zones in the Hamilton formation of Canada and New York State has been pointed out by Prof. H. S. Williams, now of Yale, and shows that no barrier existed in the Devonian times in the Ontario-New York Basin to prevent free migration of forms to and fro.

An interesting point to ascertain at present in the province of Quebec is to what extent the various life-zones of the Devonian of that province correspond with those of Ontario or of New York State ; also the extent and distribution of the various geological formations of the province of Quebec in Devonian times.—H. M. A.

THE LATE PROF. H. ALLEYNE NICHOLSON.

H. ALLEYNE NICHOLSON, M. D., D. Sc., F.R.S,E., F.G.S.," etc., etc., Regius professor of Natural History of the University of Aberdeen, St. Andrews, Scotland, died on January 19th, 1899 in his 55th year. He was born at Penrith, Scotland, September 11th, 1844, and educated at Appleby Grammar School, later at Gottingen and Edinburgh University. In 1869 he was appointed lecturer on Natural History in his own Alma Mater, Edinburgh, but two years later, 1871, accepted the offer made him by the Senate of the University of Toronto of the Chair of Natural History. During his stay in Canada from 1871 to 1874, he took a foremost part in advancing the study of Natural Science, including zoology and palæontology. In 1873 Dr. Nicholson finished his first volume of the "*Report upon the Palaeontology of the Province of Ontario*," 130 pp., 8 plates, Toronto 1874, which embraced descriptions and figures of the organic remains of the Devonian formations of Western Ontario. The more typical Devonian fossils which Dr. Nicholson had collected, by the liberality of the Legislature, were placed in the Museum of the "College of Technology" Toronto, in 1873. The Second "*Report upon the Palaeontology of the Province of Ontario*," printed by order of the Legislative Assembly, contains 96 pages of text and 4 plates of figures illustrating new or rare species of Palæozoic fossils from Ontario. These two volumes have been of great value to students of Geology and Palæontology in Canada ever since. From Toronto, he went to the Durham Univ-Colleges of Physical Science, Newcastle-on-Tyne, and from 1877 to 1882 and again from 1890 to 1894 was lecturer on Geology at the British Museum, London, and subsequently became regius professor of Natural History at the University of Aberdeen St Andrews. His "Manuals of Palæontology and Zoology" for students, "Tabulate Corals," "Monograph of British Graptolites," Monograph of British Stromatoporoids" are among his best known and principal works of reference.

Dr. Nicholson also wrote "*Text-book of Geology*" for Schools and Colleges, 266 pages, New York, 1872; and general papers on Geology, Palæontology and mining in Ontario published in the Journals of the Geological Society of London, of the Canadian Institute, Toronto, Geological Magazine and other publications. He was one of the best known and hard working palæontologists. He will be greatly missed by all of us here in Canada, who knew him and with whom he was carrying on correspondence and assisting in so many ways to elucidate points of structure in Canadian fossils.

H. M. AMI.

THEO. HOLM, DEL.

Fig. 1. VIOLA MACOUNII.
(a.) Leaves and Fruit. (b.) Flower.

Fig. 2. VIOLA VENUSTULA.
(c.) Flower. (d.) Fruit.

THEO. HOLM, DEL.

Fig. 3. VIOLA SEPTENTRIONALIS.

Flower. Fruit.

Fig. 4. VIOLA POPULIFOLIA.
Fruit.

Fig. 5. VIOLA CUSPIDATA
Flower.

Fig. 6. VIOLA CUSPIDATA. Fruit.

DRAWN FROM NATURE

VIOLA CUCULLATA.

Flower

Fruit

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, FEBRUARY, 1899. NO. 11.

ON THE ORIGIN OF SOME ARCHÆAN CONGLOMERATES.*

By ALFRED ERNEST BARLOW.

The writer, in collaboration with Dr. Frank D. Adams, is at present engaged in a geological examination of an area covering nearly 3500 square miles, including portions of the Counties of Hastings, Haliburton and Renfrew in the Province of Ontario, Canada.

These investigations and studies are believed to have a special importance because of their bearing upon some of the most intricate questions of Archæan geology, among the more important of which may be mentioned the character and relations of the so-called Grenville and Hastings Series, and their possible equivalency with other Archæan groups previously described from more remote districts. In addition, it was believed much information was desirable and could be secured in regard to the origin, relative age and composition of the gneisses and granites usually classified as Laurentian.

The work has been in progress for several seasons, but is now rapidly approaching completion, and it is confidently expected that another season will be sufficient to enable a report of an approximately final character to be written.

Several communications, either separately or conjointly, have already appeared regarding the progress of this work, indicaing not only the main conclusions likely to be reached, but also presenting some points of immediate and special scientific interest. It is in pursuance of this policy that the following is

*Read by title at the Geological Society of America, New York, Dec. 28th, 1898. Read before the Logan Club, Ottawa, January 21st, 1899. Published by permission of the Director of the Geological Survey of Canada.

offered to the Logan Club for the consideration and discussion of its members.

As stated by Dr. Adams and the writer in a previous paper, read before the Geological Society of America at the winter meeting of 1896, the rocks exposed within the area under examination belong to several sub-divisions of the Archæan.

1. Laurentian ; 2nd, Grenville Series ; 3rd Hastings Series.

The Laurentian covers by far the greater part of the area in question. Briefly stated it is now believed to consist of an extremely complicated series of intrusions, very approximately synchronous, representing plutonics of relatively greater or less basicity. These gave rise to a complex of irruptive rocks, which differ in no essential respect save that of a somewhat persistent foliation from the normal or massive types of the granite, diorite and gabbro families. The Grenville Series, on the other hand, comprises a great development of crystalline limestones, associated with certain fine-grained gneissic rocks whose general appearance and microscopic structure mark them as highly altered sedimentaries. In regions further to the east, where precisely similar rocks have been examined in detail by Dr. Adams, it has been shown that they likewise possess a chemical composition closely analogous to that of clay-slate.

The relations of these two members of the Archæan in Central Ontario, suggests in the strongest manner that in the Grenville Series we have a truly clastic group of strata which has slowly sunk down into and been invaded by much greater volumes of the granites and gneisses of the Laurentian when these latter were in a plastic condition. The limestones are very highly metamorphosed, having in most cases become thoroughly recrystallized, and now present the characters of coarse, although often more or less impure marbles. The contact between the gneisses and granites of the Laurentian on the one hand and the limestones and associated rocks of the Grenville Series on the other, is, wherever examined, one of intrusion.

Towards the south and south-east, the region is uuderlaid by rocks of the so-called Hastings Series, consisting principally

of thinly bedded limestones dolomites, &c, cut through by great massive intrusions of gabbro, diorite and granite. Detailed and critical examinations over the whole area have led to the belief that in the Grenville Series we have a more highly metamorphosed portion of the Hastings Series. This extreme alteration in the case of the Grenville Series is accounted for by the intimate presence of much greater volumes of the associated irruptives and their relatively much more acid character. In many of the previous geological descriptions of this and neighboring Archæan districts, it has been customary to refer in a rather positive manner to the existence of conglomerates as an evidence of the clastic origin not only of the Hastings and Grenville Series but also of the enclosing Laurentian gneisses. Localities were cited and descriptions given of such coarse clastics, and the often perfectly rounded character of the contained fragments was referred to as a certain indication of the wearing action of running water.

The fallacy of arguing the sedimentary origin of the whole series because of the presence of such comparatively insignificant inclusions of clastic material, has been clearly shown by recent Archæan work and is now very generally conceded. It is not however so widely known that many of the conglomerates so-called and described have no existence as such but are in reality autoclastic* rocks or dynamic breccias which have resulted in the main from the complex folding and stretching occasioned by the operation of the strong orogenic forces prevailing so intensely in pre-Cambrian times. Murray in 1853 and Macfarlane in 1866 refer to the presence of these coarse beds in the Archæan of Hastings County, while on page 31 of the Geology of Canada (1863) conglomerates are referred

* The term "autoclastic" originally proposed by H. L. Smyth (see Geology of Steep Rock Lake, Am. Jour. Sci. XLII, p. 331) is very applicable used as its author defines to rocks "which have formed in place from massive rocks by crushing and squeezing without intervening processes of disintegration or erosion, removal and depositon." Van Hise (see Principles of North American Pre-Cambrian Geology, 16th Ann. Rep. U. S. Geol. Surv. p. 679. 894-95) explains the use of the term, describes the method of formation of these rocks and the means of distinguishing them from basal conglomerates.

to by Sir William Logan as existing in the Laurentian. On page 32 and 33 of the same volume, somewhat detailed descriptions are given of conglomerates occurring in the Hastings Series then classified as Laurentian. Vennor, in 1869,* gives a three-fold classification of similar rocks occurring in the Hastings Series.

In most if not all of these instances. there seems to have been no well directed attempt to find the source of this coarse fragmental material, or a basement from the disintegration of which they might possibly have been derived. Of course at that time such search was deemed unnecessary as the pre-existence of the Laurentian was considered beyond question, and the granitic aspect of most of the fragments seemed to point unmistakably to their derivation from similar material although their exact source was not known. It will thus be evident that the precise nature of these reported coarse fragmental rocks cannot be here discussed as the descriptions at present available are necessarily vague and unsatisfactory so that further examination will have to be made at the several localities before a final decision can be reached.

In the region to the north of the occurrences mentioned in these old reports, several localities were however found where pseudo-conglomerates are very typically developed. The most noteworthy of these, showing very extended outcrops of these rocks, are to be found in the northern part of the township of Tudor between St. Ola Village and Gilmour Station on the Central Ontario Railway.

At this place also the true nature of these supposed conglomerates which it is the purpose of the present paper to describe was first clearly understood. Other exposures identical in origin were noticed on lot 18 con. III of Wollaston on the road between Coe Hill and The Ridge P.O., on lot 10 con. XIV of the same township a few miles east of Faraday P.O. ; also on lot 26 Con. XIV of Carlow and on lot 2 con. XIX of Raglan. These by no means exhaust the localities where similar rocks

*See Rep. Geol. Surv. Can. 1866-69, p. 157.

are known to exist, but will serve to indicate a few of the more important and typical localities. Besides these, pseudo-conglomerates also occur near the line between Cons. VII and VIII in the township of Monmouth on the Monck Road, a short distance east of Hotspur P.O., and also to the east of the southern extremity of Pine Lake on lot 18 con. I of the township of Cardiff. With the possible exception of these two last-named occurrences, all of the exposures of these pseudo-conglomerates met with admit of a very adequate explanation as of autoclastic origin. It is proposed, in the light of recent experience, to re-examine the localities mentioned in Monmouth and Cardiff to determine if possible the exact nature and relations of these exposures, which seemed to present such strong resemblences to stretched conglomerates.

In the northern part of the Township of Tudor, several large areas are occupied by massive igneous plutonic rocks which are clearly batholitic in their origin and behaviour. In common with other known occurrences of similar material encountered throughout this district, these intrusive masses are believed to contain a great variety of irruptive plutonic material ranging from gabbro and diabase on the one hand through diorite and hornblende-granitite, to granitite, pegmatite and lastly quartz representing the last secretions of the magma from which all have successively crystallized. On the other hand, certain of these masses are relatively much more basic than others, with gabbro and gabbro-diorite as the prevailing rock type, while others again, in areas not far remote, are decidedly acidic with ordinary granitite as the representative intrusive. The batholites are wrapped around by great mantles of the limestones, shales and amphibolites of the Hastings Series. Usually a perfect conformity if such it can be called, exists between the two, although it is quite evident from the curved and divergent strikes that the stratified series has undergone considerable displacement, while in certain places the limestones, &c, abut against and are cut off by the intrusion of the batholite. Two of these batholites occur in the northern

part of Tudor, but it is with the more easterly of these that the occurrences to be described were noticed.

This batholite has an irregular, though somewhat oval, outline, presenting a series of bays with occasional small arms, the former occupied by wedge-like areas of the clastic rocks. It covers the northern portions of con. XIX of Tudor and the southern part of first concession of Limerick, extending from lot 16 in Tudor eastward to and beyond lot 9. The area characterized by its presence is exceeding rough and barren, presenting as usual a series of low rounded hills with occasional precipices and intervening swampy flats. Macroscopically the composing rock is medium textured, of a distinct though pale flesh colour, weathering white where exposed to atmospheric agencies. To the unaided eye it has every appearance of an ordinary granite and would undoubtedly be classified as such by most observers. Under the microscope, however, plagioclase is seen to be greatly preponderant while hornblende is the most abundant ferromagnesian constituent, although biotite altered to chlorite is likewise present. The rock must therefore be placed with the diorites although it evidently represents a rather acid type. Associated with this rock and apparently a differentiation product of the same magma is a massive gabbro-diorite. The coloured constituent shows the deep green borders and pale interiors characteristic of uralitic hornblende, although the alteration of the original pyroxene is quite complete. Many individuals show a tendency to assume the actinolitic habit, and areas and patches still more intimately associated with the more acid phases of the rock are rather typical amphibolites, the hornblende and other constituent minerals having undergone still more extensive deformation and dislocation.

The place where these supposed conglomerates were first noticed was on lot 13 in con. XIX of Tudor, a short distance north of Beaver Creek. At this locality, some angular boulders composed of this material and evidently carried thence from a source not far distant, were deposited from the drift-laden

ice along the base of the diorite cliffs which here forms the north side of the valley of Beaver Creek. A search was made, with the result of finding exactly similar strata in place, forming a small band completely enclosed in the intrusive mass and extending completely across lot 13 as well as a short distance east and west into the adjacent lots. Detailed examination revealed much more extended exposures on the hills to the northward of Gilmour Station, situated chiefly on lots 11 and 12 in the XVIIIth concession.

The so-called conglomerates may be included under two great classes.

1. Those which have a matrix of limestone or dolomite.

2. Those in which a greyish, sometimes almost black micaceous rock, forms the cementing material.

The limestones breccias may likewise be subdivided into two classes (*a*) those which readily show their origin as dynamic breccias and (*b*) those which more closely resemble ordinary conglomerates and may, following Van Hise, be called pseudo-conglomerates. (See Plate VII, Fig. 1 and 2.) Both varieties of these calcareous fragmentals are abundantly represented and are as would be expected most frequently to be met with at or near the line of junction with the intrusive granites, gneisses and greenstones, these places representing areas or zones of extreme disturbance.

In regard to the material constituting the supposed pebbles they likewise admit of a two-fold division:

(*a*) Those which are formed by the breaking apart of what were once fairly continuous bands of the rusty-weathering or greyish gneiss, already mentioned as so frequently and intimately associated with these crystalline limestones and dolomites.

(*b*) Those in which a series of approximately parallel dykes of intrusive material, chiefly granite, diorite and amphibolite have suffered the necessary deformation and dislocation.

The class first mentioned (*a*) are doubtless the most abundantly represented in this district, and a great many of the exposures show almost at first sight their origin as autoclastic

rocks. The true nature of the more unusual types and those which bear such a marked resemblance to ordinary conglomerates, is not nearly so evident, and much confusion has arisen in the past from their wrong interpretation. The explanation, however, of the formation of these limestone breccias is rather simple, and every gradation is discernible at one or other of the various localities where these rocks are exposed. Outcrops which have been subjected to only normal dynamic action show impure bands, more or less continuous, composed of the prevailing light greyish often rusty-weathering gneisses representing, hardened and altered interbedded mud or silt-like depositions. These impure gneissic bands are extremely brittle and thus very liable to break up, while on the other hand, with the application of the same dynamic or stretching force, the limestone is seen to "flow," filling in the most minute spaces and accommodating itself to every phase of its new position. With a continuation of the same force with more marked intensity, the limestone gradually recrystallizes and may even become quite massive. The first process in the deformation of these bands is the development of transverse joints as the result of the folding and stretching to which the whole series has been subjected. A further application of these processes of deformation, bands originally continuous become more widely separated, the intervening spaces being occupied at once by the extremely plastic and accommodating limestone. In exposures which have been very little subjected to dynamic action, the separated fragments are quite angular and are readily traceable as one continuous band, but where extreme modification has taken place the fragments have become so rounded and displaced, owing to differential movemeut and pressure, that the resulting rock-mass presents in great perfection the characters of an ordinary conglomerate containing well rounded fragments with every appearance of having been water-worn.

The pseudo-conglomerates belonging to the second division (*b*) of those having a limestone or dolomitic matrix seem to be confined as a rule to the vicinity of irruptive masses, and

the coarse material has been formed by the breaking apart of small dykes or apophyses of the intrusive rock. At one place in Tudor, on lot 12, con. XIX, an exposure of the usual crystalline limestone is seen in contact with the granitic-looking diorite. The junction between the two rocks is exceedingly irregular and jagged and re-entering angles of the limestone fill up the interstices in the diorite. On the other hand arms or points of diorite pierce the limestone and their continuation outward is seen to have been broken in the stretching to which the rock has been subjected, leaving a series of rounded lumps of the intrusive rock extending out into the limestone and entirely separated from the parent mass. In other instances, possibly a little more remote from the batholite, the limestones are often penetrated by a series of more or less parallel dykes, most of which are pegmatitic in origin and structure. The extreme deformation of these relatively much more brittle bands or dykes produce autoclastic rocks which are undistinguishable in many instances from the ordinary clastic conglomerates.

The psuedo-conglomerates, however, that have perhaps caused most confusion and misinterpretation are those which possess a dark grey, often almost black micaceious matrix, in which are embedded rounded or lenticular fragments, the most abundant of which were evidently composed of some species of fine-grained granite. (See Plates, VI, VIII and XIX.) In previous descriptions covering this and adjacent areas, precisely similar occurrences have been invariably described as excellent examples of undoubted clastic conglomerates, while the lenticular outlines of many of the contained fragments was referred to as interesting evidence of the intense squeezing and stretching to which the whole rock-mass had been subjected. All the exposures of rocks of this kind examined in the area covered by our map-sheet, furnished little or no evidence in contradiction of such a theory while the apparent identity of the coarse fragments with material composing certain plutonic masses in the immediate neighborhood, seemed to lend additional support to such a view. On the other

hand it appeared to be equally certain that the same plutonic igneous material was at other points, not far distant, intrusive through precisely similar strata. Such apparently contradictory evidence in regard to the geological relations of these rock masses, remained unexplained until the discovery of the extensive series of exposures of similar rocks in the northern part of the township of Tudor. Here, the evidence was very complete and convincing that the supposed conglomerates were in reality autoclastic rocks and the so-called pebbles extremely deformed portions of a series of more or less parallel dykes, evidently highly differentiated apophyses of the neighboring parent plutonic mass. The diversity in composition of the coarse fragments, at first urged as one of the strongest proofs of their clastic origin, is believed now to depend on the composition of the neighboring irruptive mass. The whole series of exposures illustrate in great perfection every gradation in the process of the formation of these seeming clastics, showing how exceeding difficult it is, if not impossible, in cases of extreme deformation and movement, to distinguish between these autoclastic rocks and the ordinary coarse fragmentals characteristic of littoral action.

Exposures of these rocks which have suffered least from dynamic action, show a series of very approximately parallel bands or dykes generally of whitish or very light greyish rock embedded in and apparently cutting a dark grey almost black micaceous schist. Precisely similar phenomena are rather familiar to most workers in Archæan geology, and are characteristic of intrusive contacts, where the more acid plutonics come against darker coloured schistose material. The contrast in colour is most marked, and this is further accentuated by the kaolinization of the felspar so abundant in the lighter coloured portion of outcrops which have exposed to atmospheric decay. The action of the weather seems to be relatively more severe with the darker portions of the rock, causing these to disintegrate more rapidly and leaving the lighter coloured areas in rather prominent relief. The length of these lighter coloured

bands along the planes of fissility in the schist, is often many times in excess of the breadth at right angles to the foliation. Indeed many of the outcrops representing the less modified phase of these rocks, very closely resemble exposures of the highly differentiated and parallel alterations of basic and acidic bands so persistently typical of the granite and diorite gneisses usually classed as Laurentian. The wider and more continuous of these more acid portions agree very closely with pegmatite in structure and composition, while the narrow dykes which greatly prevail are micro-granitic in appearance.

Under the microscope, thin sections show these fine-grained felsitic looking dykes to be composed of a micro-crystalline or granulitic aggregate, made up, it may be presumed of quartz and felspar, resembling very closely the groundmass of certain quartz porphyries. Cataclastic structure is so pronounced that all trace of larger individuals, if originally present, has disappeared and a very fine-grained mosaic, of sharply extinguishing felspar and quartz individuals, which are very difficult to distinguish from one another, remains. There is a very much smaller quantity of decomposed biotite, most of which occurs in dark wavy lines representing mechanically disintegrated portions of this mineral, producing in the rock a very recognizable micro-fluxion structure. The darker coloured portion of the rock is composed mainly of biotite with occasional scales of muscovite. Narrow alternating bands are composed of water clear felspar and quartz, while calcite, surrounded by larger individuals of quartz and felspar, characterizes certain lenticular areas. Besides these, small inclusions often occur representing the lighter coloured rock or micro-granite around whih the individuals of biotite seemed to "flow" in long gentle curves corresponding very closely with their outline. The junction between the two rocks is rather sharp, but where these intrusions are larger and more numerous, there seems rather pronounced evidence of the commingling of the material of both rocks as a result of actual fusion. These are usually lenticular in outline narrowing down at either extremity and exhibiting small veinlets or tails of quartz, thus revealing their intimate

connection in origin with ordinary pegmatite. Stretching primarily develops a series of oblique transverse lines or joints which gradually widen with an increase in the amount of dynamic action. At times narrow arms or remnants may be seen connecting the severed portions of the once continuous band, but these gradually disappear. The breach becomes wider, the space thus created being filled with the more plastic schist, until finally, and in the same way as in the case of those autoclastics with the limestone matrix, the extreme of deformation is reached when the resulting rock seems perfectly indistinguishable from an ordinary clastic conglomerate.

EXPLANATION OF PLATES.

The illustrations are half-tone reproductions from photographs, taken by Mr. Joseph Keele and the author.

PLATE VI.—Autoclastic rock or pseudo conglomerate ; from lots 13, con. XIX of Tudor township in the County of Hastings, Ont.

The matrix is a dark grey, in places almost black micaceous schist pierced by dykes of a micro-granitite, which more brittle than the enclosing matrix have become autoclastic by stretching. In places the original continuity of these more or less parallel igneous dykes is still preserved, but in most instances the rock bears a marked resemblance to occurrences, which have usually been described as "stretched conglomerates."

PLATE VII—Pseudo-conglomerate (autoclastic) ; from lots 12 con. XIX of Tudor township. The enclosing matrix is a dolomitic limestone which has undergone complete recrystallization. The supposed pebbles, which occur as a series of rudely parallel and detatched lumps, weathering out from the surrounding limestone were at one time fairly continuous bands and their identity in origin with igneous dykes may be plainly seen by reference to the large and unbroken pegmatitic dyke, which is shewn in the same illustration.

PLATE VII, Fig. 2.—Pseudo-conglomerate (autoclastic) ; lot 18, con. III of Wollaston on the road between Coe Hill and The Ridge P.O. The enclosing matrix is again a dolomite, but the fragments which were at first believed to be pebbles are more diverse in composition ; granite is the most abundantly represented, but diorite, amphibolite, pegmatite and quartz were also noted. The irruptive plutonic masses in the immediate vicinity shew a corresponding diversity in composition.

PLATE VIII, Fig. 1.—Autoclastic rock ; from lot 13 con. XIX of Tudor. The matrix is the dark grey mica-schist already mentioned, probably tufaceous in origin, pierced by small parallel dykes of micro-granitite. The oblique transverse lives representing small breaks, characteristic of the first stages in this process of deformation or stretching may be noticed in the more elongated individuals while in the same illustrations other portions of the rock resembles very closely ordinary clastic conglomerate.

PLATE VIII, Fig. 2.—Autoclastic rock ; lot 13 con. XIX of Tudor ; the illustration shows,in detail and on a much larger scale, a more advanced stage in the deformation of one of the elongated individuals of micro-granitite. It is evident from this that the rounded outline is imparted to the fragments at a very early stage in the process.

PLATE IX, Fig. 1.—Autoclastic rock ; lot 13 con. XIX of Tudor. The matrix is the same dark grey mica-schist already mentioned, while the lenticular shape of themore brittle dyke bands are shown. In cross section as also shown these same individuals exhibit a more or less perfect rounded outline.

PLATE IX, Fig. 2.—Autoclastic rock ; lot 13 con. XIX of Tudor. This specimen exhibits in great perfection one phase of the rock, where it has undergone the extreme of deformation. The supposed pebbles in reality represent what were once practically continuous more or less parallel dykes of micro-granitite, which owing to differential movement and stretching have become gradually so distorted and displaced that the resulting rock mass is undistinguishable from singular exposures of similar rocks which are clearly the result of littoral action.

ON SOME SPECIES OF CANADIAN PALÆOZOIC CORALS.*

By LAWRENCE M. LAMBE, F. G. S.

In the following paper on a few species of corals from the Palæozoic rocks of Canada attention is drawn to certain structural details overlooked or misinterpreted in the original descriptions of some of the species. Supplemental descriptions of others have been induced by the further study of the type specimens or by information derived from additional material available since the species were first described. A description is also given of a supposed new species.

COLUMNARIA RUGOSA, Billings, sp.

Palæophyllum rugosum, Billings. 1858. Rep. of Progress for 1857, Geol. Survey of Canada, p. 168.

Columnaria erratica, Billings. 1858. Ibid, p. 166.

The generic characters ascribed to the genus *Palæophyllum* were—"Corallum fasciculate or aggregate ; corallities surrounded by a thick wall ; radiating septa extending the whole length ;

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

transverse diaphragms either none or rudimentary ; increase by lateral budding."

The type specimen, by far the most perfect specimen in the collection, has been closely examined and by means of a longitudinal section of one of the corallites close set complete horizontal tabulæ are found to be present. The supposed absence or rudimentary condition of tabulæ being the only character distinguishing *Palæophyllum* from *Columnaria*, the knowledge that tabulæ exist removes the barrier to the union of these two genera.

Columnaria rugosa may be defined as follows,—corallum consisting of an aggregation of circular or rounded polygonal corallites, from about 3 to 9 mm. in diameter, which are in contact with one another or free for greater or less distances. Septa, numbering about forty in well developed corallites, alternately long and short, the long ones reaching to or almost to the centre, the short ones almost rudimentary. Tabulæ complete, horizontal, slightly irregular, at times slightly concave or convex and often turned downward at their edges, about four in the space of 2 mm. Increase by lateral calicular gemmation. Exterior of corallites marked by annular lines of growth and faint longitudinal lines corresponding with the septa within.

The corallites in this species vary considerably in size in some specimens, in others they are more uniform and when in contact whether circular or polygonal they still remain distinct one from another generally with interspaces between them.

Columnaria erratica, Billings was described as "forming large masses of corallites, either in contact or separate. The separate cells are round, those in contact more or less polygonal, the radiating septa rudimentary, forming about four sulci in the breadth of one line upon the interior ; diameter of corallites from two to five lines, in general about three and a-half lines. The transverse diaphragms are not visible in the specimens examined. The walls of the separate corallites are thick and concentrically wrinkled." This species is now represented in the museum collection by a single specimen labelled in the handwriting of Mr. Billings and consists of a corallum with corallites

that are circular when free or almost polygonal when crowded together ; it unfortunately does not shew the septa but tabulæ are clearly distinguishable. Judging from the manner of growth of *C. erratica*, the presence of tabulæ and the stated presence of septa, the writer believes that the description of *C. erratica* was based on imperfectly preserved specimens of *C. rugosa* and that the two species are identical especially in view of the fact that out of a number of examples of the latter species only one shews the septa at all but fortunately in this case very well.

Trenton formation ; Lake St. John, Que., Little Discharge, Point Blue, J. Richardson, 1857 ; near Point Blue, A. R. C. Selwyn and J. Richardson, 1870 ; two miles south of Point Blue, W. McOuat, 1871. All the specimens are silicified and the structure is best seen where weathering has taken place.

CYATHOPHYLLUM ARTICULATUM, Wahlenberg.

Madreporites articulatus, Wahlenberg. 1821. Nov. Act. Soc. Upsal., vol. VIII, p. 87.

Cyathophyllum articulatum, Milne—Edwards and Haime, 1851. Polyp. Foss. des Terr. Palæoz, p. 377; and 1855, Brit. Foss. Corals, p. 282, pl. LXVII, figs. 1, 1a.

To this species are assigned a number of specimens from the Niagara rocks of Lake Temiscaming ; their general form, manner of growth and structure may be described as follows :—Corallum composite, fasciculate, with upright, slightly flexuous, subparallel corallites, increasing by lateral or by marginal calicular gemmation from an initial basal parent and forming clusters reaching a height of over eight inches and of variable breadth. Corallites subcylindrical, strongly expanded and constricted at unequal intervals with generally free thin margins to the expansions, coming together and adhering to each other where enlarged, of unequal size, the young corallites often proceeding upward with little increase in diameter, at other times rapidly gaining breadth ; varying in diameter from about 5 to 20 mm., the larg-

est being sometimes slightly over 20 mm. in diameter. Outer surface covered by an epitheca with numerous slight rings of growth and with strongly marked septal furrows. Septa, tabulæ and dissepiments well developed. Septa numberiug from sixty to over seventy in the large corallites, of two alternating sizes, the primaries passing quite to or nearly to the centre of the visceral chamber, in the latter case leaving the tabulæ smooth at the centre, the secondaries small reaching generally less than half way to the centre. Tabulæ forming a definite central zone equal in breadth to about half the diameter of the corallite, flat or slightly concave often deflected at the margin. Dissepiments as a whole rather small but unequal in size, occupying the interseptal spaces between the tabulæ and the outside wall, encroaching at times on the tabulæ. Calyces moderately deep, with steeply ascending sides and most often with expanded thin margins.

In the description given by Milne-Edwards and Haime of this species (Brit. Foss. Corals) the septa are stated to be "about sixty in number, thin, equally developed." This is evidently a misprint as far as the equality of the septa is concerned, as in fig. 1a supplementing the description, the septa are shewn as of two orders, numbering in all about sixty, half of which almost reach the centre of the visceral chamber whilst the remainder are only about half that size.

Locality and formation.—Isle of Mann (Burnt Island), Lake Temiscaming, Que. A. E. Barlow, 1893; Niagara formation.

LITHOSTROTION MACOUNII. Sp. nov.

Favosites,——(?), Whiteaves. 1877. Geol. Survey of Canada, Rep. of Progress for 1875-76, p. 98.

Corallum astræiform, composed of long, upright, slightly flexuous, closely packed, distinct, prismatic corallites that have five, six or seven sides and average about 3 mm. in breadth, forming masses evidently of considerable size; represented by two fragments the largest of which is 8 cent. high and 6 cent. broad. The corallites are somewhat irregularly marked by decided transverse often slightly oblique growth ridges, and are

covered by an epitheca regularly striated longitudinally by septal furrows. Calyces not observed. Septa from eighteen to twenty-two in number, alternately long and short, the former passing to the centre and producing a slender columella, the latter extending only a short distance inward from the wall. Frequently a primary septum instead of passing to the centre joins the one next to it at a short distance from that point A narrow peripheral area formed of small upwardly and outwardly arching plates in one or two cycles surrounds a broad tabulate inner zone. Tabulæ flat or slightly raised at the centre where they are crossed by the columella, about fifteen occurring in a space of 5 mm.

This species resembles *Lithostrotion (Stylaxis) irregularis*, McCoy* from the Carboniferous limestone of Derbyshire but the corallites are smaller, the septa are less numerous and there are fewer rows of vesicles.

Locality and formation.—Fossil Point, Peace River, British Columbia, two fragments probably belonging to the same specimen, collected by Professor J. Macoun in 1875; lower Carboniferous formation.

ACERVULARIA GRACILIS, Billings, sp.

Strombodes gracilis, Billings. 1862. Palæozoic Fossils, vol. I, p 113, fig. 94.

Original description.—"Corallum in large masses, consisting of cells from 2 to 3 lines in diameter, most of them pentagonal. Cup about one line in depth, with an irregularly rounded central style ½ line in height, and one-third or one-half the whole width of the corallite. There appear to be thirty or forty septal striæ on the inner side of the cup."

The figure on p. 113 of the above quoted work represents about one-fourth of the surface of the only specimen of this species in the collection. The specimen is silicified and not preserved as well as might be desired but by a careful examination of natural longitudinal and transverse sections the structure can

*Brit. Palæoz. Fossils, 1855. p. 101, pl. 3A, fig. 5.

be made out sufficiently clearly to give the following data:—Corallum astræiform, made up of polygonal corallites from 3 to 7 mm. in diameter with deep calyces that join each other in sharp-edged outlines and that have steep sloping sides and a rounded boss, roughly 2 mm. in breadth, at the bottom. Each corallite is contained within its own walls from which spring lamellar vertical septa whose free edges are moderately conspicuous in the calyces. Septa, numbering from about thirty to forty, alternately long and short, the former continued to the centre where they are twisted, the latter about one-half or slightly more than one-half the length of the former. Dissepiments convex, arching evenly upward and outward and filling the interseptal loculi in a circumferential area whose breadth is equal to the length of the secondary septa or about one-fourth the diameter of the corallite. Within the outer area is a zone of dissepiments or vesicles that rise upward toward the centre and in combination with the proximal ends of the primary septa form a subvesicular mass that appears at the bottom of the calyx as a rounded projection.

The presence of continuous vertical septa such as the above in corallites that are enclosed by definite walls makes clear the necessity of removing the species represented by this specimen from the genus *Arachnophyllum (Strombodes)*; although some details of structure are obscured by crystallization yet sufficient characters are preserved to suggest affinities to *Acervularia* to which genus this species is for the present at least assigned.

Locality and formation.—Manitouwaning, Grand Manitoulin Island, Lake Huron, collected by A. Murray; Niagara formation

CHONOPHYLLUM CANADENSE, Billings, sp.

Ptychophyllum Canadense, Billings. 1862. Palæoz. Fossils, vol. I, p. 107.

" *Canadense*, Billings. 1866. Cat. Silurian Fossils of Anticosti, p. 34.

Corallum large, circular, much broader than high, expanding laterally from a small, obtusely pointed base into a broad thin, frill-like horizontal extension above whose upper surface rises abruptly a central calicular area about one-fourth the breadth of the corallum; attaining a breadth of over 19 cent. and a thickness at the centre of about 4 cent. Height of the central part enclosing the calyx, above the level of the surrounding surface, in large individuals, from about 1·5 to 2 cent. Calyx* about twice as wide as high, with a diameter of about one-tenth the breadth of the corallum, flat at the bottom with very steep sides. Septa, in the visceral chamber, lamellar, of two orders, primaries and secondaries, alternating, the former meeting at the centre with a slight amount of twisting, the latter not quite half the length of the former; ascending the sides of the calyx as sharp-edged lamellæ they pass down and over the extracalicular surface as gradually broadening, flatly convex, radiating ridges having a maximum breadth near the periphery of 7 mm.; they number in different individuals from about seventy-four to eighty-four. Well developed flat or concave tabulæ, turned down at their edges and as broad as one-half the width of the calyx, are seen in a radial section, beneath the bottom of the cup. The whole of the upper surface is marked by fine, raised, interrupted and concentric, ripple-like growth lines, generally less than 1 mm. apart, those of one septal ridge sometimes continuous with at other times alternating with those of adjacent ones; the basal surface presents a similar appearance except that here the septal radii are concave instead of being convex The structure of the walls of the calyx and of the extended frill-like margin appears to be very dense. In radial sections the gradual growth of the corallum outward is indicated by parallel lines approximately at right angles to, and joining the ripple-like markings on, the upper and lower surfaces. In vertical tangential sections the septa are seen to be made up of superimposed convex layers resembling the septal structure of *C. magnificum*, Billings, but denser.

*Originally described as the basal centre "excavated into a cup-like cavity."

Locality and formation.—South-west Point, Anticosti, division 4 of the Anticosti group, collected by J. Richardson, 1856.

CYSTIPHYLLUM NIAGARENSE, Hall, sp.

Conophyllum Niagarense, Hall. 1852. Palæont. New York, vol. II, p. 114, pl, XXXII, figs. 4a—n.

Cystiphyllum Huronense, Bill. 1866. Cat. Silurian Fossils of Anticosti, p. 92.

" *Niagarense*, Rominger. 1876. Geol. Survey Michigan, Fossil Corals, p. 137, pl. XLIX, fig. 3.

" *Niagarense*, Sherzer. 1892. A revision and monograph of the genus *Chonophyllum*, Bull. Geol. Soc. of Am., vol. 3, p. 266.

The type specimen of *C. Huronense* is from the Niagara rocks of Cockburn Island, Lake Huron and was collected by Dr. R. Bell in 1865. Rominger has pointed out that *Conophyllum Niagarense*, Hall is in reality a *Cystiphyllum* and mentions its occurrence in the Niagara group of Drummond Island, Lake Huron and at Point Detour as well as in the Niagara of Kentucky, Iowa and Indiana. The specimen from Cockburn Island is preserved in such a way as to shew the longitudinal ribbing of the surface, the form, size and direction of the cystose plates within and the radial rows of denticulations on the calicular margins as well as a root-like extension near the basal extremity: details of structure such as these, taken with the general form and manner of growth of the corallum, induce the writer to believe that *C. Huronense* should properly be referred to Hall's species from the Niagara of the State of New York.

Rominger's description of this species is comprehensive and accurately describes the Canadian specimen; it appears in the following words :—"Conical polyp cells attached to other bodies at the base, and by additional root-like prolongations from the sides. Stems elongated, subcylindrical, or shorter turbinate, annulated by superficial constrictions with tortuous flexions, or by periodical total interruptions in the growth of a calyx, and the

formation of a new cell from within. The calyces are moderately deep, uniformly spreading from an obtusely angustated bottom; margins erect: their surface is blistered, and is radially striate by spinulose crests, developed in some specimens with more distinctness than in others, The surface of the polyp stems in well-preserved condition is longitudinally ribbed by septal striæ, but it often happens that the outer walls are destroyed, and that the stems are of rough exfoliated aspect, exhibiting the concave side of the blisters composing the cell cups, and the free edges of the single invaginated cups composing the stems."

CYSTIPHYLLUM AGGREGATUM, Billings.

Cystiphyllum aggregatum, Billings. 1859. Canadian Journal, new series, vol. IV, p. 137, fig. 28.

" *aggregatum*, Rominger. 1876. Geol. Survey Michigan, Fossil Corals, p. 138.

" *cæspitosum*, Schlüter. 1882. Sitzungsberichte der niederrhein. Gessellschaft für Natur-u. Heilkunde in Bonn; and 1889, Anthozoen des rheinischen Mittel-Devon, band VIII, heft 4, p. 86, pl. VIII, figs. 1—3.

Original description.—"The only specimen of this very distinct species that has come under my observation is in the cabinet of the Canadian Institute. It consists of a mass of cylindrical corallites closely aggregated and in places united by projecting folds of the outer wall, as in the genus *Eridophyllum*. The individuals are completely enveloped in a thin epitheca which is obliquely wrinkled and filled with small sublenticular cells, one or two lines in width, Diameter of longest corallite in the group, one inch, and of the smallest, five-eights of an inch."

Since the above was written a number of very fine specimens of this species, some of them of large size, have been added to the collection of the Geological Survey, therefore it is thought desirable to amplify the original description by the following, the result of an examination of the additional material—Coral-

lum aggregate, forming large masses sometimes a foot and a half across and over a foot high, composed of upwardly directed, flexuous, subcylindrical corallites that increase rapidly by lateral calicinal gemmation from a single parent corallite. As a result of their mode of growth from a small basal beginning, the corallites are somewhat divergent, those near the confines of the corallum sometimes growing almost horizontally. Corallites strongly and irregularly annulated, growing close together, frequently touching each other, their coherence being often strengthened at the points of contact by an increased development of the ridges of growth, or from want of space they may be closely pressed against one another for some distance. Mature corallites varying in diameter from 1 or 2 to over 3 cent., the young ones beginning with an average breadth of about 5 mm, and growing upward beside the old stems with a very slow increase in size, Epitheca thin, complete, shewing minor, transverse growth markings. Inner structure vesicular, similar to that of *C. vesiculosum* from which this species apparently differs only in its aggregate form.

Locality and formation.—Abundant in the Corniferous formation of Ontario; Rominger mentions its occurrence in large clusters in the Hamilton group of Thunder Bay.

(*To be continued.*)

THE WATER OF THE ILLECILLIWAET GLACIER.

By FRANK T. SHUTT AND A. T. CHARRON.

It was our good fortune, through the kindness of Dr. Saunders and Dr. Fletcher, to obtain, during the past summer, samples of water produced by the melting of the ice of the glacier known as the Great or Illecilliwaet Glacier, which can be reached by a rather arduous walk of one and a half miles from Glacier Station, B.C., on the main line of the Canadian Pacific Railway. Both samples were collected within a few feet of the glacier's irregular face, down which at the time the waters

were taken (August) numerous streams of ice-cold water were flowing to form the milky torrent that rushes down the valley in the summer to join the Illecilliwaet River.

The analytical data are as follows :—

	No. 1.	No. 2.
	Coll. Aug. 7 Anal. Aug. 15	Coll. Aug. 19 Anal. Aug. 24
	Parts per million	Parts per million
Free Ammonia	·018	·018
Albuminoid Ammonia	·027	·037
Nitrogen as Nitrates and Nitrites	·0246	·0442
Oxygen absorbed in 15 minutes	·0396	·0672
" " " 4 hours	·1056	·1744
Chlorine	·10	·10
Total Solids at 105 degrees C	30·8	12·0
Solids after ignition	30·8	8·0
Loss on ignition	None.	4·0
Phosphates	None.	None.

No. 1—When received at the laboratory (Aug. 15th.), the sample was quite murky, almost milky in appearance, from the presence of suspended mater. On standing 48 hours, a considerable amount of what proved under the microscope to be chiefly very fine fragments of quartz had settled to the bottom of the bottle. The supernatant water was, however, stlll turbid, and remained more or less so—though gradually clearing—for nearly two months.

No. 2—This sample also was milky and turbid when received, but not to such a degree as No. 1.

On Dec. 12th, the samples then being perfectly clear and brilliant, the "total solids" of the supernatant waters were again taken, with the following results:—

	No. 1.	No. 2.
	p. p. m.	p. p. m.
Total Solids at 105 degrees C.	16·8	1·6
Solids after ignition	12·0	none

These data show that the "total solids" in the waters as received consisted almost entirely of suspended rock matter. The amounts of dissolved mineral and organic matter are extremely small.

We may conclude from the analytical results obtained that the Glacier water is one of great organic purity. It is evident, however, that it cannot be considered as always constant as regards either the amount of its organic or mineral constituents; the latter, as we have seen, however are scarcely to be regarded as an intregral part of the water. The samples were collected twelve days apart, and probably at different points, which facts may allow us to understand the nature of the causes for the slight variations in the analyses.

The point of greatest interest, after establishing the high degree of purity of the water, is the large amount of finely divided rock matter in suspension. This is present in such quantities as to make the water quite milky in appearance, and is so fine that the water must stand for some weeks before thorough subsidence is effected. Microscopic examination of the deposit so formed proved it to consist almost entirely of fragments of quartzite.

For the following note on the geology of the district we are indebted to Mr. R. G. McConnell, of the Geological Survey.

"The rocks in the vicinity of the Glacier are of Cambrian age and consist largely of bluish quartzites and fine grained conglomerates holding pebbles of quartz and feldspar imbedded in a hard silicious matrix. In addition to these, greenish and dark schists of volcanic origin also occur in the neighbourhood."

Laboratory of the Experimental Farms.

Ottawa, Feb., 6th, 1899.

NOTES ON THE BIRDS OF KING'S CO., NOVA SCOTIA—PART II.

By HAROLD TUFTS, Esq., Wolfville, King's Co., N.S.

Dendragapus canadensis (*Linn.*) CANADA GROUSE.

Rather rare.

Bonasa umbellus togata (*Linn.*) CANADIAN RUFFED GROUSE.

Fairly abundant. They are now protected by law till October, 1901.

Circus hudsonius (*Linn*.) MARSH-HAWK.

Common from April till December.

Accipiter velox (*Wils.*) SHARP-SHINNED HAWK.

Fairly common throughout the year.

Accipiter cooperi (*Bonap.*) COOPER'S HAWK.

Not common. Absent in winter.

Accipiter atricapillus (*Wils.*) GOSHAWK.

Not very common. Present throughout the year.

Buteo borealis (*Gmel.*) RED-TAILED HAWK.

Fairly common except in winter.

Buteo lineatus (*Gmel.*) RED-SHOULDERED HAWK.

Not so common as the preceding species.

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

Quite common on the Grand Pré in early winter and spring.

Haliæetus leucocephalus (*Linn.*) BALD EAGLE.

Rare. A few years ago a pair nested on Long Island.

Falco rusticolus obsoletus (*Gmel.*) BLACK GYRFALCON.

One specimen was taken at Long Island, Jan. 8th, 1898.

Falco peregrinus anatum (*Bonap.*) DUCK HAWK.

Not common. Sometimes seen at Long Island in August and September.

Falco columbarius (*Linn.*) PIGEON HAWK.

Not common. Present from March till January.

Falco sparverius (*Linn.*) SPARROW HAWK.

Fairly common from April till October.

Pandion haliaetus carolinensis (*Gmel.*) OSPREY.

Rare, except in May and June, when they are frequently observed along the Gaspereau River following the movement of the ascending fish.

Asio wilsonianus (*Less.*) LONG-EARED OWL.

Common except in winter.

Asio accipiterinus (*Pall.*) SHORT-EARED OWL.

Common on the Grand Pré from April till the middle of December.

Syrnium nebulosum (*Forst.*) BARRED OWL.

Fairly common in heavily wooded regions.

Nyctala acadica (*Gmel.*) SAW-WHET OWL.

Present throughout the year, but most common in winter. A nest was taken last April containing six eggs.

Bubo virginianus (*Gmel.*) GREAT HORNED OWL.

Uncommon. Found in densely wooded districts.

Nyctea nyctea (*Linn.*) SNOWY OWL.

Rare winter visitant.

Surnia ulula caparoch (*Mull.*) HAWK OWL.

Rare. An example was taken last October.

Coccyzus erythrophthalmus (*Wils.*) BLACK BILLED CUCKOO.

Fairly common from May 20th till September.

Ceryle alcyon (*Linn.*) BELTED KINGFISHER.

Fairly common about suitable places from May till October.

Dryobates villosus (*Linn.*) HAIRY WOODPECKER.

Fairly common throughout the year.

Dryobates pubescens (*Linn.*) DOWNY WOODPECKER.

Common throughout the year.

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

Rare winter visitant.

Sphyrapicus varius (*Linn.*) YELLOW-BELLIED SAPSUCKER.

Fairly common summer resident.

Cephlœus pileatus (*Linn.*) PILEATED WOODPECKER.

Rare. One was taken in September, 1897.

Colaptes auratus (*Linn.*) FLICKER.

Abundant from April to October. Usually the flicker's nest is situated quite a distance from the ground, as one of the bird's names—"high-hole"—suggests, but last summer a nest was observed so low that the bottom was on a level with the ground outside the stump in which the nest was made. The nine eggs which this nest contained were also remarkable. One egg was no larger than a sparrow's and contained no yolk while the other eight varied greatly in shape, from spherical to extremely elongate.

Chordeiles virginianus (*Gmel.*) NIGHT-HAWK.

Abundant from May 20th till September.

Chætura pelagica (*Linn.*) CHIMNEY SWIFT

Abundant from May till the middle of September.

Trochilus colubris (*Linn.*) HUMMING-BIRD.

Common during the summer.

Tyrannus tyrannus (*Linn.*) KINGBIRD

Fairly abundant from the middle of May till the middle of September.

Contopus borealis (*Swains.*) OLIVE SIDED FLYCATCHER.

Fairly common from May 20th till October. Two sets of eggs of this bird from Wolfville are now in the National Museum at Ottawa.

Contopus virens (*Linn.*) WOOD PEWEE

Not very common, but pretty evenly distributed. Arrives here from the south, about the 1st of June, and leaves again about the 1st of September.

Empidonax flaviventris *Baird.* YELLOW-BELLIED FLYCATCHER.

Fairly common in dense low woods during the summer.

Empidonax traillii (*Aud.*) TRAILL'S FLYCATCHER.

Quite common from June till September.

Empidonax minimus *Baird.* LEAST FLYCATCHER.

Common from the middle of May till September.

Otocoris alpestris (*Linn.*) HORNED LARK.

Very common from November till April.

Cyanocitta cristata (*Linn.*) BLUE JAY.

Common throughout the year. They are very destructive to the eggs and young of our small song birds.

Perisoreus canadensis (*Linn.*) CANADA JAY.

Rather uncommon, but present throughout the year.

Corvus corax principalis (*Ridgw.*) RAVEN.

Fairly common throughout the year. They often kill very young lambs, for which reason they are persecuted by the farmers.

Corvus americanus (*And.*) CROW.

Exceedingly abundant throughout the year.

Dolichonyx oryzivorus (*Linn.*) BOBOLINK.

Abundant in summer about the meadows along the Cornwallis Valley. A set of eggs from this locality are now in the Museum at Ottawa.

Agelaius phœniceus (*Linn.*) RED-WINGED BLACKBIRD.

Rare.

Scolecophagus carolinus (*Mull.*) RUSTY BLACKBIRD.

Fairly common from the last of March till September.

Quiscalus quiscala (*Linn.*) PURPLE GRACKLE.

One observed May 3rd, 1895.

Pinicola enucleator (*Linn.*) PINE GROSBEAK.

Appears regularly about the first of December and remains till March.

Carpodacus purpureus (*Gmel.*) PURPLE FINCH.

Common in summer, while a few remain through the winter. Two sets of eggs from this locality are now in the Museum at Ottawa.

Passer domesticus (*Linn.*) HOUSE SPARROW.

Very abundant everywhere.

Loxia curvirostra minor (*Brehm.*) AMERICAN CROSSBILL.

Usually very abundant in summer when large roving flocks are to be met with everywhere. A nest containing three young birds was taken about the first of August, 1896.

Loxia leucoptera (*Gmel.*) WHITE-WINGED CROSSBILL.

Seen here only in winter and early spring and are of irregular occurrence. They frequent the tops of spruces and firs where they gather the seeds from the cones.

Acanthis linaria (*Linn.*) REDPOLL.

Are very common some winters, while during others they are rare or absent.

Spinus tristis (*Linn.*) AMERICAN GOLDFINCH.

Fairly common throughout the year.

Spinus pinus (*Wils.*) PINE SISKIN.

Breeds here regularly in May and June, and usually is common till September. At other times of the year it is very irregular. Two sets of eggs from this locality are now in the museum at Ottawa.

Plectrophenax nivalis (*Linn.*) SNOW BUNTING.

Common every winter, but not so numerous as formerly.

Poocætes gramineus (*Gmel.*) VESPER SPARROW.

Common from the middle of April till October.

Ammodramus sandwichensis savanna (*Wils.*) SAVANNA SPARROW.

Very common from the middle of April till October.

Ammodramus caudacutus subvirgatus (*Dwight*) ACADIAN SHARP-TAILED SPARROW.

Fairly common about the salt marshes at the mouths of the streams emptying into Minas Basin, from June till October.

Zonotrichia albicollis (*Gmel.*) WHITE-THROATED SPARROW.

Common from May till October. Two sets of eggs from this locality are now in the Museum at Ottawa.

Spizella monticola (*Gmel.*) TREE SPARROW.

Fairly common in winter.

Spizella socialis (*Wils.*) CHIPPING SPARROW.

Very common from May till September.

Junco hyemalis (*Linn.*) JUNCO.

Very common from March till November. A few spend the winter here.

Melospiza fasciata (*Gmel.*) SONG SPARROW.

Common throughout the year.

Melospiza georgiana (*Lath.*) SWAMP SPARROW.

Fairly common from May till October. One set of eggs from this locality is now in the Museum at Ottawa.

Passerella iliaca (*Merr.*) FOX SPARROW.

Usually quite common during the spring migration.

Habia ludoviciana (*Linn.*) RED-BREASTED GROSBEAK.

Uncommon, but a regular summer resident.

CONVERSAZIONE OF THE OTTAWA FIELD-NATURALISTS' CLUB.—JAN. 24TH, 1899.

The Annual Conversazione and Microscopical Soirée under the auspices of the O. F. N. C. was held on Tuesday, Jan. 24th, 1899 in the large Assembly Hall of the Provincial Normal School, kindly placed at the disposal of the Club by Principal MacCabe. Prof. E. E. Prince, B.A., F.L.S., President of the Club, occupied the chair. The hall was filled with a large concourse of members of the Club and friends, and the event was pronounced by all a decided success.

Among those present were: His Excellency the Earl of Minto, Patron of the Club; Capt. W.F. Lascelles, A.D.C.; Sir Henri G. Joly de Lotbinière, K.C.M.G.; Hon. Dr. Borden; Sir James Grant; Dr. G. M. Dawson, C.M.G., Director of the Geological Dept.; Colonel J. P. Macpherson; Dr. James Fletcher; Dr. I. Bradley; Prof Macoun; Mr. F. T. Shutt; Mr. Henry Macleod, C.E.; Dr. R. W. Ells, F.R.S.C.; Mr. W. Hague Harrington. F.R.S.C.; Vice-Principal S. B. Sinclair, B.A.; Mr. Kemp; Mr. Andrew Halkett; Mr. D. B. Dowling B.A.Sc.; Mr. W. T. Macoun; Mr. W. J. Wilson, Ph.B.; Mr. W. C. Bowles; Mr. A. G. Kingston, Principal McBratney; Mr. and Mrs. W. Scott; Mr. and Mrs. E. B. Eddy; Mr. W. Campbell, B.A.; Mr. and Mrs. O. J. Joliffe, M.A.; besides many teachers and students of the Provincial Normal and Model Schools and other leading educational institutions in the city. In a very neat address, Prof. Prince, gave a hearty welcome to the vast audience present and thanked the authorities of the Normal School for the use of the Lecture Hall, so well adapted for such an occasion.

Mr. S. B. Sinclair, Vice-Principal of the Normal School, expressed his appreciation of the valuable collection of geological specimens recently presented to the Normal School by Dr. Ami of the Club, and also of the rare collection of plants presented by Professor Macoun. He congratulated the society upon the nature and extent of its work. He considered that its most hopeful feature lay in the spirit of original research fostered by contact with the leaders in its different departments. The true scientist imparts his enthusiasm to those about him.

> "What he has loved,
> Others will love, and he will teach them how."

He quoted from Agassiz and others to show that such independent investigation is not only the most essential element of all natural science study worthy of the name, but that it also affords the best gymnasium for the development of vigorous personality.

Dr. Ami then announced the various exhibits of specimens displayed upon the tables in the Hall, giving brief notes of interest on each. These exhibits included:

Diagrams of Deinosaur, N. W. Territories.....Mr. L. M. Lambe.
Rocky Mountain Plants and Butterflies .....Dr. James Fletcher.
Squirrels of Canada.....Prof. John Macoun.

Behring Sea Plants.....Mr. James M. Macoun.
Indigenous Trees and Shrubs.....Mr. Wm. T. Macoun.
Silver Bear, Skeena River Country, B.C., and a Rocking Microtome.....Prof. E. E. Prince.
Weathered Rock illustrating old Devonian sea bottom..Dr. H. M. Ami.
Specimens of Bones and Skull from Klondike gravels, collected by Wm. Ogilvie, Esq..... "
Shells, Fruits and interesting collections from Jamaica .Mr. W. S. Odell.
Tropical Shells.....Mr. Andrew Halkett.

The east end of the Hall was occupied by a long table, where the following gentlemen exhibited various objects of special interest under the microscopes: Professor Prince, Mr. Kemp, Dr. Dawson, Mr. W. J. Wilson, Dr. Fletcher, Mr. Walter S. Odell (living organisms,) Mr. F. T. Shutt and Dr. Ami. Electric drop-lights attached to ornamental lamps with opal shades, kindly furnished by the Ottawa Electric Co., afforded excellent light for the instruments on the table.

The central portion of the floor was occupied by the projection microscope and science lantern from which numerous microscopic preparations themselves were exhibited on the screen magnified many thousand times. This part of the programme proved very attractive inasmuch as the whole audience could see at one glance the same microscopical object or preparation projected on the screen, whereas in the case of the table microscope only one person could examine any one slide or object at a time.

Shortly after His Excellency's arrival, Prof. Macoun described the various kinds of Squirrels known in Canada,* after which Dr. Ami projected some thirty preparations on the screen, including palate of whelk, palate of snail, proboscis of blowfly, oak saw-fly, flea from white mouse, mosquito, larva of mosquito, deep sea dredgings (H.M.S. Challenger) scales of body of a moth, cross-section of spine of Echinus, stellate hairs from the leaf of Deutzia, cross-section of hairs of elephant, deer, and other animals, &c., &c,

Dr. G. M. Dawson then gave a very interesting and instructive address on "*The remarkable landslip on the Rivière Blanche, County Portneuf, Que.*" An abstract of this paper, which was well received, appeared in the January issue of THE NATURALIST, pp. 194-195. Prof. Macoun concluded the papers of the evening by a graphic dissertation (illustrated with lantern slides) on the forest trees of Canada, showing what glorious possibilities of forestry the Dominion possessed.

*We hope to be able at some future date to give the readers of THE OTTAWA NATURALIST an abstract of Prof. Macoun's address.—THE EDITOR.

NOTES, REVIEWS AND COMMENTS.

"REPORT ON THE MARBLE, SLATE AND GRANITE INDUSTRIES OF VERMONT," by G. H. Perkins, Ph. D., State Geologist.—This is a brief preliminary report on some of the economic resources of the State of Vermont issued in accordance with an Act of the State Legislature passed in 1896. It is the first official report published by this state since the well known report of "President Edward Hitchcock in 1861."

As the work has been only recently begun, the report is limited to the three industries mentioned in the title. The different varieties of the various products and their uses are described, as well as the methods of quarrying and manufacturing them. The report is well illustrated and contains much information of a thoroughly practical character.

According to the best information now available, Vermont stands first amongst the United States in the production of marble and granite, and second, only to Pennsylvania, in slate.

The value of the annual output of the first is now about $3,500,000, of the second $1,500,000 and of the third $850,000. These figures alone show the importance of maintaining a geological survey in this state.

The subsequent and complete reports of Prof. Perkins, will be looked for with much interest both for their economic and their scientific results. JOHN A. DRESSER, Richmond, Que.

GEOLOGICAL CONGRESS.—The Eighth International Congress of geologists is to take place in Paris, August 16th to 28th in the year 1900, in connection with the Universal Exposition. A circular letter has been communicated to all American geologists inviting them to take part. Monsieur A. Gaudry is president of the committee of organization, with Messrs. Michel Levy and Marcel Bertrand as vice-presidents and Dr. Charles Barrois, secretary. Special excursions to most interesting localities are already arranged for. It is to be hoped that Canada will be fitly represented at this World's Congress.

A WELL DESERVED HONOUR.—The many readers of THE OTTAWA NATURALIST, as well as his many other friends in Ottawa will learn with pleasure that, Mr. Wm. Scott, B.A., has been chosen by the Provincial Minister of Education to fill the position of Principal of the Normal School at Toronto, rendered vacant by the death of the late Principal, Mr. Kirkland, on Dec. the 31st last. Mr. Scott was for several years a most active member of the Council of the Club and, while living in Ottawa, was an enthusiastic and untiring member of the Botanical Branch, for which he did valuable service in working up the local flora and added several new records to the Flora Ottawaensis. We heartily congratulate Mr. Scott on his promotion to the important and responsible office which he has been selected to fill, knowing that he will carry out thoroughly and well anything he undertakes.

Fig. 1.

Fig. 2.

Fig. 1.

Fig. 2

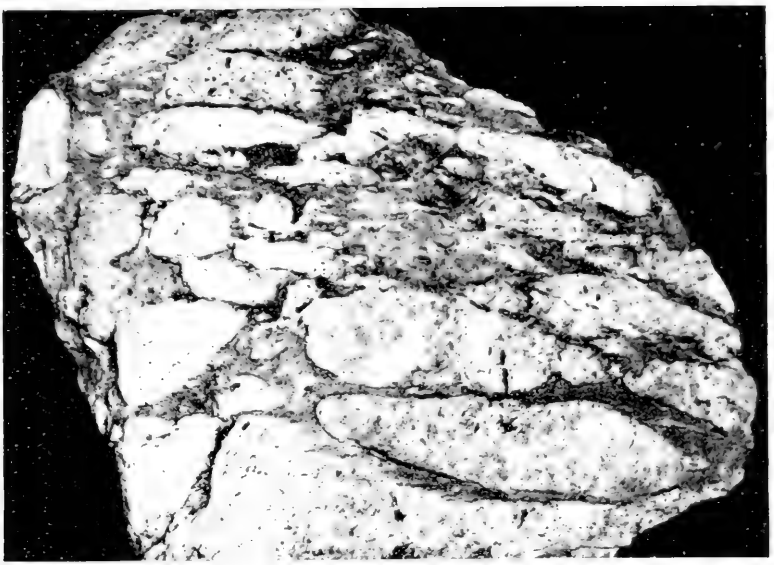

Fig. 1.

Fig. 2.

THE OTTAWA NATURALIST.

VOL. XII. OTTAWA, MARCH, 1899. NO. 12.

ON SOME SPECIES OF CANADIAN PALÆOZOIC CORALS.

BY LAWRENCE M. LAMBE, F. G. S.

(*Continued from p. 226.*)

To the notes on Canadian fossil corals published in the preceding part of this volume are added the following, with descriptions of two species that are regarded as new.

CYATHOPHYLLUM ANTICOSTIENSE, Billings.

Cyathophyllum Anticostiense, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. I, p. 109.

" *solitarium*, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 93.

Corallum simple, of moderate size, cylindro-turbinate, straight or very slightly curved, broadest near the upper end, attaining a length of about 18 cent. with a maximum diameter of over 6·5 cent. Epitheca very thin, preserved only in small patches, shewing indications of the structure beneath. Calyx rather shallow, its sides expanding outward in a gentle convex curve. Internally there is present a narrow tabulate zone, about one-fourth the diameter of the corallite, with a broad combined vesicular and septate zone surrounding it. Tabulæ thin, numerous, inosculating, in some coralla bent down at the margin, eight or ten occurring in a space of 5 mm. Septa straight, numbering from about one hundred to one hundred and twenty, of two definite lengths alternating with each other, one half reaching the centre of the visceral chamber, the remainder stopping short of the tabulæ, becoming weak and subordinate to the dissepiments near the periphery. Dissepiments strongly

developed, small, numerous, curving upward and outward between the septa, appearing in radial sections of the corallites as slightly convex plates enclosing narrow and comparatively long spaces. In tangential sections near the surface the dissepiments are seen to be angular midway between the septa, both halves of a dissepiment curving downward toward each other convexly. The dissepiments on either side of a septum generally correspond, so that at the surface with the scant development of the septa in that part, they appear as close-set horizontal wavy lines simulating the structure of *Chonophyllum*, more particularly that of *C. magnificum*, Billings.

Locality and formation.—South-west Point, Anticosti, division 4 of the Anticosti group, four specimens collected by J. Richardson in 1856. Portage Bay, Grand Manitoulin Island, Lake Huron, R. Bell and H.G. Vennor, 1865 ; Clinton and Niagara formations.

CYATHOPHYLLUM SPENCERI, sp. nov

Acervularia profunda, Billings. 1876. Geol. Surv. Canada, Rep. Progress 1874-75, p. 68.

Cyathophyllum profundum, Whiteaves. 1892. Geol. Surv. Canada, Contr. Canad. Palæont., vol I, pt. IV, p. 267.

" *profundum*, var., Whiteaves. 1892. Ibid, p. 268, pl. XXXVI, figs. 4, 4a.

Corallum composite, formed of closely connected, crowded, polygonal generally hexagonal corallites that diverge from a small base and form thick somewhat explanate masses ; largest specimen seen about 15 cent. broad and 6 cent. thick or high. Frequently spaces are left between the corallites at or near the edge of the corallum due to the less crowded growth of the corallites here and their assumption of a more nearly cylindrical form. A line of contact between contiguous corallites is recognizable, shewing that each corallite is contained inside its own walls, also some specimens have been preserved in such a manner as to admit of the corallites being separated from each other

along this line of contact. Surface of corallites irregularly ribbed transversely, with fine growth lines between, and longitudinally striated by shallow septal grooves. Corallites varying in size in the same individual and in different specimens, from about 8 to 12 mm. in the majority of specimens, and from 10 to 17 mm. in the largest specimen. Calyces polygonal in outline, their confluent margins prominently angular, depth about one-half the width, sides steep, bottom narrowly concave, septate to the centre. Septa of two lengths, from about forty-eight to fifty-six in number in different specimens, of which the longer meet at the centre of the visceral chamber and the remainder reach more than half way and often nearly to the centre, their sides not ornamented with arched carinæ. Tabulæ flat, close set, four or five in a length of 1 mm., moderately regular, their continuity in a horizontal plane often interrupted by the passage of the septa through them, narrow, forming a small but well defined central area from about one-fifth to one-third the diameter of the corallite in width. Vesicular zone surrounding the tabulate area, broad, made up of small vesicles of rather equal size, in eight or nine obliquely ascending rows, filling the interseptal loculi. Increase apparently by interstitial gemmation.

This species differs from *C. quadrigeminum*, Goldfuss, principally in having a much narrower tabulate area and a resultant broader vesicular zone, in having the two orders of septa more nearly of a size and in the absence of septal carinæ.

Locality and formation.—Dawson Bay, Lake Winnipegosis, J. W. Spencer, 1874 ; Lake Manitoba, on east side of Narrows, J. B. Tyrrell, 1888 ; and Lake Winnipegosis at Snake Island and in Dawson Bay also at Lower Salt Spring, Red Deer River, J. B. Tyrrell and D. B Dowling, 1889 ; Devonian formation.

CYATHOPHYLLUM DAWSONI, sp. nov.

Zaphrentis Minas, pars, Dawson, 1868. Acadian Geology, second edition, p. 286 (longest specimen).

Corallum simple, elongate, slightly curved, in the type specimen broadest at mid-length, contracted near the top,

annulated somewhat irregularly by well marked ridges and constrictions and by minor ridges of growth, the whole outer surface when sufficiently well preserved shewing fine, close-set, transverse raised lines about twelve in the space of 1 mm. as well as longitudinal septal striations; type specimen 6 cent. long, as measured on the convex curve, imperfect below where the basal part, possibly about 3 or 4 cent. in length, has been broken off. Calyx shallowly concave, smooth at the bottom with the septa prominent on the margin and sides. Tabulæ broad, flat, usually bent down at the edge, close-set, forming a definite central area a little over 1 cent. in breadth. Septa rather crooked, of two lengths, the larger reaching the tabulæ and often encroaching on them, the smaller not quite half the length of the larger ones, irregular, rather poorly defined, numbering in all about sixty. Vesicular zone outside the tabulæ, averaging about 5 mm. in breadth, made up of unequal, arched, dissepiments directed upward and outward between the septa.

Locality and formation.—Kennetcook, Nova Scotia, collected by Professor How; lower Carboniferous formation; one specimen belonging to the collection of the Redpath Museum McGill University, Montreal.

DIPHYPHYLLUM CÆSPITOSUM, Hall, sp.

Diplophyllum cæspitosum, Hall. 1852. Palæont. New York, vol. II, p. 116, pl. XXXIII, figs. 1 a-r.

Cyathophyllum pelagicum, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. I, p. 108.

" *pelagicum*, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 34.

Diphyphyllum cæspitosum, Nicholson, 1875. Rep. Palæont. Prov. Ontario, p. 59.

Corallum aggregate, composed of upright, slender flexuous, cylindrical corallites, increasing by lateral gemmation and forming large colonies. Corallites varying in diameter from about 5 to 8 mm., frequently touching each other, covered by

an epitheca marked annularly by fine growth lines and longitudinally by faint septal striæ. Septa of two sizes alternating with each other, the primaries almost reaching the centre, the secondaries about half the length of the primaries, averaging in number according to the size of the corallite from about forty to fifty in all. Dissepiments arching upward, between the septa, against the outside wall, generally in a single series, their cut edges as seen in transverse sections assuming the appearance of an inner wall situate less than 1 mm. from the wall proper. Tabulæ large, numerous, stretching across the visceral chamber so as to reach the dissepimental zone on either side, flat or slightly concave at the centre, deflected downward near the periphery, about ten occurring in a space of 5 mm.

Locality and formation.—Becscie River Bay, Anticosti, division 2 of the Anticosti group, J. Richardson, 1856; according to Billings the colonies measure from 6 to 15 inches in diameter.

Professor Nicholson mentions this species as occurring abundantly and in large masses in the Niagara limestone of Thorold, Ont. (op. cit. p. 59).

DIPHYPHYLLUM MULTICAULE, Hall, sp.

Syringopora ? multicaulis, Hall. 1852. Palæont. New York, vol. II, p. 119, pl XXXIII, figs. 3a—g.

Eridophyllum Vennori, Billings. 1865. Canad. Nat. and Geol., vol. II, 2nd. series, p. 431.

Diphyphyllum multicaule, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 121, pl. XLV, figs. 3 and 4.

Corallum composed of upright, subparallel, cylindrical corallites, from about 2·5 to 5 mm. in thickness, that increase by lateral budding and form colonies sometimes over 12 cent. high and exceeding 10 cent. across. Corallites slender, flexuous, separated from each other by spaces equal to or less than their own diameters, connected at irregular and frequent intervals by horizontal acanthiform outgrowths or lateral spurs that are to all appearances not solid but shew traces of vesicular structure

within. Septa numbering from about thirty-two to thirty-eight in average sized corallites, alternately long and short, the longer passing to the centre, the shorter reaching about half-way. Curved dissepiments in the outer part of the interseptal spaces in a single or at times apparently in a double series. Tabulæ close-set, about twenty in a space of 5 mm., deflected downward at their margins, difficult to make out in the silicified specimens examined. Epitheca well developed, shewing faint annular markings and longitudinal septal lines.

The corallites of this species are more slender than those of the preceding and the septa are less numerous.

Locality and formation.—Grand Manitoulin Island, Lake Huron, collected by Alexander Murray in 1847; also by R. Bell and H. G. Vennor, 1865 ; by J. Townsend, 1883 and by R. Bell, 1891 ; Niagara formation.

Rominger mentions its occurrence in the Niagara rocks of Point Detour, Lake Huron.

DIPHYPHYLLUM SIMCOENSE, Billings, sp.

Eridophyllum Simcoense, Billings. 1859. Canad. Journ. vol., IV. new series, p. 132, fig. 27.

Diphyphyllum stramineum, Billings. 1859. Ibid, p. 135.

" *stramineum*, Nicholson 1874. Rep. Palæont. Prov. Ontario, p. 33, pl. V, fig. 6

Eridophyllum Simcoense, Nicholson 1874 Ibid, p. 34, pl. VI, fig. 5.

Diphyphyllum Simcoense, Rominger. 1876 Geol. Surv. Michigan, Fossil Corals, p. 122, pl. XLVI, figs. 3 and 4.

Amplexus or *Diphyphyllum*, Whiteaves, 1892. Geol. Surv. Canada, Contr. Canad. Palæont., vol. I, pt. IV, p. 270, pl. XXXV, figs. 2, 2a.

Corallum bushy, composed of flexuous, cylindrical corallites radiating upward from a small basal beginning and rapidly increasing by lateral budding so as to form colonies at times 25 cent high and equally broad. Corallites varying in diameter

from 3 to 6 or 7 mm., frequently roughened by annular swellings of growth and constrictions, covered by an epitheca shewing minor growth markings and longitudinal septal furrows. There is a marked variation in different colonies in the number of horizontal spurs connecting the corallites: in some specimens they are numerous from about 2 to 4 mm. apart vertically, springing outward from all sides of the corallites, in others they occur at less frequent intervals whilst in some they appear to be almost absent. Septa short, bearing arched carinæ on their sides, divisible into two sizes, primaries and secondaries, numbering in all from about thirty to forty, the primaries seldom reaching half way to the centre of the visceral chamber, the secondaries very short, projecting but little inside of the single row of curved dissepiments in the interseptal spaces. In transverse sections of the corallites the dissepiments have the appearance of an inner wall about ·5 mm. distant from the wall proper as in the Silurian species *D. cæspitosum*, Hall. Tabulæ well developed, flat, horizontal, bent slightly down at their edges; from ten to fifteen occurring in a space of 5 mm.

This species is somewhat similar in inside structure to *D. cæspitosum*, Hall from which it differs principally in having shorter and less numerous septa.

The coral from the Devonian (Stringocephalus zone) of Dawson Bay and vicinity, Lake Winnipegosis described by Mr. Whiteaves (op. cit. pp. 270 and 271), and mentioned by him as bearing "a remarkably close resemblance in size, shape and internal structure" to "the *Diphyphyllum stramineum* of Billings," is here referred to *D. Simcoense* with which the writer considers *D. stramineum* to be conspecific, a view already expressed by Dr. Rominger in his excellent work on fossil corals.

Locality and formation.—Abundant in the Corniferous formation of Ontario; also from the middle Devonian of Lake Winnipegosis.

OMPHYMA ERIPHYLE, Billings, sp.

?*Omphyma subturbinata*, Milne-Edwards and Haime. 1855. Brit. Foss. Corals, p. 288, pl. LXVIII, figs. 1, 1 a—c.

Cyathophyllum Eriphyle, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. 1, p. 111.

Corallum simple, large, cylindro-turbinate. Outer surface marked transversely with shallow constrictions alternating with low growth-swellings, 5 or 6 mm. broad, representing successive calicular margins. Epitheca thin, with numerous transverse growth-lines and longitudinal depressed linear markings 2 or 3 mm. apart. Internal structure, as viewed in longitudinal and transverse sections, composed of a central tabulate area, about one-third the diameter of the corallite, surrrounded by a broad vesicular zone. Tabulæ flat, close set, moderately regular, sometimes anastomosing, about twelve in a space of 1 cent. Vesicles unequal in size, from 1 or 2 mm. to over 1 cent. in length, made up of arched plates curving upward and outward. The tabulæ are at intervals continued obliquely outward over the vesicles so as to form in reality a succession of invaginated cups flat at the bottom with dilated convex sides. Septa discontinuous vertically, formed by the infolding of the sides of the cups, broad and angular at the periphery, becoming lamellar within, not encroaching on the tabulate area, numbering about eighty and apparently of equal length. Calyx moderately deep. Length from 10 to 25 cent., diameter from 5 to 6·5 cent.

Locality and formation.—Anse à la Vieille, Baie des Chaleurs, collected by Sir W. E. Logan in 1843 ; Lower Helderberg formation.

ARACHNOPHYLLUM DIFFLUENS, Milne-Edwards and Haime, sp.

Strombodes diffluens, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 431.

" *diffluens*, Milne-Edwards and Haime 1855. Brit. Foss. Corals, 294, pl. LXXI, figs. 2, 2a.

" *diffluens*, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 34.

" *pygmæus*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 131, pl. XLVIII, fig. 3.

Corallum forming laminar or discoidal expansions, composed of confluent corallites whose calyces open on the surface with scarcely any line of demarcation between them; reaching a breadth of 9 cent. and a thickness of between 2 and 3 cent. Calyces, varying in width from 8 to 12 mm., flat or shallowly concave in the marginal area, with a circular, elevated rim surrounding a central pit 3 or 4 mm. in diameter from which radiate the septa as narrow convex ribs having a maximum breadth of about ·5 mm. The elevated rims surrounding the pits stand, in some specimens, much more prominently above the surrounding sunken calycinal extension than in others, whilst at times they develop into salient, conical projections with the pit forming an excavation at the top. Lateral junction of contiguous calyces sometimes very slightly raised, more often seen as a plane surface in which no dividing line is apparent. Septa averaging thirty in number: as in other species of the genus, lamellar and continuous vertically in the vicinity of the central pit, converted on the flat calicinal margin into surface ribs that join those of neighbouring calyces; of two orders, alternating with each other within the pit, the primaries reaching the centre or leaving a narrow, circular smooth spot at the centre, the secondaries not continued beyond the sides of the pit. As in *A. pentagonum*, Goldfuss, a coalescence of the inner septal ends in sets of twos and their continuance as single septa is often observed. Double rows of pore-openings are present in the septal ridges. The dissepimental and vesicular structure is similar to that of *A. pentagonum* only proportionately smaller. Small flat tabulæ occur in the centre of the visceral chamber.

Locality and formation.—Five miles west of Chicotte River, Anticosti, J. Richardson, 1856; Owen Sound, Ont., J. Townsend, 1874 to 1883; north end of Lake Temiscaming, Que., R. Bell, 1887; Niagara formation.

ARACHNOPHYLLUM EXIMIUM, Billings, sp.

Strombodes eximius, Billings. 1866. Geol. Surv. Canada, Cat. Silur. Foss. Anticosti, p. 93.

Original description.—"Corallum composite, apparently forming large depressed hemispherical colonies. Corallites from 9 to 15 lines across, the calice slightly concave in the outer half of the width, the central depression three or four lines wide. There are about fifty septo-costal radii in a corallite 14 lines across." "This species differs from *Strombodes pentagonus* and *Strombodes striatus* (both of which occur in the same beds) in having much coarser radii."

Additional specimens were collected by J. Townsend on Grand Manitoulin Island in 1883; one specimen in particular shews the structure admirably.

Further details as to the growth of the corallum are here appended—Corallum composite, explanate, discoidal, sometimes over 13 cent. broad and 3 cent. thick, upper surface flat or slightly convex. Corallites upright, confluent, varying in breadth from 2 to 3 cent., with shallowly concave calyces whose boundaries are poorly defined and only slightly elevated. Calyces with a well marked, rather deep and comparatively broad central pit, averaging nearly 1 cent. in width, having steep at times almost vertical sides and a flat bottom. Tabulæ, forming a well defined axial area, flat or slightly convex, turned down at their edges, as broad as the pit is wide, about sixteen in a space of 5 mm. Septa, numbering from about forty to fifty-two, lamellar and uninterrupted in a narrow area surrounding the tabulæ, of two orders, the primaries reaching the centre of the tabulæ as carinæ, the secondaries not infringing on the tabulæ; beyond the confines of the central pit their vertical continuity is interrupted and they radiate outward as gradually broadening flatly convex ribs, reaching a maximum breadth of 2 mm. at the edge of the calycinal extension where they meet the septal ribs of adjacent calyces. Pore-openings in the septal ribs have not been recognized in specimens belonging to this species. The vesicular structure supporting the calycinal floors developed at intervals in the upward growth of the colony is composed of blister-like plates that are rather smaller and less convex than in other species of the genus, also the radially folded calycinal

floors appear to be developed with greater frequency and are consequently closer together than in *A. pentagonum*, Goldfuss, from which this species differs in many essential points. Between the lamellar septa arched dissepiments curve downward to meet the tabulæ.

Locality and formation.—West Point, Grand Manitoulin Island, Lake Huron, R. Bell, 1866, and Grand Manitoulin Island, J. Townsend. 1883 ; Niagara formation.

CLISIOPHYLLUM BILLINGSI, Dawson, sp.

Cyathophyllum Billingsi, Dawson. 1868. Acadian Geology, second edition, p. 287, fig. 84 b.

Corallum simple, turbinate, evenly curved, annulated by distinct ridges of growth, terminating above in a shallow calyx ; nearly 5 cent. long as measured on the convex curve, 18 mm. broad near the top. Epitheca complete, thin, with very fine, close-set, transverse growth lines and longitudinal septal striæ. Internally a narrow peripheral, vesicular area, in breadth equal to about one-fifth the maximum diameter of the corallum and made up of small convex plates arching upward and outward, surrounds a broad inner zone of vesicles that are directed upward and inward and fill the interseptal spaces, the centre being occupied by a columella that appears at the bottom of the calyx as a thin, laterally compressed projection. Septa about seventy-two in number, of two sizes alternating with each other, the primaries well developed, a few of them passing to the centre the remainder almost reaching the centre, the secondaries very short. In the calyx the secondaries appear only at the periphery but the primaries are conspicuous as sharp-edged lamellæ converging toward the centre. On the surface where the epitheca has been removed by weathering the outer edges of the two orders of septa are exposed as longitudinal ribs of equal strength with the horizontal edges of the vesicular plates filling the spaces between them.

Locality and formation.—Lower Stewiacke, county of Colchester, Nova Scotia, collected by Mr. C. F. Hartt; lower

Carboniferous formation. One specimen the property of the Redpath Museum, McGill University, Montreal.

LONSDALEIA PICTOENSE, Billings, sp.

Lithostrotion Pictoense, Billings. 1868. Dawson's Acadian Geology, second edition, p. 285, fig. 83.

Corallum compound, fasciculate, composed of long, upright, flexuous, cylindrical corallites that increase freely by lateral calicinal gemmation and are separated from each other by spaces of variable width though frequently in contact. Corallites attaining a breadth of about 10 mm., the young ones beginning with a diameter of between 2 and 3 mm. Epitheca complete. Internal structure consisting of a circumferential vesicular zone, in breadth equal to about one-fifth the diameter of the corallite, defined within by a stout inner wall that encloses a tabulate area at the centre of which is a comparatively large columella about 1 mm. in thickness. From the inner wall converge short, strong, well defined septa that are occasionally extended outward into the vesicular zone and more rarely reach the outer wall. The septa extend only about half-way across the space between the inner wall and the columella ; alternating with them are observed occasionally rudimentary septa which are also indicated in the outer wall in those exceptional instances when the primary septa traverse the peripheral vesicular area. Tabulæ moderately regular, about twelve in a space of 5 m n., inclined slightly upward at their junction with the inner wall and rising suddenly and inosculating with each other near the centre so as to form the columella. Vesicles of the outer area long and narrow, formed by curved plates rather unequal in size, that are directed obliquely upward and outward and fill the space between the two walls.

Represented in the collection by a small fragment, roughly 4 cent. broad and over 2 cent. high, embedded in compact limestone that hides the exact characters of the surface of the corallites.

Locality and formation.—East River, Pictou, Nova Scotia, collected by Sir J. William Dawson; lower Carboniferous formation.

PHILLIPSASTRÆA BILLINGSI, Calvin.

Phillipsastrea gigas, Billings, 1859. Canad. Journ., vol. IV, new series, p. 128; incorrectly identified with *Arachnophyllum (Astrea?) gigas*, Owen.

" *gigas*, Nicholson. 1875. Rep. Palæont. Prov. Ontario, p. 77.

" *gigas(?)*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 128, pl. XXXVII, fig. 4.

" *billingsi*, Calvin. 1893. Amer. Geologist, vol. XII, p. 111, pl. VI, figs. 1 and 2.

Corallum composite, large, discoidal, more or less convex above, rather flat below, formed of slightly divergent, confluent, polygonal corallites, from about 2 to over 4 cent. in diameter, that increase by marginal calicinal gemmation from a central basal beginning; attaining a breadth of over 40 cent. and a height of nearly 12 cent. Basal surface covered by a concentrically wrinkled epitheca. Corallites not bounded by a wall, their septa meeting and becoming confluent with those of the neighbouring corallites; opening on the upper surface in calyces having a broadly convex, exsert reflexed circular rim surrounding a deep, steep-sided pit measuring from about 8 to 10 mm. in diameter and 4 or 5 mm. deep. Septa well developed, numbering from about forty to sixty, of two alternating sizes, the larger reaching the centre and becoming somewhat twisted, or falling short of it, the smaller not extending beyond the sides of the central pit; they are decorated on their sides by arched carinæ curving upward and inward and appearing on their free edges in the central pit and reflexed calicinal margins as small transverse denticulations. Tabulæ, forming a narrow axial area, at times well developed, flat at the centre, turned down at the edge, the primary septa passing over them to the centre as carinæ, at

other times interfered with by the septal ends which cut into them and destroy their horizontal continuity giving them more the character of dissepiments than of tabulæ. Dissepiments filling the interseptal spaces and curving upward and outward in regular order, those in the peripheral region being generally larger than those nearer the centre; they are pierced at their junction with each other by oval or circular pore-openings forming a uniserial row midway between the septa.

Locality and formation.—Corniferous formation of Ontario.

PHILLIPSASTRÆA VERNEUILI, Milne-Edwards and Haime.

Phillipsastrea Verneuili, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 447, pl. 10, fig. 5

" *Verneuili*, Billings. 1859. Canad. Journ., vol. IV, new series, p. 127, fig. 24.

Phillipsastræa Verneuili, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 127, pl. XXXVIII, fig. 2.

Phillipsastrea affinis, Billings. 1874 Geol. Surv. Canada, Palæoz. Fossils, vol. II, pt. I, p. 11.

Phillipsastræa Verneuili, Nicholson. 1875. Rep. Palæont. Prov. Ontario, p. 78.

Corallum forming large discoidal masses over 30 cent. broad and 8 cent. thick or high, upper surface flat, lower surface irregular, strongly marked by concentric foldings or wrinkles of growth and covered by an epitheca. Septa numbering from about thirty to forty-six Corallites varying in diameter from 10 to 16 mm. Central pit of the calices from 3 to 5 mm. in diameter. In no particular does this species differ from *P. Billingsi* except in the smaller size of its corallites and in a diminution in the number of the septa. In transverse sections and in weathered specimens it is observed that a single row of pore-openings occurs between each pair of septa, the pores piercing the dissepiments where they rest on each other, the distance apart of the pores in a single row thus depending on the size of the dissepiments. This pore structure which

appears not to have been noticed previously in species of this genus and which is well shewn in some specimens of *P. Billingsi* in the collection is apparently somewhat analagous to that which is seen in some species of the genus *Arachnophyllum*.

Locality and formation.—Corniferous formation of Ontario; Indian Cove, Gaspé, in the Gaspé limestone, No. 8 (Oriskany formation), collected by R. Bell in 1862; also three loose specimens from the Devonian area south of Hudson Bay, collected by R. Bell in 1877 at Long Portage, Missinaibi River to Moose Factory. Of the Long Portage specimens one has corallites of average size but the other two have corallites and calicinal pits that are considerably larger than those of specimens usually assigned to this species and approach in size those of the smaller forms of *P. Billingsi*. Measurements taken from the two last mentioned specimens give the following results—diameter of calyces from 17 to 20 mm., diameter of central pits 6 or 7 mm. In all three specimens the septa number from about forty to forty-four and the pore-openings can be detected in natural transverse sections.

Mr. Whiteaves records* the occurrence of this species in the Hamilton formation on the authority of Mr. Schuchert who collected a good specimen of it at Bartlett's Mills in 1895,

CHONOPHYLLUM NYMPHALE, Billings, sp.

Cyathophyllum nymphale, Billings. 1862. Geol. Surv. Canada, Palæoz. Fossils, vol. I, p. III.

Corallum simple, short, broadly expanded, concave on the lower surface, convex above; dimensions of the type and only specimen known, height at centre 4 cent., breadth about 9 cent. Basal surface apparently provided with an epitheca. Calyx shallow, convex at the centre, with broadly expanding reflexed margins exhibiting about eighty low, rounded septal ribs that increase in breadth outwardly. In a radial section a central area, about 1 cent. in breadth, is disclosed; it is made up of small slightly convex plates arching upward and inward so as to form

*Geol. Surv. Canada, Contr. Canad. Palæont., vol. I, pt. V, p. 365.

an axial vesicular mass whose surface appears in the calyx as a rounded protuberance. Surrounding the central area is a broad vesicular zone in which can be detected the gradual growth upward of the corallum by the superposition of vesicular layers, 2 or 3 mm. in thickness, each layer terminating above in a thin covering of flexuous, continuous laminæ representing the position of the surface of previous calyces. The convex plates composing the vesicular layers are small, generally 1 mm. or less in length. The septa, starting at the confines of the central vescular area, radiate outward as thin vertical laminæ and disappear in the peripheral region ; they are represented on the calicular surface by the gradually broadening superficial convex ribs that are connected with each other laterally. In tangential sections at the margin of the calicular expansions the cut edges of the septal ribs, here about 3 mm. in breadth, appear as horizontal continuous parallel wavy lines. What appear to be septal carinæ or possibly structures analogous to the supporting processes of the septal laminæ as developed in some species of the genus are seen in the radial section of the corallum.

Locality and formation.—Anse à la Vieille, Baie des Chaleurs, one specimen collected by Sir W. E. Logan in 1843 ; Lower Helderberg formation.

ZAPHRENTIS GIGANTEA, Lesueur, sp.

Caryophyllia gigantea, Lesueur. 1820. Mém. du Mus., t. VI, p. 296.

Zaphrentis gigantea, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 340, pl. IV, figs. 1, 1a-c.

" *gigantea*, Billings. 1859. Canad. Journ., vol. IV, new series, p. 121,

" *gigantea*, Nicholson. 1874. Rep. Palæont.. Prov. Ontario, p. 22, pl. III, figs. 1, 1a.

" *Eriphyle*, Billings. 1875. Canad. Nat. and Geol., vol. VII, 2nd. series, p. 233.

" *Hecuba*, Billings. 1875. Ibid, p. 234.

" *gigantea*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 145, pl. LII.

"Polypier cylindro-conique, très-long, à bourrelets d'accroissement larges et peu saillants ; fossette septale proportionnellement un peu petite, située très-prés de la muraille ; au moins 70 cloisons égales, minces, arrivant sur la partie supérieure des planchers jusqu' à une petite distance du centre, où elles sont légèrement flexueuses ; un égal nombre de cloisons rudimentaires ; planchers très-grands, envahissant les loges intercloisonnaires, où l'on ne voit pas de traverses vésiculeuses indépendantes, et lisses en dessous dans une grande étendue. La longueur est fréquemment de 40 a 50 centimètres ou même plus, le diamètre du calice de 7 ou 8" (Milne-Edwards and Haime).

The description given by Rominger of this species is a thorough and accurate one and makes allowance for the variations that exist in this species in common with most other species; it appears in the following words :—"Conico-cylindrical, horn-shaped polyparia, attaining in some specimens a size of two and a half feet in length, by a diameter of three inches. Some enlarge their diameter rapidly to a certain thickness, and then grow on in a uniformly cylindrical shape ; others are in the young state, slender, flexuose, and irregularly constricted stems, and grow gradually to larger diameters. The surface of the polyparia is covered by an epitheca with shallow annular wrinkles of growth and longitudinally ribbed by septal striæ, which, however, are not in all specimens equally distinct. Calyces spacious, with erect walls, and acute, wedge-like margins ; bottom broad, marginally depressed and flat in the centre. In one place of the circumference the diaphragms are more deeply depressed by a septal fovea. Radial lamellæ stout, linear, alternately long and short, but appearing nearly equal on the margins of the calyces, where the sharp crested leaves of the inside expand into low rounded rugæ. The extension of the radial crests toward the centre is subject to variations ; in some the central part of the diaphragms remains smooth, and the crests are confined to their peripheral circumference ; in others the crests reach as low carinæ to the centre and become irregularly entangled in their convergence, but these central portions of the crests are merely

superficial, and do not intersect the diaphragms to form continuous vertical leaves. The number of lamellæ in calyces of about two and a half inches diameter is 150 to 160, half of which are of the smaller size. Found in the upper Helderberg limestones of Michigan, Canada, Ohio, and in the Western States."

Locality and formation.—At Rama's farm, Cayuga, and at other localities in Ontario ; Corniferous formation.

ZAPHRENTIS MINAS, Dawson.

Zaphrentis Minas, pars, Dawson. 1868. Acadian Geology, second edition, p. 286 (small specimens,) fig. 84a.

Corallum simple, turbinate, small, slightly curved, about twice as long as broad, pointed below and obscurely marked transversely by low accretion ridges. Epitheca complete, with distinct longitudinal septal furrows and fine, close-set, transverse growth lines shewing on the surface. Calyx deep, with thin vertical walls and a moderately flat bottom, the depth equal to more than one-half the width. Tabulæ rather irregular, crossing from side to side, with minor incomplete tabulæ at times resting on the principal ones Septa, from about sixty-five to seventy-five in number, alternately long and short, the long ones passing to the centre, the remainder only about 1 mm. in length ; on the walls of the calyx the primaries are reduced to thin sharp edged ridges and the secondaries become almost obsolete. Fossette of moderate depth, extending outward to the wall on the flat or concave side of the coral.

The figure accompanying the original description does not convey a correct idea of the depth and form of the calyx ; the specimen from which the drawing was evidently made is 40 mm. in length along the convex curve, about 23 mm. in maximum breadth near the top and the calyx, as seen in a longitudinal section of the corallum, is about 12 mm. deep.

Locality and formation.—West River, Pictou, N.S., collected by Professor How ; lower Carboniferous formation. Two small specimens and the basal extremity of a third the property of the Redpath Museum, McGill University, Montreal.

This species is very closely related to if not identical with *Zaphrentis Enniskilleni*, Milne-Edwards and Haime (Brit. Foss. Corals, p. 170, pl. XXXIV, fig. 1) of the Carboniferous limestone of the north-west of Ireland.

ZAPHRENTIS MIRABILIS, Billings, sp.

Amplexus mirabilis, Billings. 1875. Canad. Nat. and Geol., vol. VII, 2nd. series, p. 232.

Zaphrentis invenusta, Billings. 1875. Ibid, p. 233.

" *Egeria*, Billings, pars. 1875. Ibid, p. 234 (the third specimen mentioned in the description).

" *subrecta*, Billings. 1875 Ibid, p. 235.

" *Leda*, Billings. M.S.S.

Original description. — "Corallum sometimes abruptly curved in different directions, expanding to a width of from fifteen to twenty lines in a length of four or five inches from the base; above which it becomes more nearly cylindrical. Surface with fine engirdling striæ, in general four or five in the width of two lines, but in some places the same number occur in the width of one line. There are also numerous angular rings of growth, distant from two to fifteen lines from each other, with sub-concave spaces between. Septal costæ rounded, distinctly defined by sharp striæ between them, seven or eight in the width of three lines near the base, and four or five in the same near the calice. There are about forty large septa at the calice, where the diameter is about eighteen lines, with the same number of small ones between them. The larger have a depth of three or four lines and the smaller one line. All of the septa are more or less curved, sometimes very tortuous. The tabulæ have not been observed."

"The above description was drawn up from a specimen, eleven inches in length, measured along all the curves. It is fifteen lines in diameter at five inches from the base, and about eighteen lines at the cup. The septal costæ are very distinctly defined at the base but become more flattened and obscure up-

wards. In external characters it resembles *A exilis*, but the much greater development of the septa distinguishes it therefrom."

This species is regarded as belonging to the genus *Zaphrentis* on account of its well developed septa : it appears to differ from *Z. gigantea*, Lesueur principally in being more slender, in having fewer septa and also in being typically more strongly annulated. In the type specimen a longitudinal section through the cup shews complete, slightly concave tabulæ stretching across the visceral chamber from wall to wall and abruptly turned down at their edges.

Z. invenusta, *Z. Egeria*, and *Z. subrecta* are believed to be identical with *Z. mirabilis*, and to the same species are assigned a number of specimens in the collection that possess the slender form and the comparatively few septa that are characteristic of the species.

Using the type specimen as a basis *Z. mirabilis* may be described as follows—

Corallum simple, long, cylindrical, slender, pointed at the base, generally curved or variously twisted, ending above in a moderately deep cup with thin vertical side walls and a flat or slightly undulating bottom ; reaching a length of 30 cent. or more and apparently not exceeding between four and five cent. in diameter. Septa of two sizes, alternating, the primaries somewhat flexuous, reaching generally rather more than half way to the centre, the secondaries somewhat variable in their length being in different specimens from less than one-third to about three-fourths as long as the primaries ; numbering in all from about sixty to one hundred. On the surface of the corallum the position of the outer ends of the septa is indicated by distinct, shallow, longitudinal furrows. Tabulæ complete, numerous, flat or undulating, turned down at their edges. A small septal fovea is generally discernable near the lateral margin to one side of the convex curve.

Locality and formation,—Corniferous formation of Ontario.

CYSTIPHYLLUM VESICULOSUM, Goldfuss, sp.

Cyathophyllum vesiculosum, Goldfuss. 1826. Petref. Germ., vol. I, p. 58, pl. XVII, figs. 5a-e, and pl. XVIII, figs. 1a-d.

Cystiphyllum cylindricum, Hall. 1843. Geol. New York, pt. IV, p. 209, figs. 1, 2. Non Lonsdale.

" *vesiculosum*, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p, 462 ; and 1853, Brit. Foss. Corals, p. 243, pl. LVI, figs. 1, 1a, 1b.

" *Americanum*, Milne-Edwards and Haime. 1851. Polyp. Foss. Terr. Palæoz., p. 464, pl. 13, figs. 4, 4a.

" *Senecaense*, Billings. 1859. Canad. Journ., vol. IV, new series, p. 137.

" *grande*? Billings. 1859. Ibid, p. 138.

" *Americanum*, Billings. 1859. Ibid, p. 139.

" *Americanum*, Nicholson. 1874. Rep. Palæont. Prov. Ontario, p. 36, pl. VI, fig. 8 ; and *C. vesiculosum*, Nicholson, 1874, ibid, p. 37, fig. 8.

" *superbum*, Nicholson. 1875. Palæont. Prov. Ontario, p. 73, pl. I, fig. 1.

" *Americanum*, Rominger. 1876. Geol. Surv. Michigan, Fossil Corals, p. 137, pl. L, upper row and right-hand half of lower row.

Americanum, Hall. 1876. Illustr. Devonian Fossils, pl. XXVIII, figs. 1-7.

Corallum simple, varying from turbinate to conico-cylindrical, pointed at the base, straight or curved, flexuous or geniculated, sometimes long and slender, at other times comparatively short and thick. Annulated by growth expansions and constrictions, in some specimens much more pronounced than in others, frequently contracted at the calicular end. Epitheca complete, thin, shewing minor rings of growth, the whole marked by fine transverse lines of which, in well preserved specimens, as many as twenty-four can be counted in a space of 2 mm : faint

longitudinal indications of linear septal markings are also not unfrequently developed. Calyx of variable depth, in short, turbinate coralla comparatively shallow, often with broad margins, in more cylindrical forms generally somewhat deeper in proportion to the diameter and with steeper sides. Surface of calyx blistered and often marked radially by interrupted, more or less distinct, superficial septal ridges. Inner strueture entirely vesiculose, composed of convex blister-like plates resting on each other and directed obliquely outward and upward to the periphery ; at the centre of the visceral chamber the vesicles are more nearly horizontal and as a rule larger than the others.

This species is very variable in shape and size, sometimes in the stout, short forms reaching a diameter of over 10 cent. with a length of about 27 cent., in the slender forms an equal length may be attained with a thickness of only 3 or 4 cent. In his description of *C. Senecaense* Billings mentions a variation in length of from three inches to two feet with a diameter of three-quarters of an inch to one inch and a half. The same authority in referring to the size of *C. grande* says "There are fragments of this species in the collection of the Geological Survey of Canada, five inches in diameter ; and one specimen, still lying in the rock, is known which is three feet long."

Examples of twin corallites with a common epitheca are not uncommon.

Locality and formation.—Abundant in the Corniferous and Hamilton formations of Ontario.

NOTES ON THE BIRDS OF KING'S CO., NOVA SCOTIA.—PART III.

By HAROLD TUFTS, Esq., Wolfville, King's Co., N.S.

Progne subis (*Linn.*), PURPLE MARTIN.

One was seen at Windsor, Hants Co., August 18th, 1898, and as this was only at the distance of some four miles from the boundary of Kings Co., I feel justified in including it under the present list, as no doubt it has also appeared in this county.

Petrochelidon lunifrons (*Say*), CLIFF SWALLOW.

Common summer resident.

Chelidon erythrogaster (*Bodd.*), BARN SWALLOW.

Common summer resident. This species is the last to arrive in spring, but is also the last to depart in the fall, specimens being seen as late as Sept. 28th, 1897, several weeks after the other species had gone south.

Tachycineta bicolor (*Vieill*), TREE SWALLOW.

Common from the last of April to September,

Clivicola riparia (*Linn.*), BANK SWALLOW.

An abundant summer resident.

Ampelis cedrorum (*Vieill.*), CEDAR WAXWING.

Fairly common from June to September. One was taken here about the first of January, 1896.

Lanius borealis (*Vieill.*), NORTHERN SHRIKE.

Rather an uncommon migrant. Sometimes a winter resident.

Vireo olivaceus (*Linn.*), RED-EYED VIREO.

A common summer resident.

Vireo solitarius (*Wils.*), BLUE-HEADED VIREO.

Fairly common from May 15th to October.

Mniotilta varia (*Linn.*), BLACK AND WHITE WARBLER.

Fairly common summer resident. A nest containing four eggs was taken June 3rd, 1896; it was placed in a cavity at the

base of a rotten stump and was composed of fine grasses and bark fibres.

Helminthophila ruficapilla (*Wils.*), NASHVILLE WARBLER.

A rather uncommon summer resident.

Compsothlypis americana (*Linn.*), PARULA WARBLER.

A fairly common summer resident.

Dendroica æstiva (*Gmel.*). YELLOW WARBLER.

A common summer resident.

Dendroica coronata (*Linn.*), MYRTLE WARBLER.

They arrive here some seasons as early as April 20th, three weeks ahead of the other warblers. The nest is usually placed in a small spruce or fir, near the trunk and is lined with feathers so placed as to curl over the nest, thus protecting the contents during the birds' absence. A set of eggs from this locality is now in the Government Museum at Ottawa.

Dendroica maculosa (*Gmel.*), MAGNOLIA WARBLER.

A fairly common summer resident. A nest taken last June was placed in a small spruce bush a foot or two above the ground, and was composed of grasses and hairs. The four eggs which it contained are now in the Government Museum at Ottawa.

Dendroica pensylvanica (*Linn.*), CHESTNUT-SIDED WARBLER.

A rather uncommon summer resident.

Dendroica striata (*Forst.*), BLACK-POLL WARBLER.

Rather rare.

Dendroica virens (*Gmel.*), BLACK-THROATED GREEN WARBLER.

An abundant summer resident. A set of eggs from this locality is now in the Government Museum at Ottawa.

Dendroica palmarum hypochrysea *Ridgw.*, YELLOW PALM WARBLER.

A rather uncommon migrant.

Seiurus aurocapillus (*Linn.*), OVEN-BIRD.

A fairly common summer resident.

Seiurus noveboracensis (*Gmel.*), WATER THRUSH.
Fairly common summer resident.

Geothlypis trichas (*Linn.*), MARYLAND YELLOW-THROAT.
A common summer resident.

Sylvania pusilla (*Wils.*), WILSON'S WARBLER.
An uncommon summer resident.

Sylvania canadensis (*Linn.*), CANADIAN WARBLER.
A rather uncommon summer resident.

Setophaga ruticilla (*Linn.*), AMERICAN REDSTART.
An abundant summer resident. A set of eggs from this locality is now in the Government Museum at Ottawa.

Anthus pensylvanicus (*Lath.*), TITLARK.
Abundant on the Grand Prè during the migrations.

Galeoscoptes carolinensis (*Linn.*), CATBIRD.
A fairly common summer resident.

Troglodytes hyemalis (*Vieill.*), WINTER WREN.
Not very common.

Certhia familiaris americana (*Bonap.*), BROWN CREEPER.
Resident in small numbers throughout the year.

Sitta carolinensis (*Lath.*), WHITE-BREASTED NUTHATCH.
Resident except in mid-winter.

Sitta canadensis *Linn.* RED-BREASTED NUTHATCH.
Resident throughout the year.

Parus atricapillus (*Linn.*), CHICKADEE.
Abundant throughout the year. A set of eggs taken in Gaspereau is now in the Government Museum at Ottawa.

Parus hudsonicus (*Forst.*), HUDSONIAN CHICKADEE.
Common throughout the year but especially in winter. A set of eggs from this locality is now in the Government Museum at Ottawa.

Regulus satrapa (*Licht.*), GOLDEN-CROWNED KINGLET.
Common throughout the year.

Regulus calendula (*Linn.*). RUBY-CROWNED KINGLET.
Much less common than the preceding species.

Turdus fuscescens (*Steph.*), WILSON'S THRUSH.
A fairly common summer resident.

Turdus ustulatus swainsonii (*Cab.*) OLIVE-BACKED THRUSH.
Not very common.

Turdus aonalaschkæ pallasii (*Cab.*), HERMIT THRUSH.
A fairly common summer resident.

Merula migratoria (*Linn.*), ROBIN.
Abundant from April 1st to November, and a few are sometimes observed in winter.

The following species were accidently omitted, or have been observed since. In their proper order they belong in the first paper, on the Water Birds.

Urinator lumme (*Gunn.*), RED-THROATED LOON.
Transient visitant.

Larus delawarensis *Ord.* RING-BILLED GULL.
Common in Minas Basin during the spring migration.

Anas boschas (*Linn.*), MALLARD.
Rare migrant.

Charitonetta albeola (*Linn.*), BUFFLEHEAD.
Transient visitant. Observed in Minas Basin.

Clangula hyemalis (*Linn.*), OLD SQUAW.
Transient visitant in Minas Basin.

ANALYSES OF ICE FROM THE OTTAWA DISTRICT.

By R. F. RUTTAN, B.A., M.D., C.M.,
Professor of Chemistry, McGill Medical College, Montreal, Que.

The following notes obtained in the analyses of three samples of ice sent me from the Ottawa District marked respectively: I, II and III, may not be uninteresting to the readers of THE OTTAWA NATURALIST and are herein submitted as recorded at the Chemical Labratories, McGill College, Montreal, January 7th, 1893..

Sample 1.—From the Gatineau River above Roman Catholic Church.

Sample 2.—From Gilmour's Point, Ottawa River, Quebec side.

Sample 3.—Above Chaudière Falls, Ottawa River, 500 feet from shore, Ontario side.

Appended to this note will be found the tabulated results of the analyses. In general terms, I may say, that all three samples are perfectly wholesome and may be used with safety for domestic purposes.

Not only did I make a chemical analysis but obtained what I consider more important from a sanitary point of view, a bacteriological analysis of the three samples. The bacteriological analysis entirely confirmed the chemical one.

All three samples were practically free from bacteria of any kind. From sample No. 2 only one single living bacterium was detected in the experiments made. The relative purity of these samples as compared with Ottawa or St. Lawrence water may be appreciated when it is considered that the same number of samples would have yielded from either of these waters in the experiments made upwards of 1,000 bacteria in the three cubic centimetres used.

The single bacterium in sample No. 2 may or may not indicate a less degree of purity in this particular sample. The single bacterium might easily be obtained from the atmosphere as a necessary error of experiment.

With regard to the chemical analysis, the results are decidedly in favour of sample No. 3 over samples 1 and 2.

Samples 1 and 2 contain a stratum of bubbley ice through the middle. The bubbles being long and spindle-shaped and would indicate that the ice was grown in shallower water than that from which No. 3 was obtained. This, of course, is not so favourable a condition for the formation of pure ice as where the volume of water is very large compared with the thickness of the ice formation.

None of the samples contained more than *traces* of solid substance held in suspension. Sample No. 2 however, alone gave indications of any dust particles.

Sample No. 2 contains slightly more organic matter than either of the others as shewn by the quantity of albuminoid ammonia obtained by distillation of the melted ice. On igniting the very minute residue left after evaporating the samples to dryness, samples No. 1 and No. 2 scintillated indicating thereby the fact that these samples contain minute particles of solids in suspension.

No such phenomenon was observed in the case of No. 3.

On the whole I may repeat that although all three samples are perfectly safe for domestic use, sample No, 3 is on the whole to be preferred.

TABULATED RESULTS OF ANALYSES OF ICE FROM NEAR OTTAWA, ONT.

RESULTS GIVEN IN PARTS PER MILLION.	Designation of Sample. I Gatineau Point above R.C. Ch. Reference No. 1215.	Designation of Sample, II Gilmour's Point Ottawa River. Reference No. 1216.	Designation of Sample, III Above Chaudiere Falls, 500 feet from shore. Reference No. 1217.
Total Solids	9.6	19.3	12.3.
Phenomena on ignition	Scintillates.	Scintillates.	No blackening.
Free ammonia	0.070.	0.080.	0.068.
Albuminoid ammonia	0.085	0.103.	0.065.
Albuminoid ammonia after filtering through paper	0.066	0.085.	0.058.
Oxygen consumed by organic matter in 4 hours at 80° F.	0.246.	0.240.	0.000.
Chlorides	Trace.	Trace.	Trace.
Bacteria per cubic centimeter	None.	One in 3 c. c.	None.
Colour of melted ice	0.40 Blue.	0. 36 Blue.	0.55 Blue.
Column of 2 feet	0.45 Yellow.	0.50. Yellow.	0.65 Yellow.
(Lovibond's Scale)	0.00 Red.	0.00 Red.	0.00 Red.

REPORT OF THE ORNITHOLOGICAL BRANCH OF THE OTTAWA FIELD NATURALISTS' CLUB FOR 1898.

As most, or in fact nearly all, of the results of the work of the Ornithological Branch have appeared in THE NATURALIST during the past year, it is only necessary here to give a brief résumé of what has been done.

Birds arrived early last spring, the Horned Lark, which was seen in 1897 for the first time on the 22nd of February, being noted in 1898 on the 17th. The Song Sparrow was seen on the 18th of March in 1887, and on the 11th in 1898. The Robin on the 12nd of March in 1897, and on the 15th in 1898. From these few dates it will be observed that the birds came about one week earlier this year than in 1897.

All those who had opportunities for taking the dates of the arrivals of birds kindly sent them to the ornithological editor and by consulting the lists which appeared in the April, May, June, July and August numbers of THE NATURALIST it will be found that several members of the Club have continued to show an interest in ornithology and have done their part in bringing this branch of science before the public.

In all, 123 species of birds were recorded this year, which is seven more than in 1887, when 116 species were noted.

Two new birds were added this year having been taken by Mr. F. A. Saunders. On the 17th of June he shot a specimen of the Short-billed Marsh Wren in the Mer Bleue, and on the 24th he saw the Grasshopper Sparrow near Hull and again near the Experimental Farm on 26th and 27th, one specimen being shot on the 28th; the Grasshopper Sparrow was not taken previously nearer than the St. Clair Flats.

One albino bird and one semi-albino were taken this year. The first was an albion Cliff Swallow taken by Mr. Geo. R. White, a description of which appears in THE NATURALIST for January 1899. The second was a semi-albino Song Sparrow taken by Mr. C. H. Young on the 26th of March, 1898, a description of which appears in the May number for 1898.

Notes have been briefly furnished during the year by persons living in different parts of Canada, among whom may be mentioned Mr. Wm. E. Saunders, London, Ont., Mr. Allan Brooks, Vernon, B.C., Mr. Harold Tufts, Wolfville, N.S, and Mr. L. J. Boughner, Long Island, Lake Erie.

An interesting observation this winter was made by Mr. C. H. Young, who noted a Robin on the 2nd of January. One of the legs of this bird was stiff and apparently useless, but it could fly quite readily. No grossbeaks had been noted up to February 4th 1899. Birds have been very scarce this winter.

W. T. MACOUN,
A. G. KINGSTON,
GERTRUDE HARMER,
} Leaders.

SECOND WINTER SOIRÉE, 1898–1899.

The evening of Jan. 10th, 1899, was wholly devoted to geology, Prof. Prince, the President, was in the chair and there was a fair attendance of members.

"*Notes on an herbivorous Deinosaur from the Cretaceous of Western Canada.*"

by Mr. Lawrence M. Lambe, was the first paper presented. In the course of his remarks the lecturer pointed out the methods pursued in obtaining the remains of these extinct giants from the stratified rocks of the Red Deer River district in Alberta. The general results obtained during the summers of 1897 and 1898 comprised portions of several skeletons, representing four species of deinosaurs, three herbivorous and one carnivorous.

Trachodon (*Hadrosaurus*) *mirabilis*, Leidy, from the Canadian Cretaceous was then described, giving the more salient features of the great group of herbivorous-deinosaurs or reptiles to which it belongs. The paper was copiously illustrated by specimens and diagrams. A hearty vote of thanks, proposed by Dr Ami, seconded Mr. Walter R. Billings, was unaminously tendered to Mr. Lambe for his excellent paper.

Dr. Ells then asked that his paper be taken as read. It is entitled: "The Minerals of the Ottawa Valley." The paper is to be published lished shortly in *The Ottawa Naturalist*. Specimens of Minerals from the Ottawa Valley were then exhibited and examined by members present.

The "Report of the Geological Branch," for 1898—1899 by the Leaders, H. M. Ami, W. J. Wilson and R. W. Ells, was then submitted to the meeting and taken as read: it will also appear in a forthcoming number of the NATURALIST.

FOURTH WINTER SOIRÉE 1898–1899.

The meeting was held on Tuesday, Feb. 7th, 1899, in the Y.M.C.A Hall, Prof. E. E. Prince, President of the Club in the chair.

1 "**Some native herbaceous perennials worthy of cultivation**," was the theme upon which Mr. W. T. Macoun first spoke at some length. After exhibiting an extensive series of flowering perennials from various parts of Canada, giving notes on the results of experiments made in cultivation upon them at the Central Experimental Farm, Mr. Macoun referred to a number of showy local species which he recommended members of the Club to grow and observe. Plants belonging to the genera Hepatica, Anemone, Sanguinaria, Thalictrum, Dicentra, Trillium, Lobelia, Lilium, Gentiana, Aster, Solidago, Cypripedium, and many others worthy of cultivation.

Discussion —Prof. Macoun pointed out that it was imperative to give as nearly as possible the natural conditions of environment to the plants on trial which the botanist found in nature. He also remarked that *Anemone patens*, exhibited by Mr. W. T. Macoun was found by himself (Prof. Macoun) in bloom on the 17th of April on the Peace River in N. lat. 56°. He had also collected the same plant in bloom as late as 28th October in the same district, which, added Prof. Macoun, is destined to be one of the most fertile and greatest wheat-producing regions of the Canadian North-West, Messrs. R. B. Whyte, Dr. Fletcher, Dr. Ami, Mr. Harrington, and several others took part in the discussion giving results of experiments with native species.

2 "**On the burrowing habits of Cambarus—the Cray-fish,**" by H. M. Ami, was the next paper on the programme. While digging for the remains of a mastodon in Norfolk County, Ontario, Dr. Ami had observed several holes traversing the peat, shell-marl and other Pleistocene deposits to a depth of some *thirty* inches.

At the bottom of some of the holes were found living examples of the Cray-fish, which on closer examination proved to belong to the genus *Cambarus*, and a form which in all probability is new to science. The holes were evidently excavated deep enough by the Cray-fish to reach a water supply in order to maintain their existence, upon which the life of Cray-fish necessarily depends. Two live specimens were captured and one reached Ottawa alive in the fall of 1897. They were both healthy specimens and the *abdominal legs* of one of these, (upon which naturalists who follow Hagen, the highest authority on the Astacidæ, base their determination and identification of the species), which in some respects resembling those of *Cambarus Bartonii*, are nevertheless much stouter and shorter with the secondary hooklet more prominent and inclined at a different angle than in *C. Bartonii*.

More extended notes and results of observations on this form will be given later in THE NATURALIST.

3. "**Some Ottawa Fresh-water Polyzoa,**" by Mr. Walter S. Odell, was the title of the third paper of the evening. He described in general terms the group called Polyzoa, and mentioned the various forms found at Ottawa, giving descriptions by means of which they may be detected and recognized. Microscopic preparations of the statoblasts of *Fredricella*, *Pectinatella*, and other genera of Ottawa Polyzoa, collected by Mr. Odell in the Rideau Canal, the Ottawa and Gatineau rivers, were then examined under a microscope.

The "**Report of the Ornithological Branch for 1898-9**" was then presented by Mr. W. T. Macoun on behalf of the Leaders in Ornithology, himself, Mr. A. G. Kingston and Miss Harmer. This Report as well as the preceding paper by Mr. Odell, THE NATURALIST hopes to be able to publish at no distant date. H. M. AMI.

FIFTH WINTER SOIRÉE

"*The Archæology of Lake Deschenes*," by T. W. E. Sowter, of the Club, included descriptions of investigations on Lighthouse Island, the site of seven Algonquin villages. Kettles, knives, hatchets and spears of French manufacture have been unearthed and serve to illustrate an early phase of European influence in America. Huron Indians had lived there also. Mr. Sowter urged upon the members present to follow up investigations in this very promising field.

"*The extra-limital Insects found at Ottawa*," by Mr. W. H. Harrington F.R.S.C. came next. He dwelt upon the alarming increase in the number and variety of the destructive insects imported in various ways from Europe. The parasites which prey upon these pests had not yet been found in Canada. This paper was illustrated by a choice series of mounted specimens which were greatly admired.

"*The report of the Entomological Branch*, 1898–99," was then submitted by Dr. James Fletcher on behalf of the Leaders.—J. Fletcher, W. H. Harrington, W. Simpson.

SIXTH WINTER SOIRÉE.

"*Natural History in Art*" by Professor James Mavor, M.A., of Toronto University was the attractive title of a most interesting paper. Prof. Mavor opened with a clear and concise definition of Art and traced Natural History forms such as flowers, animals, and anthropomorphic representations in the art productions of primitive races of the world. Egyptian, Mexican, Peruvian and Indian antiquities afforded numerous examples of representatives of the lotus-flower, the crocodile and alligator, the bear, the frog and other creatures in architecture, pottery and other arts.

"*The Life-history of the Salmon*," by Professor E. E. Prince B.A., F.L.S., was then discussed. The speaker referred to the different species of salmon peculiar to Canada both in the Atlantic and Pacific slopes. Copious slides skilfully prepared in colours or from actual photographs served to illustrate a most interesting topic which we hope to give at a future date in the pages of THE OTTAWA NATURALIST.

VOTE OF THANKS.—At the last meeting of the Council of the O.F.N.C. a unanimous vote of thanks was passed to the Ottawa Electric Co. for their generosity and kindness in installing the magnificent electric table lamps for microscopes and wires for projection microscope *gratis*.

NOTES, REVIEWS AND COMMENTS.

GIANT RIPPLE MARKS.—At the New York meeting of the Geol. Society of America last December, Prof. G. K. Gilbert of the United States Geol. Survey drew the special attention of the fellows to a very interesting phenomenon which he had observed in the Medina Sandstone. There were giant undulations in the strata which marked extraordinary ripple marks varying in width from 10 to nearly 30 feet. Having discussed the mechanical forces at work in the production of ordinary ripple marks, their orientation, the accompanying phenomenon of cross-bedding, he calculated the height of the waves required to form such giant ripple marks. These he described as waves which must have measured at least sixty feet in height.

The occurrence of these in sandstone strata had been noticed, but not previously accounted for. This structure interferes very materially with the workability of many a sandstone quarry in the United States.

During the summer of 1897 Dr. Ami noted the occurrence of similar structures in the upper Carboniferous or Permo-Carboniferous of Pictou Connty, Nova Scotia as exemplified in McKean's Quarry, east of Pictou town, in Macpherson's Quarry on the West River, and in the sandstones of the same age near Little Harbour. They can be readily compared with the giant ripple marks as described from the Medina of Lockport by Prof. Gilbert.

FINE MICROSCOPICAL MATERIAL.—At the close of the Fourth Soiree of the Club, on behalf of Mr. George Bryce Scott, a most enthusiastic microscopist of Moncton, New Brunswick, Dr. Ami distributed a large quantity of fine microscopical material in the shape of foraminiferal mud or marl most promising indeed. The material was collected at the northern extremity of the Bay of Fundy in a heap of refuse material—probably used as ballast by some of the vessels which visit that portion of Canada in search of 'plaster' or gypsum so abundant around Hillsboro and vicinity. Any member of the Club or person interested in Foraminifera can obtain more of this material from the undersigned until the supply runs out. More than sixty distinct species of Foraminifera have been detected already. The exact locality whence this ballast came has not yet been ascertained, but the marine shells

end associated fauna may help to throw light upon the district from which the material originally came.—H. M. AMI, Geol. Survey Dept., Ottawa.

The Editor has received from Mr. C. C. James, Deputy Minister of Agriculture, Ontario, a copy of the 14th Annual Report of the Superintendent of Farmers' Institutes for Ontario. This Volume comprises many papers of special value to farmers. The topics dealt with embrace cultivation, soil fertility, manures, drainage, bee-keeping, poultry raising, and other lines of activity. 3,270 addresses have been delivered through the Province by representative gentlemen, amongst names furnished we note that of Mr. W. T. Macoun, of our Club. The result of experiments made in different European countries and in the United States, by which important additions are made to our knowled are also added. The Institute has a membership of 16,351 members. The Department is to be congratulated upon its work during 1898 in the Report just issued.

MR. C. W. NASH, of Toronto, Ont., contributes an interesting paper "*On the Birds of Ontario in Relation to Agriculture*" which, is worthy of special mention. It author, gives much useful information as to the habits and food of our birds showing how they aid the farmer by the destruction of vermin and insects. It is adorned by 32 excellent illustrations of Ontario birds, drawn from life by Mr. Nash.

OBITUARY,

DR. G. J. ALLMAN, M.D. F.R.S.. Emeritus Professor of Natural History in the University of Edinburgh, whose death was so recently chronicled in nearly all the British Scientific Magazines was one of the most brilliant of zoologists and at the same time one of the most genial and kindly of men.

Hydrozoa formed his chief field of labour and his magnificent Monograph on the "Tubularian Hydrozoa" published in 1872 will make his name famous for all ages in zoological circles.—H.M.A.

NEW MEMBERS, O. F. N. C.

Sir Henri Joly de Lotbinière, K.C.M.G., Inland Revenue Dept., Ottawa; R. W. Brock, Esq., B.A., F.G.S.A., Geol. Survey Dept., Ottawa; W. C. McCalla, Esq., Geneva St., St. Catharines, Ont.; Theo. Denis, Esq., B.A.Sc., Geol. Survey Dept., Ottawa; A. B. Rowan-Legg, Esq., 403 Bay St., Ottawa; A. H. Belliveau, Esq., Marine and Fisheries Dept., Ottawa; J. H. Grisdale, Esq., Central Experimental Farm, Ottawa; R. Stuart Breckenridge, 104 Queen St., Ottawa; Joseph Keel, Esq., B.A.Sc., Geol. Surv. Dept., Ottawa; Clarence R. Church, M.D., C.M., Elgin St., Ottawa; Harold Tufts, Esq., Wolfville, Nova Scotia.

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