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CORRELATION OF THE TIMISKAMING OUTLIER WITH DESCRIPTION OF A NEW CEPHALOPOD*

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THE PALAEOZOIC outlier of Lake Timiskaming, consisting of sediments of Ordovician and Silurian age, lies within the Precambrian shield. According to Hume[1] who studied it in detail, it occupies 250 square miles.

In 1935 J. F. Henderson of the Geological Survey of Canada, found two forms of cephalopoda about 50 feet above the contact of the Precambrian with the basal sandstone of the Ordovician near Ville Marie, Quebec, on the east side of Lake Timiskaming. One of these is here described as new. The other is a *Narthecoceras* which genus has hitherto been found in the Selkirk member only of the Red River formation of Manitoba. This reopens the question of the age of the Ordovician beds of the Timiskaming Palaeozoic outlier. The beds in which these fossils were found correspond to the more calcareous upper part of the Lower Sandstone member of the Liskeard formation as described by Hume. He stated that the Liskeard is of Trenton age, that the 50 feet of red shales occurring below the sandstone at one point may be of Trenton or Black River age, and that a covered interval of 40 feet lying above the Liskeard and below the Silurian may be of Richmond age. The whole of the Liskeard was correlated with the Galena-Trenton of Manitoba as it was then called. The finding of the *Narthecoceras* sustains Hume's correlation of the Liskeard, with the Lake Winnipeg Ordovician, but it is now recognized that the Manitoba fauna is of Richmond not of Trenton age, as was supposed by Whiteaves[2].

1. Hume, G. S. Geol. Surv. Canada, Mem. 145, pp. 16, 17, 1925.

2. Whiteaves, J. F. Geol. Surv. Canada, Pal. Foss. 3, pt. 2, 1897.

The possibility of the Richmond age of the Manitoba fauna was first suggested in 1915 by Bassler[3] in American Ordovician and Silurian Index Fossils. The Richmond age was definitely recognized by the writer in 1925 from fossils found in 18-inch cores of wells drilled a few miles north from Winnipeg for the water supply of that city. *Rhynchotrema capax* was present, and forms very similar to the Richmond *Whitella* were found by the writer and Miss M. A. Fritz in 1920 in the basal sandstone at Grindstone Point, Lake Winnipeg. This was communicated[4] to Foerste[5] who recognized the Richmond aspect of the Cephalopoda, but reserved definitely ascribing the rocks to that age until further study was completed on the other phyla. He introduced the name Red River for the Manitoba formation.

Meanwhile a similar fauna brought from Baffinland by Soper is referred to the Richmond by Wilson[6]. This was later described in more detail. About the same time, when discussing the cephalopoda of the McMillan expedition to Foxe Peninsula, Baffin Island, Foerste[7] correlates them with the Red River fauna but retains his reservation as to the age. In the same publication Hussey[8] definitely assigns the fauna to the Richmond age.

A similar Arctic fauna from Greenland has been described by Troedsson[9]. Part of it he ascribes definitely to the Richmond and part he correlates with the Manitoba fauna which he

3. Bassler, R. S. U.S. National Museum Bull. 92, 1915.

4. Personal correspondence.

5. Foerste, A. F. Denison Univ. Bull. 24, p. 130, 1929.

6. Wilson, A. E. Geol. Surv. Can. Mus. Bull. 53, pp. 124-129, 1928. Roy. Soc. Canada 3 ser. 25, pp. 285-306, 1928.

7. Foerste, A. F. Univ. Michigan, Con. Mus. Pal. 3, pp. 25-70, 1928.

8. Hussey, R. C. *op. cit.* pp. 71-75.

9. Troedsson, G. T. Medd. om Gronland, B. 72, Nr. 1, p. 148, 1929.

refers to under the old conception of Galena-Trenton. It is probable that the later publications had not reached him when preparing his manuscript.

Cox[10] recorded the same fauna in Akpatok Island, Ungava Bay, Labrador and definitely considered it to be of Richmond age.

It seems fairly well established, then, that the Manitoba Red River formation is of Richmond age. If the correlation of the Timiskaming outlier is correct, and the writer believes that it is, then the Liskeard formation is also of Richmond age.

The Richmond age of the Liskeard is still further corroborated by a comparison with the fauna from the outlier at Lake St. John, Quebec. The coral fauna of the Lake Timiskaming exposures is closely allied to that of the "Coral Reef" horizon of the Lake St. John outcrops which Foerste[11] considered to be of Richmond age.

In 1930, Miller[12] in a paper on the "Correlation of the Bighorn Formation", noted the similarity between the faunas of the Liskeard and the lower horizon of the Bighorn suggesting the possibility that both were younger than the Trenton.

While the writer definitely considers the Ordovician rocks of the Timiskaming outlier to be of Richmond age, it is recognized that there are certain features that are quite suggestive of the Cobourg horizon of Trenton age. Besides some rather generalized forms such as *Liospira*, the two forms described as *Rhynchotrema increbescens* and *R. inæquivalvis* are much more closely allied to the then undescribed form of *R. intermedia* than to the Black River forms to which they are referred. The *Hormotoma trentonensis* is very similar to the form in the Cobourg beds. There has long been a theory that the Richmond is a recurring Black River fauna, but recent studies have suggested to the writer that there is a close similarity between both these faunas and the Cobourg fauna, which may explain some of the earlier correlations of the Arctic Richmond faunas with the Trenton.

DESCRIPTION OF NEW FOSSIL

The specimen here illustrated is so remarkable that it is thought advisable to make a record of it, although its interpretation is somewhat obscure. Considered as a siphuncle it has an unusual striation which is normally indicative of the external surface of a conch. Considered as a conch, not only is the siphuncle not continuous but, as each camera was superseded by the progressing living chamber it was completely filled by the siphuncle. In addition, only periodically spaced septa are connected with the siphuncle. It is thought, then, that less violence is done to established Cephalopoda by considering the specimen a siphuncle.

Family *Endoceratidæ*

Genus *Hendersonia* Wilson, nov. gen.

Siphuncle only known.

Since the material at hand is fragmentary it is difficult to separate generic and specific characteristics. Those features are given as generic in which it differs most widely from other forms.

Long, comparatively slender forms; exterior of conch and septal necks unknown; exterior of siphuncle longitudinally striated between the septal scars; endocones apparently double walled, funnel-shaped, rapidly expanding anteriorly and having three supports extending out from the siphuncle wall.

Hendersonia apparently belongs to the Endoceratidæ and is related to *Endoceras* and *Vaginoceras* but it differs from both these genera in the presence of the endocone supports and in the considerably greater length and fewer number of the endocones.

Genotype: *Hendersonia sola.*

Hendersonia sola Wilson, n. sp.

Plate I

Specimen evidently large. Siphuncle only known, long and gradually tapering. One specimen, incomplete at both ends, measures 10½ inches in length. The longest transverse diameter at the larger end is 2 inches, at the smaller end 1 inch. Cross section subtriangular, longer diameter 2 inches, shorter diameter 1⅜ inches but slightly crushed ventro-dorsally. One side, limited by obtuse angles, is only slightly convex, and is considerably longer than the others. The two remaining sides are more convex, equal to one another and meet in a narrow curve rather than an angle. It is thought that the living form lay on the more flattened surface. There are 7 septa in a fragment 2½ inches in length. The anterior half of the space between the septal scars is very slightly concave. The apical half is slightly convex, giving the specimen a faintly annulated aspect. Longi-

10. Cox, I, Geol. Mag. 70, pp. 3, 359-373, 1933; 73, pp. 289-306, 1936.

11. Foerste, A. F. Geol. Surv. Canada, Mem. 83, p. 155, 1916.

12. Miller, A. K. Amer. Jour. Sci. (5) 20, p. 211, 1930.

tudinal striæ, 4 to 5 in ½ inch, mark the ventral surface. They may have been obliterated by weathering from the dorsal side. The septa are slightly oblique ventrally, trending more to the anterior on the right, and have a very gently curved lobe dorsally.

The siphuncle contains large cone-shaped endocones with ventral side slightly flattened conforming to the exterior wall, becoming a true cone at the tip. Each cone overlaps the succeeding one for at least one quarter of its length. One cone fragment, lacking the upper part and the tip, measures 2¾ inches in length. The complete cone would attain a length of 3½ to 4 inches. The largest diameter of a 2-inch fragment tapers from ⅞ inch to ¼ inch. The anterior of the endocone is apparently attached to the wall of the siphuncle. Decreasing in size it is swung within the siphuncle, excentrically at the apical end, somewhat near the right and ventral sides. The endocone is hollow, except perhaps for the acute apex, and double walled at the smaller end, perhaps throughout. The finer details are obscured by secondary calcite. A unique feature, however, is its almost equi-distant longitudinal supports to keep it steady within the siphuncle. Two of these are quite evident, and there are indications of a third. The strongest support, which is ventrally placed, may have had some part in weighting the ventral side. Like the whole specimen, however, its strength and thickness may have been increased by secondary deposits, though the quantity of lime in the water must have been limited judging from the small amount in the matrix. The second support is on the upper right hand sector. It appears to be the left in the illustration in figure 4. Both of these supports show a thin median division which suggests that they may have been a fold from the outer endocone. A third support is indicated in the corresponding position on the upper left hand side. This sector is badly preserved in the cross section illustrated and is only vaguely suggested, but it can be seen in another section. It is thought that what appears to be the third wall of the upper third of the inner cone in Figure 4 is a broken fragment of this support. The longitudinal section shows a double wall but no trace of a third wall. These supports are continuous longitudinally.

Horizon and locality — Near Ville Marie, Timiskaming district, Quebec, from the upper part of the basal sandstones of the Liskeard formation of Richmond age.

National Museum of Canada, Holotype number 9132.

Plate I

1. *Hendersonia sola* x ½, showing the rate of tapering. Holotype, National Museum of Canada, Number 9132.
2. Fragment from the top in figure 1, showing the striation, septal scars, and form of the interspaces between the septa. x 2/3.
3. Longitudinal section of the upper centre piece of the holotype showing an unfilled part of the double wall, the rate of tapering of one endocone, its position within the siphuncle in that plane, and the broken posterior tip of the next anteriorly placed endocone. x 2/3.
4. Tangential section of the lower centre piece of the holotype, showing double wall of one endocone and its supports extending to the wall of the siphuncle. x 2/3.

NESTING OF THE WHITE-WINGED CROSSBILL

By JAMES BOND

THE WHITE-WINGED CROSSBILL (*Loxia leucoptera*) is, like the Red Crossbill (*L. curvirostra*), a bird of undependable habits. On three visits to the Magdalen Islands, during the month of June in 1934, 1935 and 1936, this species was found by me, but it was rare in 1934 and 1936. In 1935 it was exceedingly abundant everywhere, ranking second in numbers, among forest birds, to the ubiquitous Blackpoll Warbler. These birds appear to have a very protracted breeding season. A number of young, which had probably hatched in April, were seen being fed by the adult females, while other individuals were obviously nesting or were about to nest. Males were observed singing here and there in the woods and examination of certain of these showed enlarged testes. This was noted not only in the adult male but in the immature as well.

I found but one nest (on June 8, 1935), which was situated near the top of a small spruce about seven feet above the gorund. When found, the female was on the nest, covering

her four young. On being flushed, she returned immediately to within a few feet of the nest, emitting an incessant, querulous *pit*, while the nest was being examined and photographed. The following morning the female was absent for some time but appeared at the nest about 9 o'clock with a flock of her kind that had been feeding in a stand of taller spruce a quarter of a mile distant. As the flock flew high overhead, she descended and immediately began her monotonous calling, whereupon several others joined her, although for a short time only. One of them, an adult male, was collected but proved not to be the owner of the nest, which I never saw. The males evidently take little or no part in the care of the young. The nest was a rather roughly-built cup composed of dry spruce twigs and was heavily lined with rabbit fur. The young had hatched about three days prior to its discovery. They were covered with down and it was noted that the inside of their mouths was rather bright purplish red in colour.

All the crossbills that I observed in the Magdalen Islands were *leucoptera* and during the many summer months that I have spent during the past ten years in Maine, New Brunswick and Nova Scotia, this was the only crossbill I encountered I mentioned this fact to that able ornithologist, Mr. R. W. Tufts of Wolfville, N.S., who informed me that he likewise has noticed that, in recent years, the White-winged Crossbill has increased and the Red Crossbill decreased in numbers in his Province.

VASCULAR PLANTS FROM MANSEL (MANSFIELD) ISLAND, N.W.T.

By NICHOLAS POLUNIN

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THIS RATHER large island lies around lat. 65°N. and long. 80°W. near the mouth of Hudson Bay. It was named about 1612 by Sir Thomas Button in honour of a friend named Mansel, hence the frequently applied appellations 'Mansell' and 'Mansfield' are incorrect. Except for occasional low rolling hills and small rocky outcrops the island is almost flat, having moreover a rounded coastline and low, barren shores. Although supporting many archaeological sites, it was in more recent times uninhabited until a few decades ago when a number of Eskimos drifted across on ice floes from the mainland and had to spend some years there before managing to return home. Subsequently the Hudson's Bay Company imported a few families of Eskimos who now live on the island but make contact each summer by motorboat with the trading post situated on the mainland of Quebec near Cape Wolstenholme.

The chief importance of Mansel Island lies in its proximity to the Churchill "Grain Route" (as recently as 1936 a large European freighter became a total loss on its desolate shore) and in its having been "reserved for the purpose of providing grazing grounds for reindeer and musk ox" by special Order-in-Council of the Canadian Government, March 10, 1920. At the same time and with the same end in view, the closely adjacent Coats and Southampton Islands were likewise set aside at the request of the "Royal Commission upon the possibilities of the Reindeer and Musk-ox industries in the Arctic and Sub-Arctic Regions"; that Mansel might prove less suitable than the other islands for this purpose was, however, soon realised by the Commissioners since they say in their report, (Anon. 1922 p. 25) that they "understand from the evidence" that it "is very rugged and short of vegetation, although it might possibly, on further investigation, be found well adapted for reindeer". While the detailed observations necessary to settle this question have not yet been made it does indeed seem highly probable that Mansel Island would be useless for experiments on the introduction of domesticated reindeer (except perhaps to show that these animals cannot live in such extremely exposed and barren places!) since the conditions and sparse plant communities on it appear from all accounts to be very like those on the similar limestone surface of Akpatok Island not so far away (cf. Polunin 1934b).

For the scientist Mansel Island offers another feature of peculiar interest — its highest point being only about 300 ft above sea level, and the adjacent shores of Hudson Bay having risen (according to unimpeachable evidence supplied by Mr. D. A. Nichols of the Geological Survey

of Canada) at least 600 ft in Post-Pleistocene times, there can be practically no doubt that the whole of the island has risen out of the sea since the last period of glaciation[1]. It follows that all the phanerogamic and other plants now comprising the land flora of Mansel Island must have migrated subsequently to the final recession of the Pleistocene ice, which in this region is supposed to have taken place only a few thousand years ago. Now the recent phytogeographical studies of Fernald (1925), Lynge (1933), Gelting (1934), Nordhagen (1935) and others on the "persistence" of plants on unglaciated areas in many parts of the northern hemisphere have discounted the teachings of such geologists as would have had us visualise a complete scouring of northern lands during the Pleistocene, with a consequent expulsion of all forms of life; indeed this botanical evidence has actually in some instances led geologists revisiting such regions to areas which on further investigation they had to admit have not been glaciated after all! But the other side of the picture must not be forgotten, viz. that just as migration has obviously taken place from these unglaciated "nunataks" of plants whose descendents subsequently came to populate the (generally much larger) intervening areas which had previously been glaciated but are now well vegetated, so too has there been much natural migration over greater distances, and across such "barriers" as the 40 miles wide straits separating Mansel Island from the adjacent mainland of Quebec. At least this is true in the Arctic, where the agencies of dispersal are so efficient, and may be presumed to include as principles little if at all active elsewhere (1) ice-rafting (as with the unfortunate Eskimos who were blown over to Mansel Island), (2) wind propulsion on the smooth and continuous ice of frozen seas (the straits between Mansel Island and the mainland freeze over completely in exceptionally severe winters) and (3) transportation of seeds and other small disseminules *frozen* to the fur and feathers of migrating animals and birds. Thus here, for example, there is very little room for doubt that the whole of the very considerable land flora of Mansel Island, whose phanerogams alone will probably be found on further investigation to exceed 100 species, has immigrated from the mainland or elsewhere by natural means during the last few thousand years.

Mansel Island was first explored botanically by Dr. Robert Bell in the summer of 1884. In his report (1884 p. 33DD) Bell gives a vivid picture of the terrain and a running commentary on the geology of the island but fails to mention the plants he collected. Nor does he say anything about the vegetation, although from his description of the island in general, we get the impression that this must be extremely poor, if not wellnigh absent, for he says of "the eastern part... about midway down" that "it resembled a gigantic ridge of gravel; but stratified rocks, in low horizontal ledges, appeared here and there, through the *débris*, at different levels" and, later "I landed again near the south end of the island, and found the water very shallow in approaching the shore. No rock was detected *in situ* at this place; but a great extent of gravel and coarser shingle, derived from limestone like that found *in situ* farther north, was thrown into a succession of long, low ridges and terraces, all curving with the contour of the land. Behind most of the ridges I met with long ponds of clear, fresh water."

No other scientist is known to have visited Mansel Island until August 1936, when Mr. Douglas Leechman of the National Museum of Canada, during the Eastern Arctic Patrol of that year, effected a landing for a few hours on the north end of the island. From Mr. Leechman's verbal account it would appear that the terrain in this part is much the same as in those described by Dr. Bell; plants are scarcely in evidence at all except in occasional damp and sheltered depressions[2] in the otherwise barren expanses of light-coloured limestone. As in some other cases during expeditions which we have made together, when his co-operation has been of the utmost value, Mr. Leechman very kindly collected for me all the plants he could find during his visit to Mansel Island, unfortunately (but necessarily) brief as this was; they form rather more than half the substance of the list given below of all the vascular plants so far known to occur on the island.

The individual specimens are mostly of reduced stature, many being pulvinate, and the

1. Mr. Nichols assures me that the isostacy *in these regions* is nowhere known to be sufficient to allow of any other possibility, although in view of the great local effects observed in southern Norway (I write from Greenland where no literature is available and quote in this instance merely from memory) it would be comforting to have some future expedition find marine shells on the highest point of Mansel Island.—N.P.

2. In one of these depressions, where the vegetation was locally closed, Mr. Leechman gathered plentiful material of what is perhaps the most interesting plant yet found on Mansel Island, viz. *Petasites sagittata* (Pursh) Gray which has only once before (Polunin 1934a, p. 203) been recorded from anywhere in the Arctic Archipelago.

species are almost all of rather high arctic and circumpolar distribution, although a few (such as *Stellaria crassifolia* Ehrh. and *Pedicularis flammea L.*) are of more restricted range, at least in the Arctic, while just one, *Petasites sagittata* (Pursh) Gray, is relatively southern. Indeed, as on some other similarly windswept and inhospitable areas elsewhere, especially when these are predominantly or wholly of limestone, the flora of Mansel Island is much more arctic in its affinities than the latitude would lead us to expert[3], and includes one species at least (*Draba subcapitata* Simmons) which here appears to have its southermost limit in the world.

In the botanical appendix to Bell's report (1884), comprising the "List by Professor Macoun of the plants collected..." the records are unfortunately obscured by the "lumping" together, as if they constituted a single locality, of "Mansfield, Digges and Nottingham Islands, at the western end of the straits". However the majority of the records are cited individually for Mansel Island in one or another part of Macoun's great "Catalogue of Canadian Plants", while Bell's collection, which is disseminated through the National Herbarium of Canada, has recently been worked over and the identifications revised by the present writer, who finds represented therein a total of 28 species and 2 subsidiary forms. Mr. Leechman found 30 species and 3 subsidiary at the one point at which he landed — of which no less than 14 species and 2 subsidiary forms are new to the island, whose known vascular plant flora now comprises the following 45 species and 4 subsidiary forms. These are all flowering plants; but there can be no doubt that with their easily disseminated, light spores and circumpolar distribution several pteridophytes must have reached the island and will be found with further exploration, as well as many many more phanerogams.

GRAMINAE

Hierochloe pauciflora R. Br. Leechman 1936.

Alopecurus alpinus Smith: Bell 1884, Leechman 1936.

Arctagrostis latifolia (R. Br.) Griseb. Bell 1884, Leechman 1936.

Catabrosa algida (Soland.) Fries (*Phippsia algida* (Soland.) R. Br.) Bell 1884 — no specimen seen, the one originally in the National Herbarium of Canada, whose identify is confirmed in the handwriting of Theo. Holm, having become detached from its sheet and lost; however there can scarcely be any doubt about the report by Macoun (1888 p. 196 sub nom. *Phippsia algida*), even if the only remaining portion of Bell's material on which this report was based belongs to *Puccinellia paupercula* (q. v.).

Poa arctica R. Br. (*P. cenisia* All.) Bell 1884, Leechman 1936.

Poa alpina L. forma *brevifolia* (Gaudin) Polunin *n. comb.* (*Poa alpina brevifolia* Gaudin, Agrostologia Helvetica I, p. 193, 1811) Leechman 1936.

Dupontia Fisheri R. Br. Bell 1884, Leechman 1936. Bell's collection is the source of the persistent reports of *Colpodium* (usually sub nom. *Arctophila*) from Mansel Island — egs. by Macoun (1888 p. 229), Holm (1907 p. 337 and 1922 p. 8B), Simmons (1913 p. 51) and even Malte & Ostenfeld (MS.). The specimens, which I have seen (National Herbarium of Canada nos 14712 & 14713), although they formed part of Holm's type of his "*Arctophila trichopoda* sp. nov." have shining spikelets and awnless lemmas and clearly belong to *Dupontia*.

Puccinellia paupercula (Holm) Fernald & Weatherby: Bell 1884 — the specimen in the National Herbarium of Canada (no. 34782) is the type of *Glyceria paupercula* Holm. It forms part of the collection which constituted the basis for Macoun's report of *Catabrosa algida* from Mansel Island, which report is almost certainly to be upheld, as has been explained above.

Festuca brachyphylla Schultes (*F. ovina* L. var. *brevifolia* (R. Br.) Hart) Bell 1884.

CYPERACEAE

Eriophorum Scheuchzeri Hoppe: Bell 1884, Leechman 1936. Bell's specimen in the National Herbarium of Canada (no. 34721) was first named "E. vaginatum" but clearly belongs to *E. Scheuchzeri* (*fide* Fernald).

Carex maritima. Gunnerus (*C. incurva* Lightf.) Leechman 1936.

Carex misandra R. Br. Leechman 1936.

Carex aquatilis Wahlenb. var. *stans* (Drej.) Boott: Leechman 1936.

Carex membranacea Hook. (*C. membranopacta* L. H. Bailey) Leechman 1936.

3. Thus I know an area in Spitsbergen, at a latitude of nearly 80° N. and some 2500 miles distant on the other side of the Atlantic, whose similarly low and exposed limestone surface supports a flora (and probably also vegetation) which is almost identical with that of Mansel Island, while most of the surrounding sheltered areas are almost incomparably better vegetated.—N.P.

SALICACEAE

Salix reticulata L. Bell 1884 — no specimen seen, but recorded by Macoun (1886 p. 454), Leechman 1936.

Salix arctica Pall. (s. l.) Bell 1884, Leechman 1936.

(*Salix fullertonensis* Schneider ? Bell 1884 — cited by Schneider (1918 p. 342) as "Mansfield Island... no. 24622... specimen mancum incertum" but, as with his similarly tentative reports of *S. fullertonensis* x *groenlandica* (later named *S. hudsonensis* Schneider), the specimens are intermediate and seem best referred to other species — generally to *S. arctica* Pall.)

POLYGONACEAE

Koenigia islandica L. Bell 1884 — labelled "damp mossy places" and mixed with seedlings of *Cochlearia officinalis* L. (s. l.) and scraps of *Cerastium* sp. and *Stellaria humifusa* Ehrh. (see sheet in National Herbarium of Canada).

Polygonum viviparum L. Leechman 1936.

CARYOPHYLLACEAE

Silene acaulis L. (var. *exscapa* (All.) DC.) Bell 1884 — no specimen seen, but the head form recorded by Macoun (1886 p. 494). All plants from Arctic Canada belong, however, to var. *exscapa*.

Lychnis apetala L. Bell 1884, Leechman 1936 Bell's no. 2621 in the National Herbarium of Canada is the type specimen of Holm's *Lychnis nesophila* but, as will be fully explained in my forthcoming "Botany of the Canadian Eastern Arctic, Part I", this is merely an insignificant phase of *L. apetala*.

Cerastium alpinum L. (s. l.) Bell 1884 [4], Leechman 1936.

Stellaria longipes Goldie: Leechman 1936; also f. *humilis* (Fenzl) Ostenfeld ex Grontved: Bell 1884 — named "var. *Edwardsii* Torrey & Gray".

Stellaria crassifolia Ehrh. Bell 1884 — mixed with *Koenigia islandica* etc. (see above) and not previously reported from Mansel Island or any other part of the Arctic Archipelago, in the southern-most portions of which it is, however, widespread and fairly common.

RANUNCULACEAE

Ranunculus nivalis L. Bell 1884.

Ranunculus sulphureus Soland. Leechman 1936.

PAPAVERACEAE

Papaver radicatum Rottb. (*P. nudicaule* of Authors, not L.) Bell 1884, Leechman 1936.

CRUCIFERAE

Cochlearia officinalis L. (s. l.) Bell 1884.

Cardamine pratensis L. var. *angustifolia* Hook. Leechman 1936.

Draba alpina L. Bell 1884; also var. *gracilescens* Simmons: Leechman 1936; also var. *nana* Hook. emend. Fernald: Bell 1884, Leechman 1936. Bell's specimen of var. *nana* in the National Herbarium of Canada (no. 1902) is the type of *Draba Bellii* Holm, which appears to be a mere *forma* rather than a true variety, and surely cannot be maintained as a distinct species — cf. Fernald (1934 p. 285).

Draba subcapitata Simmons: Leechman 1936 — apparently the farthest south record of this usually high-arctic species.

Draba fladnizensis Wulfen (s. l.) Bell 1884, Leechman 1936. Bell's specimen was reported by Macoun (1886 p. 488) as "*Draba androsacea* Wahl." and has since been variously named by the late Mrs. Ekman and others.

Arabis alpina L. Leechman 1936.

SAXIFRAGACEAE

Saxifraga cernua L. Bell 1884, Leechman 1936.

Saxifraga caespitosa L. Bell 1884, Leechman 1936; also f. *uniflora* (R. Br.) Engler: Bell 1884.

Saxifraga aizoides L. Bell 1884 — no specimen seen, but recorded by Macoun (1886 p. 525).

Saxifraga tricuspidata Rottb. Bell 1884.

Saxifraga Hirculus L. Bell 1884, Leechman 1936.

Saxifraga oppositifolia L. Leechman 1936.

ROSACEAE

Dryas integrifolia M. Vahl: Leechman 1936.

PYROLACEAE

Pyrola grandiflora Radius — no specimen seen. Recorded without details of collector or date in Malte & Ostenfeld (MS.) as occurring on Mansel Island, perhaps merely because it can scarcely be absent. Exactly the same remarks apply to the next two species.

ERICACEAE

Cassiope tetragona (L.) D. Don — no specimen seen (cf. above).

4. The scrap of *Cerastium* among Bell's *Koenigia* (see above) probably belongs to this species.

Vaccinium uliginosum L. var. *alpinum* Bigel. — no specimen seen (cf. above).

SCROPHULARIACEAE

Pedicularis flammea L. Bell 1884 — no specimen seen, but recorded by Macoun (1886 p. 573.)

COMPOSITAE

Matricaria inodora L. var. *nana* (Hook). Torrey & Gray: Bell 1884.

Petasites sagittata (Pursh) Gray: Leechman 1936.

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SOME MARINE ALGAE FROM LABRADOR, HUDSON BAY, AND ARCTIC CANADA

By HUGH P. BELL and CONSTANCE MacFARLANE

THE SPECIES mentioned below were collected by Mr. Douglas Leechman, of the National Museum of Canada, Ottawa, during the voyage of R.M.S. *Nascopie* to the northern parts of Canada in the summer of 1934. Although Mr. Leechman's special line of work was the collection of information dealing with the life and customs of the people along the coast and although the conditions for collecting algae were rather restricted, depending not only on the weather but on the state of the tide, a considerable number of species were obtained from about fifteen localities. The list is of value as extending our knowledge of the detailed distribution of the 30 species mentioned in localities which are seldom visited by an experienced algologist. For purposes of convenience of reference the names are grouped in alphabetical sequence under the three recognized subdivisions, namely, green, brown, and purple.

CHLOROPHYCEAE

Chaetomorpha Melagonium Kuetz. Dundas Harbour, Lake Harbour, Pond's Inlet, Wakeham Bay.

Chaetopteris plumosa Kuetz. On floe ice between Belcher Islands and Cape Henrietta-Maria.

Enteromorpha intestinalis Link. Charlton Island, Churchill, Pangnirtung.

Enteromorpha Linza J. Ag. Pond's Inlet.

Enteromorpha prolifera J. Ag. Charlton Island, Southampton Island.
Rhizoclonium sp. Cartwright, Charlton Island, Wakeham Bay.
Ulva Lactuca L. Churchill, Lake Harbour.

PHAEOPHYCEAE

Agarum Turneri Post. & Rupr. Cape Wolstenholme, Churchill, Dundas Harbour, Pond's Inlet.
Alaria esculenta Grev. Cape Wolstenholme, Pond's Inlet, Wakeham Bay.
Ascophyllum nodosum Le Jolis. Cartwright.
Desmarestia aculeata Lamour. Craig Harbour, Dundas Harbour, Lake Harbour, Pond's Inlet, Southampton Island.
Desmarestia viridis Lamour. Pangnirtung.
Fucus evanescens Ag. Cape Smith, Cape Wolstenholme, Cartwright, Churchill, Craig Harbour, Lake Harbour, Pond's Inlet, River Clyde, Southampton Island, Wakeham Bay.
Fucus vesiculosus L. Cartwright, Pangnirtung.
Laminaria digitata Lamour. Cape Wolstenholme.
Laminaria Phyllitis Lamour. Charlton Island, Pond's Inlet.
Sphacelaria sp. Wakeham Bay.

RHODOPHYCEAE

Ahnfeltia plicata Fries. Charlton Island; on floe ice between Belcher Islands and Cape Henrietta-Maria.
Delesseria sinuosa Lamour. Charlton Island.
Dumontia filiformis Grev. Dundas Harbour, Pond's Inlet.
Halosaccion ramentaceum J. Ag. Cartwright, Wakeham Bay.
Odonthalia dentata Lyngb. Charlton Island.
Phycodrys rubens Batt. Churchill.
Phyllophora Brodiaei J. Ag. Churchill, Pond's Inlet.
Polysiphonia urceolata Grev. Pond's Inlet.
Porphyra laciniata Ag. Wakeham Bay.
Ptilota pectinata Kjellm. Cape Wolstenholme, Cartwright.
Ptilota plumosa Ag. Cartwright.
Rhodomela subfusca Ag. Wakeham Bay.
Rhodymenia palmata Grev. Charlton Island, Pond's Inlet, Wakeham Bay.

SOME MARINE ALGAE FROM ANTICOSTI ISLAND AND THE GASPE PENINSULA[1]

By J. ADAMS

[1]Contribution No. 524 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

IN SCHMITT'S "Monographie de l'Ile d'Anticosti" mention is made of about 20 species of seaweeds belonging mostly to the brown group *Phaeophyceae*. It is probable that the list needs revision as the occurrence of some of the species mentioned seems to be very doubtful if the present system of nomenclature is followed. One species in particular *Halidrys siliquosa* Lyngb. should be deleted from the list as it has not been found elsewhere in Eastern Canada. During two short visits to the island in the summer months of 1933 and 1934 although mainly concerned with the higher plants I collected some marine algae consisting partly of material washed ashore and partly of plants growing in their natural habitat. A few specimens were also obtained from several points on the Gaspé coast. For the correct identification of most of the above material I am greatly indebted to Prof. H. P. Bell of Dalhousie University and to Miss Constance MacFarlane. For convenience of reference the names are grouped in alphabetical order under the three main colour-groups, namely, green, brown, and purple.

Of the localities cited Ellis Bay and Baie Ste. Claire are at the west end of Anticosti Island while the others are on the Gaspé Peninsula.

CHLOROPHYCEAE

Cladophora flexuosa Harv., Ellis Bay.
Enteromorpha intestinalis Link. Ellis Bay and Ste. Anne des Monts.
E. intestinalis Link forma *clavata* J. Ag., Ellis Bay.
Monostroma fuscum Wittr., Ellis Bay and Percé
Rhizoclonium tortuosum Kuetz., Ellis Bay and Percé.
Spongomorpha arcta Kuetz, Ellis Bay
Ulva lactuca L., Ellis Bay.
U. Linza J. Ag., Ellis Bay.

PHAEOPHYCEAE

Agarum Turneri Post. & Rupr., Ellis Bay.

Chorda Filum Stackh, Ellis Bay.
Chordaria flagelliformis J. Ag., Ellis Bay and Ste. Anne des Monts.
Desmarestia aculeata Lamour., Ellis Bay.
Dictyosiphon foeniculaceus Grev., Ellis Bay.
Ectocarpus confervoides Le Jolis, Ellis Bay.
Elachistea fucicola Fries., Ellis Bay.
Fucus evanescens Ag., Ellis Bay and Ste. Anne des Monts.
F. vesiculosus L., Ellis Bay.
Leathesia difformis Aresch., Ellis Bay.
Ralfsia verrucosa Aresch., Ste. Anne des Monts.
Scytosiphon lomentarius J. Ag., Baie Ste. Claire and Ste. Anne des Monts

RHODOPHYCEAE

Ceramium rubrum Ag., Ellis Bay.
Corallina officinalis L., Ellis Bay.
Cystoclonium purpurascens Kuetz., Ellis Bay.
Delesseria sinuosa Lamour., Ellis Bay and Cap des Rosiers.
Dumontia filiformis Grev., Ellis Bay.
Halosaccion ramentaceum J. Ag., Ellis Bay and Percé.
Lithothamnion polymorphum Aresch., Ellis Bay.
Melobesia Lejolisii Rosan., On *Zostera marina* in Ellis Bay.
Polysiphonia nigrescens Grev., Ellis Bay.
P. urceolata Grev., Ellis Bay.
P. violacea Grev., Ellis Bay.
Porphyra laciniata Ag., Ellis Bay and Ste. Anne des Monts.
Ptilota pectinata Kjellm., Ellis Bay.
Rhodomela subfusca Ag., Ellis Bay.
Rhodymenia palmata Grev., Ellis Bay and Ste. Anne des Monts.

59TH ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB
REPORT OF COUNCIL

Transaction of the Council's business during the year required four meetings and an adjourned session, the average attendance being 16. These meetings were held at the following homes: December 28, 1936, Mr. and Mrs. F. J. Fraser; April 6, Dr. R. E. DeLury; April 10, Mr. and Mrs. H. G. Crawford; October 28, Mr. and Mrs. P. A. Taverner; and November 30, Mr. and Mrs. Hoyes Lloyd.

Lectures.—A very successful public lecture, attended by His Excellency, the Governor General and party, and some 1200 people, was held in the Glebe Collegiate Institute, January 26. The speaker was Dr. Wm L. Finley of the American Nature Association, who spoke to a showing of five reels of exceptionally fine motion pictures. The Committee also co-operated with the Excursions Committee in arranging monthly lectures throughout the winter.

Bird Census.—The annual bird census taken in conjunction with other Societies in Canada and the United States, was held locally on December 26, 1936. Twenty observers organized in nine parties, reported 1380 individuals of 22 species. Of special interest were the Great Horned Owl, Arctic Three-toed Woodpecker, Golden-crowned Kinglet and Evening Grosbeak.

Excursions.—Two meetings of this Committee were held to arrange activities. Twelve excursions were held during the spring and fall months as follows.

April—to Rideau River near Hog's Back.

May—to McKay Lake, Pink's Lake, Fairy Lake and Experimental Farm Arboretum.

June—to Britannia and Black Rapids, the latter as guests of Dr. M. G. McElhinney on his yacht.

September—to Black Rapids, repeating the boat trip.

October—to Gatineau Point, Meach Lake and Arboretum.

November—a conducted trip through the National Museum.

Lectures, reviving in some degree the old-time soirées of the Club, have been continued as in the past year or two, with a gratifying attendance. Through the courtesy of the Rev. Father Banim these have been held in the library of St. Patrick's College. Speakers and topics were:

December 10, 1936. Mr. G. W. Sinclair on "Fossils".

January 21, 1937. Dr. Arthur Gibson on "Spiders and Insects, with particular reference

to the work of the Dominion Entomological Laboratories at Belleville."

February 18, 1937. Mr. A. E. Porsild on "Canada's Reindeer Experiment".

March 18, 1937. Mr. W. H. Minshall on "Botany".

April 18, 1937. Dr. H. F. Lewis on "Birds".

November 25, 1937. Father F. E. Banim on "How to Know the Flowers".

An interesting outcome of the latter lecture is a laboratory class in botany meeting weekly now for study of mosses of the Ottawa district.

The Committee's financial statement shows a balance of $14.55, turned over to the Club Treasurer. This comprises receipts from excursion tickets $19.00, and profits on three trips involving transportation charges, $4.05; and expenditures on a circular, stationery and postage, $8.50.

Garden party.—An innovation this year was a garden party held on June 19th, on the grounds of Dr. DeLury's home, Fairmont Ave., which proved a happy means of bringing together many older members and those chiefly active on excursions, etc. The success of this initial venture warrants its repetition.

International Committee for the Protection of the Birds of the World.—Mr. Hoyes Lloyd and Dr. Harrison F. Lewis were the representatives.

Publications.—*The Canadian Field-Naturalist* has appeared regularly and has been maintained at the size and standard which the finances of the Club have permitted in recent years. Various recommendations for improvement have been given careful consideration and are to be introduced as finances allow. The magazine performs a needed service to Canadian and other naturalists requiring a medium for publication; and puts before the public valuable matter which would otherwise not appear.

Fauna and Flora Committee.—A systematic effort has been made to have local species lists prepared by specialists in every department of natural history. It was hoped that a publication might be ready for 1938 on the occasion of the American Association summer meeting to be held at Ottawa, but the difficulties in some directions proved insuperable. The various manuscripts already received or nearing completion are, however, to be got out in mimeographed form at a nominal charge, or, in the case of matter largely original, will be published in *The Canadian Field-Naturalist.* The annotated list of Reptiles and Amphibia has already done useful service.

Membership.—The Committee held two meetings, and has worked in close collaboration with the Excursions Committee, feeling that the local field held the greatest promise for immediate increase of membership. Two circulars were issued which were well distributed at the Finley and Porsild lectures, and brought some results. The necessity of every present Club member actively canvassing known prospects is stressed.

Finance.—An order for one complete set of the Club's publications has been secured, for delivery as soon as it can be made up, at $160.00. Apart from this the year will be closed with a balance of $52.29.

Acknowledgements.—The Council wishes to take this opportunity to express its appreciation of the work and co-operation of many of its members, and especially to thank the Rev. Father F. E. Banim and his colleagues for kind accomodation for the winter meetings, Dr. M. G. McElhinney for enjoyable outings each summer, Miss Peggy Whitehurst, recently resigned Secretary, for much hard work faithfully and enthusiastically performed, and the leaders of the various excursions. To the incoming Council the hope is expressed that their rounding out of 60 years of Club activity may be a source of satisfaction in every way.—HERBERT GROH, *President.*

STATEMENT OF FINANCIAL STANDING
OTTAWA FIELD-NATURALISTS' CLUB, DECEMBER 3, 1937

ASSETS		LIABILITIES	
Balance in Bank, December 3, 1937 .	$ 13.89	NIL—	
Bills receivable	38.40	Balance	52.29
	$52.29		$52.29

RECEIPTS		EXPENDITURES	
Balance on hand, November 26, 1936	$ 3.12	Printing and mailing The Canadian Field-Naturalist	$ 907.10
Fees—Current	813.40	Editor's Honorarium	90.00
" —Advance, etc.	81.00	Postage and Stationery	36.81
Separates and Illustrations	151.96	Separates and Illustrations	80.17
Single and back numbers	35.35	Bank discount	18.62
Miscellaneous	244.49	Miscellaneous	102.65
		Repaid to Reserve Fund	80.08
	$1329.32		$1315.43
		Balance in Bank, December 3, 1937	13.89
			$1329.32

WILMOT LLOYD, Treasurer.

Audited and found correct
December 6, 1937.
HARRISON F. LEWIS,
W. H. LANCELEY,
Auditors.

STATEMENT—PUBLICATION FUND
DECEMBER 3, 1937

ASSETS		LIABILITIES	
Canadian Government Bonds	$900.00	NIL—	
Balance in Bank	105.85	Balance	$1005.85
	$1005.85		$1005.85

RECEIPTS		EXPENDITURE	
Balance in Bank, November 26, 1936	$103.41	Payment of Bond Int. to Current Account	39.50
Bond Interest	39.50	Balance in Bank, December 3, 1937	105.85
Bank Interest	2.44		
	$145.35		$145.35

WILMOT LLOYD, Treasurer.

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STATEMENT—RESERVE FUND
DECEMBER 3, 1937

ASSETS		LIABILITIES	
Canadian Government Bonds	$1200.00	NIL—	
Balance in Bank	307.27	Balance	$1507.27
	$1507.27		$1507.27

RECEIPTS		DISBURSEMENTS	
Balance in Bank, November 26, 1936	$ 169.40	NIL—	
Bond Interest	54.00	Balance in Bank, December 3, 1937	$307.27
Bank Interest	3.79		
Repaid from Current Account	80.08		
	$307.27		$307.27

EDWARD F. G. WHITE, Chairman,
Reserve Fund Committee.
WILMOT LLOYD, Treasurer.

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December 6, 1937,
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NOTES AND OBSERVATIONS

"Helix rufescens" RE-DISCOVERED AT OTTAWA.—While hunting for land shells in Rockcliffe Park on May 24th, 1937, I found a few specimens of *Fruticicola striolata* (Pfeiffer) (formerly known as *"Helix rufescens"* Pennant), under a pile of leaves that had apparently been raked up somewhere in the park. Search at all likely places where a colony might be failed to bring any results. On leaving the park I had a look along the embankment between the road and the new iron fence around Government House, where they were found to be plentiful under grass and leaves about two hundred feet east of the main entrance. This is not the first time that the species has been mentioned for the district. Many years ago Latchford introduced "several hundred" specimens which were set out on the Exhibition Grounds, but the colony failed to survive. The Rockcliffe colony is so far removed from the Exhibition Grounds that it is believed to be an independent introduction; its fate in the future will be watched with interest.—G. E. FAIRBAIRN.

A NEW BAT FOR THE TORONTO REGION LIST.—On September 11, 1937, upon the occasion of the fall field day of the Toronto Ornithological Club at the Holland River, four miles southwest of Bradford, Simcoe county, a few of us were pitching tents under a grove of hemlocks, when the writer noticed a small brown bat crawling over the bark of one of the trees. By placing my hat over it, I was able to secure it. Examination revealed its exceptionally long ears, which when laid forward reached well past the tip of the nose, denoting the form *Myotis keenii septentrionalis* (Trouessart). This specimen of the Long-eared Brown Bat, the first to be taken in the Toronto region, was preserved and is now in the collection of the Royal Ontario Museum of Zoology.

The writer is indebted to Mr. L. A. Prince and Mr. S. C. Downing of the museum's staff for valued assistance in the identification of the specimen and for pointing out certain differences between this species and the Little Brown Bat *Myotis lucifugus lucifugus*. *Keenii* is distinguished by having longer ears, which overlap the nose; in *lucifugus* they scarcely reach to the nose; a longer and narrower tragus; almost equal 3rd. and 5th. fingers; and a more slender skull.

The specimen was a female and measured: total length, 93 mm.; tail, 42 mm.; thumb, 6 mm.; hind foot, 8 mm.; expanse, 239 mm.; humerus. 24 mm.; tibia, 17 mm.; ear, 16 mm.; 3rd. metacarpal, 31 mm.; 5th metacarpal, 30 mm.

While records for this species are scattered over most of the province of Ontario, its presence had not been previously detected within the Toronto region. There are specimens in the collection of the Royal Ontario Museum of Zoology from Wingham, Huron county, Lake Kashi, Muskoka district; and Lake Timagami, all of which have been recorded by Dymond (1929). (*Can. Field-Nat.* 43:137). — O. E. DEVITT.

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The Canadian Field-Naturalist

VOL. LII OTTAWA, CANADA, FEBRUARY, 1938 No. 2

GEOLOGY OF SOUTH NAHANNI RIVER, N.W.T.

By A. E. CAMERON AND P. S. WARREN

INTRODUCTION

THE GEOLOGY of the Mackenzie Mountains, forming the divide between the Mackenzie and Yukon drainage systems, is but vaguely known. Their inaccessibility and the absence of minerals of economic importance are probably both contributory to this lack of knowledge. Our information regarding the geology of these mountains is based largely on the reconnaissance surveys of early explorers. In 1888-89, McConnell[1] made a traverse down the Liard River which skirts the southern end of Mackenzie Mountain and found rocks of Cambro-Silurian, Devonian, Triassic and Cretaceous age. McConnell states: "No rocks holding Silurian fossils were found in any part of the district" (1, p. 14 d). Hume [2 3] in 1922 showed that at least part of McConnell's Devonian is Carboniferous in age.

Keele in 1907-8[4] traversed the north end of the mountains from Ross River down Gravel River to the Mackenzie. He found rocks of the following ages:—Cambrian, Ordovician, Silurian, Devonian and Cretaceous. In 1921, Hume[5] investigated North Nahanni and Root Rivers tributary to the Mackenzie at Camsell Bend and reports only Devonian rocks within the front ranges of the Mackenzie Mountains, though the same year Camsell and Malcolm[6] show Silurian rocks in this section. In 1923 Hume[7] examined the Dahadinni and Little Bear Rivers, tributary to Mackenzie River and both heading in Mackenzie Mountains. The front range in this area was found to include Silurian rocks.

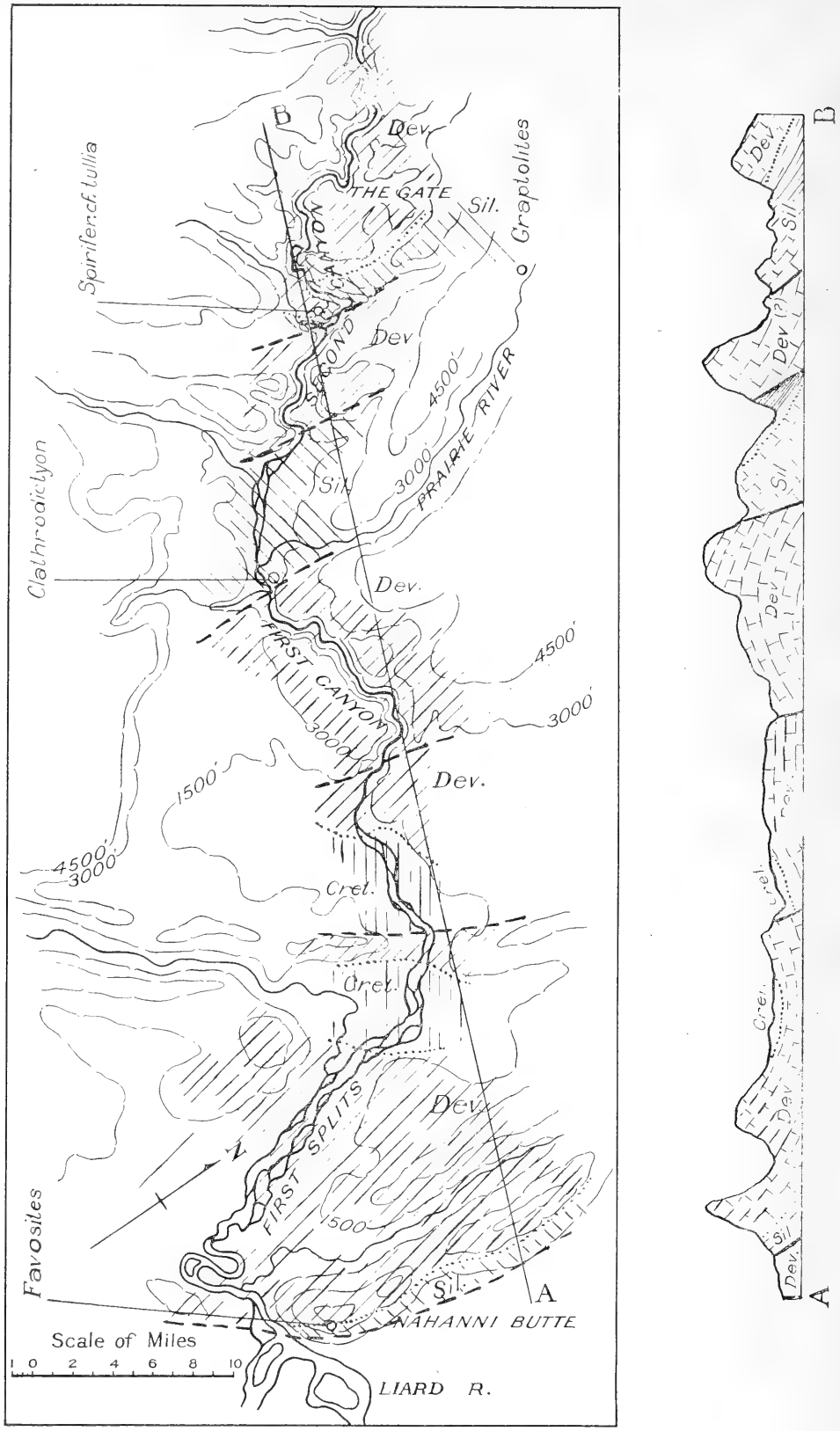
In 1935 Cameron[8] made a reconnaissance trip up the South Nahanni River for a distance of 80 miles, and made a few general observations on the geology of the area. As this part of the Mackenzie Mountains has had no previous geological study, it is considered that the results are of sufficient interest for further elaboration.

TOPOGRAPHY

The Mackenzie Mountains, though considered as a part of the Rockies, lie to the east of the general strike of the front ranges of that system. Their southern end rises abruptly from the plains, strikes in a north-westerly direction and finally in a westerly direction as they are affected by the Yukon and Alaskan system of mountains. Though altitudes have not been obtained with any degree of exactitude, the average mountains seldom reach an elevation of more than 6,000 to 7,000 feet.

The Liard River traverses the plain immediately to the south of the Mackenzie Mountains, in some places passing quite close to the limestone ranges in their most southerly extension. Probably the closest contact of the river with the ranges is at Nahanni Butte, some 60 miles from the mouth of the Liard. Nahanni Butte is the southermost mountain of the front ranges of the Mackenzie Mountains. Its base is skirted by the Liard and it rises precipitously some 5000 feet above the river. It is at this point that the South Nahanni enters the Liard from the north.

The general course of South Nahanni River is a few points to the west of the strike of the principal ranges of the Mackenzie Mountains. Through most of its course, therefore, it is a subsequent stream flowing between the ranges, but occasionally it cuts through a range into the valley to the east. Its course through the mountain valleys is marked by strong meanders and much braiding and usually low banks. Where the river cuts through a mountain range its valley assumes the form of a canyon with preciptous cliffs attaining in some places a height of 4,000 ft. The course of the river, therefore, is divided into canyons and "splits", the latter name being the local appellation for the shallow, meandering course of the river between the canyons. In the 80 miles of the lower part of the river traversed



Sketch map showing lower reaches of South Nahanni River, N.W.T.

by Cameron, he encountered two "splits" and two canyons. The "gate" of the Nahanni, the farthest point reached, is on the upstream side of the second canyon.

Certain peculiarities of the course of the South Nahanni make it appear that the valley is largely antecedent to the main structure of Mackenzie Mountains. The river cuts its way through high ranges of hard rock making immense canyons, when it could have gone round the end of the ranges by flowing a few miles farther and have traversed softer rocks all the way. It is just possible that glaciation may have had some influence in producing these drainage anomalies, but evidence of glaciation is not strongly marked in this area.

One indication of the effect of glacial action on the course of the Liard River is notable. Originally the Liard must have flowed up the valley of the South Nahanni to the north Elbow, a distance of 40 miles, and thence out to the valley of the Mackenzie by the North Nahanni. This passage was apparently blocked by glaciation forcing the Liard to swing south at Nahanni Butte and cut a new channel to the Mackenzie.

It should be mentioned that Hume (1923, p. 120) reports a drainage anomaly of a similar nature in the North Nahanni drainage basin and comes to the same conclusion as did the writers regarding the antecedent pattern of the Mackenzie mountain drainage.

GEOLOGY

The geological section as worked out by Keele on Gravel River at the north end of the Mackenzie Mountains, by Hume in his traverses on Little Bear, Dahadinni, Root and North Nahanni Rivers, tributary to Mackenzie River on the east face, and by McConnell and Hume on Liard River at the south end of the mountains, shows a thick series of Palaeozoic sediments ranging from Ordovician to Carboniferous in age, overlain by Mesozoic rocks of Triassic and Cretaceous age. Keele found Ordovician on the Gravel River but Hume found no Ordovician in any of his traverses south of the Gravel. McConnell reports Ordovician fossils on the upper reaches of the Liard. The only definite occurrence of Carboniferous rocks is that reported by Hume on Liard River, south and west of the mouth of the South Nahanni. It would thus appear that at least in the east half of the Mackenzie Mountain system, the Palaeozoic rock is essentially of Silurian and Devonian age.

The Mesozoic rocks reported in the general area are Triassic and Cretaceous. Triassic rocks, however, are known only on the upper reaches of the Liard and have not been observed in the Mackenzie Mountains where McConnell reports the Cretaceous lying on the Devonian.

The traverse made in 1935 by Cameron up the South Nahanni was the first geological investigation of the interior of the Mackenzie Mountain system. It was found that the system consists of a series of more or less parallel folds and fault blocks striking generally North. Folding appears to be more characteristic of the outer ranges, whereas in the interior, sharp serrated ridges are prevalent which are more expressive of faults than folds. Each of the faulted or folded blocks appears to represent the same succession of beds and to consist of a thick series of massive limestones overlying an equally thick series of calcareous and arenaceous shales or slates. Apparently below the shales another massive bed of limestone occurs. The definite position of this bed of limestone is uncertain.

Nahanni Butte, at the mouth of the South Nahanni, and forming the termination of the front range of Mackenzie Mountains, has been reported by Hume, as previously stated, to be massive Devonian limestones overlying a Silurian series. Cameron at this point collected a coral identified as *Favosites* cf. *F. niagarensis* Hall. This specimen has corallites about 1½ mm. in diameter and all about equal in size. Tabulae are closely spaced, about 2 to 1 mm. Mural pores and spines were not observed. This fossil was obtained in a limestone horizon overlying a shaly series at an elevation of about 800 feet above the river. The horizon is probably of Niagaran age.

At the top of the first canyon, on the east flank of Deadman's Valley, a fault brings up massive limestones from which a stromatoporoid was collected. This fossil was determined as *Clathrodictyon*, a type with "cannopore" tubes, but too badly broken down for specific determination. The genus occurs mainly in the Silurian. This limestone is overlain by shale which forms the floor of Deadman's Valley to the north and west, and is closely on strike with a similar shale series on Prairie River which, as will be discussed later, yielded definite Silurian fossils.

About half way through the second canyon a fault brings up a thick series of calcareous and arenaceous shales overlain by massive, light-coloured limestones. No fossils were noted

in the shales at this place, but the overlying limestone yielded the following fauna:

Schuchertella chemungensis (Conrad)
Leiorhynchus sp. nov. *Camarotoechia* sp.
Atrypa reticularis (Linn) *Spirifer* cf. *tullia* Hall
Athyris sp.

The horizon is Upper Devonian as shown by *Spirifer* cf. *tullia* and *Schuchertella chemungensis*. The *Leiorhynchus* has been obtained from the Upper Devonian, at other localities in the Mackenzie valley.

Though the underlying shales yielded no fossils at this locality, graptolites of Silurian (Clinton) age were collected from shale beds on Prairie Creek from a locality on strike with this horizon. These graptolites were submitted to Dr. Rudolph Ruedemann whose determinations and discussions are appended to this paper.

Underlying the broad valley occupied by the section of the South Nahanni known as the first "splits", and caught in some of the fault blocks of the second canyon was a section of soft, black fissile shales which apparently overly the Devonian limestones. No fossils were obtained from any of the exposures of these shales but they are lithologically similar to Cretaceous shales of the Peace and Liard River sections, and would appear to represent remnants of the Cretaceous beds caught in the mountain building movement. Local trappers report the occurrence of coal seams on the west side of the Nahanni River valley in the first "splits", giving further confirmation of Mesozoic horizons in this section.

To summarize the geological evidence on South Nahanni River, there is definite evidence of two Silurian horizons, the Clinton and Niagaran. No evidence of Devonian other than the upper was discovered, though probably the middle is present. The finding of Cretaceous beds infolded with the Palaeozoics confirms Hume's interpretation that Mackenzie Mountain structures, like those of other Rocky Mountain structures, are Post-Cretaceous in age

Cameron did not ascend the South Nahanni above the "Gate", but Precambrian rocks are said to occur in the upper reaches of the Flat and Caribou Rivers tributary to the South Nahanni from the west. In recent years a considerable amount of placer gold activity has developed on these rivers and their tributaries. A specimen of a carbon mineral determined by Dr. R. L. Rutherford as anthraxolite or shungite was given to Cameron by a local Indian and was reported to have been obtained on the headwaters of Meilleur Creek, a tributary of the South Nahanni. So far, minerals of this type have been obtained in the North West Territories of Canada, only in Precambrian horizons.

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APPENDIX

BY RUDOLF RUEDEMANN

Graptolites from Silurian shale at Galena Creek, tributary of Prairie River, 14½ miles east of gates of South Nahanni River, N.W.T. Collector A. E. Cameron 1935 *(Sent by Professor P. S. Warren.)*

Dark gray somewhat sandy shale contains the following faunule:

Monograptus cf. *convolutus* (Hisinger) and *M. spiralis* (Geinitz)
M. pandus Lapworth
M. cf. *priodon* (Bronn) and *M. clintonensis* (Hall).
Retiolites (Gladiograptus) geinitzianus Barrande var. *maximus* nov.

This faunule points distinctly to the Clinton age of North America and the Gala-Tarannon age of Great Britain.

M. convolutus is characteristic of a zone (20) of the Upper Birkhill, but the form before us has characters leading to *M. spiralis* which occurs in all zones of the Tarannon (22-25). *M. pandus* occurs in zones 22-24. *M*

priodon in zones 23-29, doubtfully in zone 22. *Retiolites geinitzianus* in zones 23-26.

While close relationship of the horizon with the Gala-Tarannon of Great Britain is indicated by these forms, the presence of the *M. priodon-clintonensis* group and of *Retiolites geinitzianus* points to the Clinton age of the formation, as *M. clintonensis* and the var. *venosus* of *R. geinitzianus* are the index fossils of the Clinton (Williamson) graptolite shale.

It is very probable that the same graptolite horizon is present in the Silurian graptolite shale band in the Brisco limestone of Sinclair Canyon, British Columbia. The writer (see Walcott, 1924) has recorded from the band:

Monograptus cf. *spiralis* (Geinitz)
M. marri Perner.
Retiolites (*Gladiograptus*) *geinitzianus* Barrande.

This faunule, on closer study, may prove identical with that from Galena Creek.

Also in Idaho occurs a fauna with *M.* cf. *pandus* and *Cyrtograptus murchisoni* which may belong here or as indicated by *Cyrtograptus murchisoni* to the base of the Wenlock.

Monograptus cf. *convolutus* (Hisinger) and *M. spiralis* (Geinitz)
Plate 1, Figures 1-5.

Prionodus convolutus, Hisinger, Leth. Suec. Supplem. p. 114, pl. 35, fig. 7. 1837.

Graptolithus convolutus Carruthers, *Geol. Mag.* vol. V, p. 127, Pl. V, fig. 1, 1868.

Monograptus convolutus, Tornquist, Siljansomrad. Grapt. II, p. 30, pl. III, figs. 5-11, 1892.

Monograptus convolutus, Perner, Grapt. de Bohême, p. 13, pl. XII, figs. 26-29, pl. XIII, fig. 41, text fig. 10, 1897.

Monograptus convolutus, Elles & Wood. Pal. Soc. vol. for 1916, p. 467, pl. 47, figs. 1a-d, text fig. 324 a & b. 1918.

Diagnosis by Elles & Wood.

"Polypary often of considerable size and length, coiled into a flat spiral, except at the distal extremity which is merely arcuate; slender, but widening gradually for the first few whorls, then maintaining a constant breadth of 3 mm. for the remainder of its extent. Thecae ten to seven in 10 mm., on the convex margin; those of the proximal portion of the narrow, isolate *Rastrites* type, those of the distal portion triangular, in contact only, with fully four-fifths of length free, of which the outermost fifth is involved in reflexion to form a small inconspicuous barb, or this barb may appear to be more or less completely replaced by a distinct spine."

Horizon and locality: Dark gray Silurian shale, collected by A. E. Cameron 1935 at Galena Creek, tributary of Prairie River 14½ miles east of gates of South Nahanni River, N. W. T.

Remarks: We have before us a small slab bearing remains of six specimens, the two largest and most complete are figured here. They agree in most characters with the British species as elaborately described by Elles & Wood, but approach also *M. spiralis* (Geinitz) in the smaller proportion of the theca isolate (½-¼) and the greater proportion of the barb and may lead over to that species.

A slab densely covered with *Monograptus* cf. *pandus* etc. on one side, exposes on the opposite bedding plane besides some specimens of the same species a large impression of a rhabdosome of *M.* cf. *convolutus*, with a diameter of 32.5 mm. (See fig. 5.)

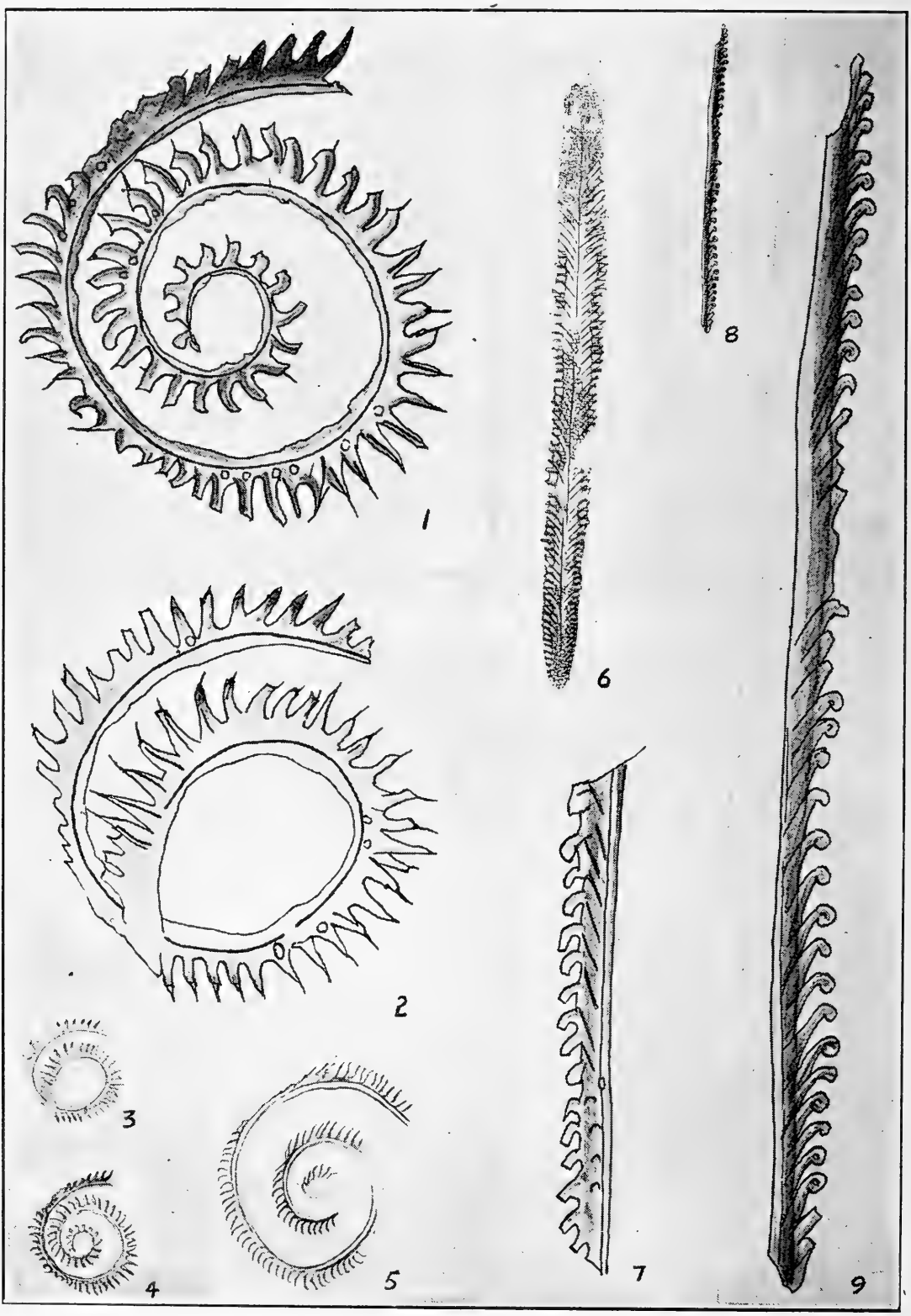
Retiolites (*Gladiograptus*) *geinitzianus* Barrande var. *maximus* nov.
Plate 1, Figure 6.

A single specimen of a Gladiograptus from the dark gray Silurian shale of Galena Creek with *Monograptus convolutus* stands out by its size surpassing all congeners. In its general outline, character of thecae and reticula it well agrees with the well-known European Silurian graptolite *Retiolites* (*Gladiograptus*) *geinitzianus*, surpasses it, however, distinctly in size. The rhabdosome attains a length of 10.2 cm. and a width of 8 mm. The thecae number 11-8 in 10 mm., are hence slightly larger than in the typical *geinitzianus*. We distinguish the form as a variety *maximus*. From the species *R. perlatus* Nicholson this form differs in the gradual widening, coarser reticula and more distinct ventral and apertural margins of the thecae which are much more closely arranged in *perlatus* (16-12).

Monograptus pandus Lapworth
Plate 1, Figure 7.

Elles & Wood's diagnosis:

Polypary several cm. in length, approximately straight; fairly robust even at the proximal end and widening steadily till a maximum breadth of 2.5 mm. is attained. Thecae nine to ten in 10 mm., of the general type of *M. priodon*, but shorter, and set so that the hooks, involving one-third only of the thecae, are often nearly in contact, and only occupy one-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fifth of the total breadth of the polypary.

Horizon and locality: Dark gray Silurian shale, collected by A. E. Cameron 1935 at Galena Creek, tributary of Prairie River, 14½ miles east of gates of South Nahanni River, N. W. T.

Remarks: The form here figured agrees well in its general outline and the character of the thecae with the common European graptolite and although the material is not well preserved it is certain that the form belongs to the *pandus-marri* group and in the relatively smaller breadth of the hooks and their close arrangement is nearer to *M. pandus* than to *marri*.

Monograptus cf. *priodon* (Bronn)
M. clintonensis (Hall)

Plate 1, Figures 8, 9.

A graptolite of the *Monograptus priodon-clintoni* group was found covering a slab of dark gray Silurian shale from Galena Creek, tributary of Prairie River, 14½ miles east of gates of South Nahanni River, N. W. T.

The specimens are preserved as impressions only in a somewhat sandy shale and therefore not as distinct as might be desired. The material leaves, however, no doubt that it belongs to the group of *M. priodon* and *M. clintonensis* Hall, which are closely related and by many considered as identical. The writer (1908, p. 453) saw a differential character in the nature of the thecae of the sicular or proximal end which however is not available here, as no similar ends are shown. O. T. Jones remarks that in his opinion *M. clintonensis* as labelled in American collections, includes more than one form and that the species calls for careful re-examination. The writer has already recognized one or several varieties as var. *chapmanensis* from Maine.

EXPLANATION OF PLATE

Monograptus cf. *convolutus* (Hisinger) and *M. spiralis* Geinitz
Fig. 1. Specimen No. Si. 264 x 4
Fig. 2. Specimen No. Si. 265 x 4
Fig. 3. Specimen No. Si. 265 x 1
Fig. 4. Specimen No. Si. 264 x 1
Fig. 5. Specimen No. Si. 266 x 1
Reliolites geinitzianus Barrande var. *maximus* nov.
Fig. 6. Specimen No. Si. 267 x 1
Monograptus pandus Lapworth.
Fig. 7. Specimen No. Si. 268 x 4.
Monograptus cf. *priodon* (Bronn) and *M. clintonensis* (Hall)
Fig. 8. Specimen No. Si. 269 x 1
Fig. 9. Specimen No. Si. 269 x 4

The numbers of the specimens refer to the catalogue of the Geological Museum, University of Alberta.

CHRISTMAS BIRD CENSUSES, 1937

MONTREAL, QUE. — December 26, 1937; 8.30 a.m. to 4.15 p.m. Snow flurries; 19 inches snow on ground; wind fresh, east veering to north-west; temp. 14° at start, 18° at return. Five parties of observers covered 25 miles on skis, snowshoes, and on foot, and 20 miles by automobile. The census area includes Mount Royal, Westmount Mountain, Montreal West, St. Lambert, and Caughnawaga. American Golden-eye, 30; White-winged Scoter, 37; Red-breasted Merganser, 2; Great Horned Owl, 1; Hairy Woodpecker, 3; Downy Woodpecker, 12; American Crow, 4; Black-capped Chickadee, 43; White-breasted Nuthatch, 7; Brown Creeper, 2; American Robin, 1; Common Starling, 180 (est.); English Sparrow, 292 (est.); Pine Grosbeak, 10; Common Redpoll, 10; Tree Sparrow, 1. Total, 16 species, about 635 individuals. Seen recently: Snowy Owl, December 24th. — J. D. CLEGHORN, J. A. DECARIE, JOHN FRY, W. S. FRY, GEORGE HOW, G. M. HYDE, H. A. C. JACKSON, COLIN NICOL, H. F. SEYMOUR, MR. AND MRS. L. M. TERRILL, A. M. TERROUX, *members of the Province of Quebec Society for the Protection of Birds, Incorp.*

OTTAWA, ONT. — December 26, 1937; 7.30 a.m. to 5.00 p.m. Completely overcast and snowing until 10.30 a.m.; rest of day partly cloudy, with 50 per cent clear sky as maximum, occasional snow-flurries; wind east, light, to 2.00

p.m., then calm to 3.30 p.m., then strong west wind to dark; 18 in. snow on ground; temp 10° at 8.30 a.m., 17° at 1.30 p.m. Twenty observers in 9 parties, in various directions about Ottawa. American Golden-eye, 81; Hooded Merganser, 1; Common Pheasant, 2; Rock Dove, 24; Hairy Woodpecker, 5; Downy Woodpecker, 8; Blue Jay, 13; American Crow, 28; Black-capped Chickadee, 128; White-breasted Nuthatch, 22; Red-breasted Nuthatch, 4; Brown Creeper, 4; American Robin, 1; Northern Shrike, 2; Common Starling, 327; English Sparrow, 1254; Pine Grosbeak, 7; Redpolled Linnet, 154; Pine Siskin, 15; American Goldfinch, 99; Lapland Longspur, 3; Snow Bunting, 473. Total, 22 species, 2655 individuals. The Hooded Merganser, a female or young bird, was identified by Dr. R. E. DeLury, who found it on the Rideau River, a short distance below Hog's Back. Merganser beak, small size, and dark coloration were noted. This bird may have been injured, as it was not seen to fly, but it appeared well otherwise. The Lapland Longspurs, in the company of a Redpolled Linnet, were feeding in a weedy field near Aylmer, Quebec, where they were identified by Dr. Harrison F. Lewis. Characteristic markings were clearly observed. The Hooded Merganser and the Lapland Longspur have not previously been found in Christmas Bird Censuses at Ottawa.—OTTAWA FIELD-NATURALISTS' CLUB.

Observers: R. M. ANDERSON, F. E. BANIM, R. F. CLARKE, D. B. DELURY, R. E. DELURY, B. A. FAUVEL, G. H. HAMMOND, T. S. HENNESSEY, C. E. JOHNSON, GIFFARD JOHNSON, REVELL JOHNSON, W. H. LANCELEY, BARNARD McL. LEWIS, C. R. LEWIS, HARRISON F. LEWIS, HOYES LLOYD, ARTHUR D. NELLES, A. E. PORSILD, L. K. POUPORE, PEGGY WHITEHURST.

PAKENHAM, LANARK CO., ONT.—December 24, 8.10 a.m. to 12 noon and 1.30 p.m. to 3.15 p.m. Dull sky, visibility good, fresh east wind, with heavy snow after 2.45 p.m. 12 inches snow on ground. Temperature 2° below zero at start, 11° above at finish. 15 miles on foot, 20 miles by automobile. Four observers separate. Eastern Hairy Woodpecker, 2; Northern Downy Woodpecker, 2; Blue Jay, 10; Eastern Crow, 5; Black-capped Chickadee, 39+; White-breasted Nuthatch, 6; Eastern Robin, 1; Eastern Golden-crowned Kinglet, 2; Common Starling, 29; English Sparrow, 84; Canadian Pine Grosbeak, 2; Common Redpoll, 99+; Eastern Snow Bunting, 32. Total, 13 species, 313 individuals. Seen recently, Snowy Owl, 1 (December 18); Canada Ruffed Grouse, 2, and Brown Creeper, 2 (December 26). Numerous flocks of birds were observed but were not definitely identified. These may have been Goldfinches or Pine Siskins, as both have been unofficially reported in the district. Redpolls are very plentiful this season.

On December 18th four Pine Grosbeaks, including one rosy male, were seen. No Evening Grosbeaks have been noted. The one Robin was found in a clearing in the woods that is sheltered on one side by small cedars. It was feeding on bittersweet. A Robin, presumably the same bird, was also observed in the same clearing on December 14th. The lack of Grouse in this census was disappointing. At least six are resident in the woods on the outskirts of Pakenham, but none could be found on census day.—EDNA G. ROSS, VERNA M. ROSS, ALLAN F. ROSS, WILMER ROSS.

ARNPRIOR, ONT.—December 25; 9.30 a.m. to 5.00 p.m. Fine, 12 in. snow; moderate n. w wind; temp. 11° at start, 15° at return. 18 miles on foot and snowshoes. Observers separate. Canada Ruffed Grouse, 3; Eastern Horned Owl, 2; Northern Pileated Woodpecker, 2; Eastern Hairy Woodpecker, 3; Northern Downy Woodpecker, 6; Blue Jay, 1; Eastern Crow, 2; Black-capped Chickadee, 36; White-breasted Nuthatch, 7; Red-breasted Nuthatch, 6; Eastern Brown Creeper, 1; American Robin, 1; Common Starling, 1 plus; House Sparrow, 1 plus; Eastern Purple Finch, 2; Canadian Pine Grosbeak, 2; Common Redpoll, 22 plus; Common Snow Bunting, 29. Total, 18 species, 127 (plus) individuals. Subspecies determined geographically. No attempt made to count Starlings or House Sparrows. Seen recently, flock of 1000 Snow Buntings. Evening Grosbeaks are absent this year.—LIGUORI GORMLEY AND CHARLES MACNAMARA.

GANANOQUE, ONT. — December 27. Cloudy moderate temp.; wind west. Two observers in the vicinity of Gananoque and along the partly open St. Lawrence River. American Common Merganser, 2; Bald Eagle, 1; Herring Gull, 2; Great Horned Owl, 1; Hairy Woodpecker, 1; Blue Jay, 3; Black-capped Chickadee, 8; White-breasted Nuthatch, 1; Bronzed Grackle, 1; Snow Bunting, 12. Total, 10 species, 32 individuals. — W. E. EDWARDS, G. C. TONER.

ATHENS, ONT.—January, 1, 1938. Cloudy at first, north-east wind, with sleet, changing to snow, then clearing; temp. 6° at start, 12° at return. Observer alone. 18 to 24 in. snow on the level. 5 miles on snowshoes. Ruffed Grouse, 13; Great Horned Owl, 1; Downy Woodpecker, 1; Blue Jay, 2; Black-capped Chickadee, 15; Red-breasted Nuthatch, 2; Pine Siskin, 100 (3 flocks). Total, 7 species, 134 individuals. Siskins feeding on seeds of conifers. Each flock seemed to keep to its own locality. Have identified no Redpolls so far this winter. Snow Buntings very plentiful, not found during census.—MURRAY W. CURTIS.

HALIBURTON, ONT.—December 21; 8.00 a.m. to 1.10 p.m. and 1.50 p.m. to 3.50 p.m. Mostly cloudy, snowing in p.m.; about 1 ft. snow; wind southerly, moderate; temp 6° at start; about 12 miles afoot Ruffed Grouse, 1; Great Horned Owl, 1 (heard); Hairy Woodpecker, 1; Downy Woodpecker, 2; Blue Jay, 7; Black-capped Chickadee, 55 approx.; Brown-headed Chickadee, 4; Red-breasted Nuthatch, 2; Brown Creeper (?), 1; Golden-crowned Kinglet, 3; Pine Grosbeak, 40 approx.; Redpoll (sp. ?), 60 approx.; White-winged (probably) Crossbill, 85 approx.; Snow Bunting, 5. Total, 14 species, about 267 individuals. Other recent records are: 16th, Barred Owl and Pine Siskin; 19th, Pileated Woodpecker; 20th, Evening Grosbeak. Crossbills seen at close range during the month proved to be White-winged Crossbills.—E. W. CALVERT.

BRADFORD, SIMCOE COUNTY, ONT.—December 25; 10 a.m. to 4.15 p.m.; sky overcast; temp. 25° to 30°; moderate north-west wind; 2 in. snow. 4 miles on foot along the Holland River, west from Bradford and return. Observers together. Common (Ring-necked) Pheasant, 1; Eastern Hairy Woodpecker, 1; Blue Jay, 3; Black-capped Chickadee, 30; White-breasted Nuthatch, 1; Red-breasted Nuthatch, 4; Brown Creeper, 2; Eastern Golden-crowned Kinglet, 1; Common Starling, 3; English Sparrow, 10; Pine Grosbeak, 2; Redpolled Linnet, 25; Pine Siskin, 150; White-winged Crossbill, 10. Total, 14 species, 243 individuals — D. SUTHERLAND AND O. E. DEVITT.

TORONTO, ONT.—The census of December 26, 1937, was the 13th consecutive Christmas bird census carried out by the Brodie Club. Although this number may give a reasonably accurate picture of our usual winter bird population there is an erratic tendency in winter records of many species which suggests that at least 20 will be necessary before sufficient figures are available to justify any conclusions as to periodicity effects of weather, etc. There has been little tendency in the census figures to form periodic peaks and depressions, either in number of species or individuals, but this may become apparent over a longer period.

On this census, with 42 observers in the field, we recorded 58 species, which is 12 more than on any previous census and 18 more than last year when there were 43 observers. There are other indications that birds are present in greater numbers this winter than for some time. The number of common birds is probably more significant in this respect than the number of erratic visitors and if we take the ten species which have been seen on all of the 13 censuses, which might be considered as our basic winter bird population, we find that in 8 of the 10 more individuals were seen this year than ever before. The two exceptions are the Downy Woodpecker and the English Sparrow, the number of the former having been exceeded only once, 1936, and the latter being counted for only the third year. The other eight species seen on every census are: American Golden-eye, Old-squaw, Blue Jay, Common Starling, White-breasted Nuthatch, Black-capped Chickadee, Tree Sparrow and Song Sparrow. There are indications of a fairly pronounced invasion of northern forms, although this is balanced by a high count of species which are normally only summer residents.

There is no doubt that some of the increase in numbers of birds seen on recent censuses is attributable to more observers but as this usually only means larger groups covering the same ground it can be discounted to some extent. On the other hand censuses tend to become more thorough. Following the same routes year after year we come to know just where to look for certain birds. As a good example, the Swamp Sparrow was practically unknown here in winter prior to 1927 but for the past 6 years we have seen one, two or three on every census. This does not indicate more Swamp Sparrows but only that we know where and how to look for them.

Three species were seen this year which were new on our census lists, viz., the Red-breasted Merganser, Pileated Woodpecker and Hudsonian Chickadee. The two last-named were seen by

no. 8 party at Nancy Lake, about 20 miles north of the city, where the Pileated breeds and where a few of the Chickadees have been present since late autumn. At Nancy Lake, too, was found a quite extraordinary concentration of Red-breasted Nuthatches, 26 being counted.

CHRISTMAS BIRD CENSUS OF THE BRODIE CLUB — TORONTO
DECEMBER 26, 1937

SPECIES	PARTIES:	1	2	3	4	5	6	7	8	TOTALS
Redhead		....	....	....	....	1	....	....	....	1
Greater Scaup Duck		....	....	45	240	1030	....	....	....	1315
American Golden-eye		....	....	83	300	60	6	....	....	449
Buffle-head		....	....	3	....	16	....	....	....	19
Old-squaw		....	....	40	73	812	....	....	....	925
American Common Merganser		....	....	2	....	9	....	....	....	11
Red-breasted Merganser		....	....	....	....	2	....	....	....	2
American Goshawk		....	1	....	....	....	....	....	....	1
Sharp-shinned Hawk		....	....	....	1	....	....	....	....	1
Red-tailed Hawk		1	1	....	1	....	....	....	....	3
American Rough-legged Hawk	1	....	....	....	....	....	....	....	....	1
Marsh Hawk		2	....	....	1	....	....	....	....	3
American Sparrow Hawk		1	....	....	....	....	....	1	....	2
Ruffed Grouse		....	....	....	....	....	....	1	2	3
Common Pheasant	55	8	5	10	11	6	14	1	110	
Wilson's Snipe		....	....	1	....	....	....	....	....	1
Glaucous Gull		....	....	1	....	1	....	....	....	2
Great Black-backed Gull		....	....	7	4	15	5	....	....	31
Herring Gull		7	54	261	355	905	43	....	....	1625
Ring-billed Gull		....	....	2	1	....	....	....	....	3
American Screech Owl		1	....	....	....	....	....	....	....	1
Great Horned Owl		1	....	....	2	....	....	....	....	3
Snowy Owl		....	....	....	....	1	....	....	....	1
Barred Owl		1	....	....	....	....	....	....	....	1
Short-eared Owl		....	1	....	....	....	....	....	....	1
Belted Kingfisher		....	....	1	....	....	....	....	....	1
Northern Flicker		....	1	....	....	....	....	....	....	1
Pileated Woodpecker		....	....	....	....	....	....	....	1	1
Hairy Woodpecker		....	....	....	....	....	....	....	2	2
Downy Woodpecker		7	9	18	5	....	4	2	45	
Blue Jay		2	5	17	10	....	2	20	56	
American Crow		....	4	15	....	....	18	....	37	
Black-capped Chickadee		21	39	70	26	7	26	70	259	
Hudsonian Chickadee		....	....	....	....	....	....	1	1	
White-breasted Nuthatch		....	5	14	4	....	....	1	24	
Red-breasted Nuthatch	2	....	3	....	1	....	3	26	35	
Brown Creeper	4	2	3	10	....	....	....	1	20	
American Robin		1	....	....	....	....	....	1	2	
Golden-crowned Kinglet		....	....	5	....	1	2	4	12	
Cedar Waxwing		....	1	....	....	....	....	....	1	
Northern Shrike		....	1	....	....	....	....	....	1	
Common Starling		424	588	66	428	270	114	17	1907	
English Sparrow		162	331	149	188	150	163	57	1200	
Eastern Meadowlark		....	2	....	....	....	....	....	2	
Rusty Blackbird		....	....	3	....	....	....	....	3	
Cardinal		....	....	6	1	....	1	....	8	
Common Purple Finch		2	17	10	32	....	....	....	61	
Pine Grosbeak		3	....	....	....	....	....	....	3	
Redpolled Linnet		....	11	2	6	....	90	....	109	
Pine Siskin		....	....	....	....	....	225	70	295	
American Goldfinch		8	6	17	44	....	110	....	185	
Red-eyed Towhee		....	1	....	....	....	....	....	1	
Slate-coloured Junco		16	23	20	9	....	20	2	90	
Tree Sparrow	3	18	63	172	10	9	4	....	279	
White-throated Sparrow		....	....	....	1	....	....	....	1	
Swamp Sparrow		....	1	1	....	....	....	....	2	
Song Sparrow		1	5	5	11	2	1	....	25	
Snow Bunting		1	....	....	....	....	....	50	51	
Total individuals:	65	690	1181	1056	1765	3297	853	328	9235	
Total Species:	5	22	26	30	26	18	21	18	58	

Our census counts of the Common Pheasant show a fairly steady increase of this bird in the Toronto region. The first census record was in 1928 when 1 was seen and since then the figures have been: 1929, 2; 1930, none; 1931, 5; 1932, 17; 1933, 61; 1934, 44; 1935, 43; 1936, 74; 1937, 110. In spite of a falling off of the Starling count for the preceding two years and general reports of a decrease, more were seen on this census than on any other, or 1907 as against the next highest number, 1514 in 1934. English Sparrows were more than 1000 below the records of the previous two years and this agrees with the opinion of most observers that lately the population has decreased. The number of Cardinals seen is twice the highest former census figure and encourages one to think that, barring accidents, this desirable bird will yet become firmly established in this region.

The weather at Toronto during December has been a little colder than last year but not extreme. Snowfall has been light and on census day, although there was from 2 to 3 inches of snow in the woods, the ground in the open was practically bare. The weather was fair, with a maximum temperature of 37° and a minimum of 23° and a west wind of from 29 to 35 miles.

Those taking part in the census and their parties were as follows: 1. H. M. Halliday, W. V. Crich. 2. L. L. Snyder, G. S Bell, R. J. Rutter, J. Oughton, P. Oughton, D. Miller, F. Barratt, S. Troyer. 3. C. E. Hope, J. Walty, F. Banfield, G. Beare. 4. O. Devitt, M. Boissonneau, A. Boissonneau, E. Boissonneau, W. Mansell, D. Forbes, C. Cook 5. J. L. Baillie, P. Harrington, M. Speirs, L. Beldan, B Beldan, Dr. Cummings, H. Ivor, F. Mowat. 6. H. Southam, F. Emery, R. Lindsay, F. Norman, R. Carreau, D. West, R. Hicks, G. Lambert. 7. R. Bennett, R. Saunders. 8. E. G McDougall, R. Ussher, W. Gunn.—THE BRODIE CLUB. Per: R. J RUTTER, *Secretary*.

VINELAND STATION, ONT.—December 27.—9.00 a.m. to 4.00 p.m. One party of 4 observers in a.m., only 2 observers in p.m. Cloudless; ground bare; light wind varying from south to east; temp, min. 23°, max. 35.3°. West bank of Jordan Pond, Lake shore, Experimental Farm, Ball's Falls. 8 miles on foot, 5 by automobile. Scaup Duck (?), 2; Marsh Hawk, 1; Common Pheasant, 2; Herring Gull, 2; Ring-billed Gull, 1; Eastern Mourning Dove, 16 (1 flock); Northern Flicker, 1; Northern Downy Woodpecker, 3, Horned Lark, 7; Black-capped Chickadee, 4; White-breasted Nuthatch, 3; Brown Creeper, 1; Eastern Golden-crowned Kinglet, 4; Common Starling, 15; English Sparrow, 80+; Red-winged Blackbird, 2; Cowbird, 4; Eastern Purple Finch, 9; Redpoll (?), 30+; Eastern Goldfinch, 2; Slate-coloured Junco, 43; Tree Sparrow, 45+; Song Sparrow, 2. Total 22+ species, 270+ individuals. — W. J. K. HARKNESS, R. C. ROSS, J. STRONG, D. A. ROSS.

HAMILTON, ONT. (Burlington Bay and Beach, Aldershot, Dundas Marsh, Escarpment to Ancaster, Bronte and Lake Medad).—December 27; 8 a.m. to 6 p.m. Clear; traces of snow; wind east, light; temp. 26° to 34°. Eight parties on foot, one by car. Mallard Duck, 3; Black Duck, 250; Greater Scaup Duck, 600; Lesser Scaup Duck, 3; American Golden-eye, 270; Buffle-head, 6; Old-squaw, 2; American Common Merganser, 300; Red-breasted Merganser, 2; Sharp-shinned Hawk, 1; Cooper's Hawk, 2; Red-tailed Hawk, 1; Red-shouldered Hawk, 1; Common Rough-legged Hawk, 4; Bald Eagle, 1; Marsh Hawk, 6; American Sparrow Hawk, 2; Ruffed Grouse, 18; Gray Partridge, 4; Common Pheasant, 26; Glaucous Gull, 1; Iceland Gull, 2; Great Black-backed Gull, 82; Herring Gull, 5200; Mourning Dove, 3; American Screech Owl, 3; Eastern Horned Owl, 3; Arctic Horned Owl, 1; Snowy Owl, 1; Northern Flicker, 5; Hairy Woodpecker, 15; Downy Woodpecker, 35; Blue Jay, 80; American Crow, 69; Black-capped Chickadee, 124; White-breasted Nuthatch, 40; Red-breasted Nuthatch, 8; Brown Creeper, 13; Winter Wren, 1; Brown Thrasher, 1 (J. Martin); American Robin, 4; Golden-crowned Kinglet, 8; Cedar Waxwing, 101; Common Starling, 886; English Sparrow, 360; Bronzed Grackle, 1; Cardinal, 9; Common Purple Finch, 34; Redpolled Linnet, 88; Pine Siskin, 86; American Goldfinch, 68; Slate-coloured Junco, 206; Tree Sparrow, 411; White-throated Sparrow, 2 (Mrs. Morton, H. C. Nunn); Swamp Sparrow, 2; Song Sparrow, 6; Snow Bunting, 50. Total 56 species, 9511 individuals.—Hamilton Bird Protection Society (F. H. Butcher, Leroy Dove, Mrs. J. G. Farmer, Maurice Hackman, Dr. R. E. Haist, Kenneth Hannigan, Peter Henderson, Oliver Hewitt, Gavin Lawrason, Miss Edith McEwin, Mrs. F. E. McLoghlin, Dr. and Mrs G. O. McMillan, Rev. Calvin McQuesten, Miss J. Magee, Miss Eleanor Malcolm, Jack Martin, Miss Ruby Mills, Mrs. J. P. Morton, Douglas Mundell, H. C.

Nunn, Leonard Pollard, Blair Ronald, Douglas Simpson, Miss Laura Stewart, Clifford Swan, Ivor Thornewell, Vernon Trott, J. H. Williams, George W. North.)

KITCHENER AND WATERLOO, ONT.—December 29; 8.45 a.m. to 5.15 p.m. Sky overcast in a.m.; mainly clear, with much-improved visibility after noon; somewhat variable wind, averaging moderate, easterly most of afternoon; 8 in. crusted snow on ground; temp. 20° to 25°. Eighteen observers were afield in four parties, three by auto, one on foot. Largest list of one party, 24 species. Birds appeared considerably more plentiful, both in numbers and in species, than during our Christmas Bird Census in 1936. This winter certain "northerners" preponderated, especially the (Common) Redpoll and the Pine Siskin, which are occurring largely in mixed flocks, though pure flocks of either species often seem to segregate, at least temporarily, apparently for special foraging or roost-resorting purposes. The Snow Bunting, typically found here at such times, was missed in this census. The single Rusty Blackbird, found in active forage near the Bridgeport Dam, constitutes the first known winter record for at least the County of Waterloo. Black Duck, 26 (1 flock); American Common Merganser, 6 (1 group, close to Black Ducks); Red-tailed (?) Hawk, 1 (R. A. B.); Ruffed Grouse, 2; Common ("Ring-necked") Pheasant, 3; Herring Gull, 55; Ring-billed Gull, 2; Great Horned Owl, 1 (observed in late afternoon in "Beesley" swamp, by two hunters who know the species well); Hairy Woodpecker, 3; Downy Woodpecker, 11; Blue Jay, 130+; Black-capped Chickadee, 45; White-breasted Nuthatch, 16; Red-breasted Nuthatch, 33; Golden-crowned Kinglet, 10; Common Starling, 110+; English Sparrow, 275+; Rusty Blackbird, 1 (vigorous male); Common Purple Finch, 12; Pine Grosbeak, 2 (Hilliard Swamp); Common Redpoll, 210+; Pine Siskin, 275±; American Goldfinch, 25; Slate-coloured Junco, 17; Tree Sparrow, 32; Song Sparrow, 5. Total, 26 species, 1308+ individuals.

Other recent observations of interest: Great Blue Heron, 1 (about Dec. 22); Sharp-shinned Hawk, 1 (Dec. 30); Bald Eagle, 1 (mature bird Puslinch Lake, Nov. 7); Mourning Dove, 1 (Dec. 31); American Screech Owl, 1 (Dec. 25); Belted Kingfisher, 1 (shortly before Dec. 29); Pileated Woodpecker, 1 (Dec. 28 and 30); American Crow, 1 or more (about Dec. 18); Brown Creeper, 3 (Dec. 30); American Robin, 1 (about Dec. 15); Cedar Waxwing, about a dozen (late in Dec. or early in Jan.); Bronzed Grackle, 1 (Dec. 1); Snow Bunting (casual reports of small flocks since early December).—Observers: A. Bain, R. A. Boothby, F. W. R. Dickson, G. W. Knechtel, F. H. Montgomery, C. B. Price, K. Robbins, Miss D. Russell, F. A. Shantz, Miss V. Snyder, and eight public school senior boys. — F. H. BENDER, *Secretary*, Kitchener-Waterloo Naturalists' Club.

WOODSTOCK, ONT.—December 26; 9 a.m. to 6 p.m. Fair, wind south-west, 3 in. snow, with heavy ice crust, temp. 25° at 9 a.m., rising slightly later. Eleven observers, in two parties, along Cedar Creek, hardwood areas and cedar swamp around Hodges' Pond and Sweaburg. Distance travelled: 5 miles by automobile, 9 miles on foot. Great Blue Heron, 1 (seen several times); Black Duck, 2; Cooper's Hawk, 1; American Rough-legged Hawk, 1; Common (Ring-necked) Pheasant, 9; Herring Gull, 2; Great Horned Owl, 1; Blue Jay, 5; American Crow, 100+; Black-capped Chickadee, 50+; Cedar Waxwing, 1; Common Starling, uncounted; English Sparrow, uncounted; Pine Siskin, 40; American Goldfinch, 2; Slate-coloured Junco, 10; Tree Sparrow, 6; Song Sparrow, 9. Total, 18 species, 240+ individuals. Dec. 25, a flock of Snow Buntings, 150+; Dec. 27, Hairy Woodpecker, 1, and Mourning Dove, 1.—Observers: E. Dutton, C. Cooke, G. L. Nutt, E. Long, J. Woodham, T. Best, S. Best, E. Farmer, Mrs. Illbury, Misses F. Jones and D. Best.—H. MILNES, for *Woodstock Naturalist Society*.

LONDON, ONT. (VICINITY OF).—December 18; daylight until dark. 14 observers in 6 parties. Great Blue Heron, 2; Black Duck, 19; American Golden-eye, 32; American Common Merganser, 31; Sharp-shinned Hawk, 1; Red-tailed Hawk, 2; American Rough-legged Hawk, 2; Bald Eagle, 1; American Sparrow Hawk, 1; Bob-white, 14 (1 covey); Common (Ring-necked) Pheasant, 9; Herring Gull, 75; Mourning Dove, 1; American Screech Owl, 1; Great Horned Owl, 2; Belted Kingfisher, 4; Red-headed Woodpecker, 6; Hairy Woodpecker, 5; Downy Woodpecker, 23; Blue Jay, 67; American Crow, 96; Black-capped Chickadee, 111; White-breasted Nuthatch, 34; Red-breasted Nuthatch, 15; Brown Creeper, 13; Golden-crowned Kinglet, 6; Northern Shrike, 1; Common Starling, 281;

English Sparrow, not counted; Cardinal, 32; Common Purple Finch, 9; Redpolled Linnet, 325; Pine Siskin, 24; American Goldfinch, 19; Slate-coloured Junco, 87; Tree Sparrow, 82; Song Sparrow, 11; Snow Bunting, 4. Total, 38 species, 1448 individuals, plus English Sparrows.

In many ways, despite several decidedly cold "snaps", the winter of 1937-38 has proven rather remarkable, ornithologically. After a week of sub-zero weather, a Killdeer Plover was found and taken, along the Thames River, on December 17 — the first winter record for this species in Middlesex County, although this bird is regularly found in winter not many miles to the south of our borders. Next in the list of unusual occurrences were four Eastern Bluebirds, found on December 17, a few miles west of London, and, on the same date, in the same place, two Swamp Sparrows. The former were discovered feeding on the ground where several horses had pushed aside the snow in search of food, thus leaving scattered patches of ground clear of snow. The Sparrows were not located together, one being found frequenting a frozen stretch of reeds and rushes that in summer harbours several pairs of this species. The second Swamp Sparrow noted was selected from a flock of Tree Sparrows feeding along a stretch of ground left bared of snow by a small stream of water.

Other recent bird records of interest include: Ruffed Grouse (Dec 12), Winter Wren (Dec 12), Northern Flicker (Dec. 15), Snowy Owl (Dec. 25); American Robin (Dec. 23 and 25), Pine Grosbeak (Dec. 26), Marsh Hawk (2 on Dec. 27), Evening Grosbeak (Dec. 27).

The census, in itself, presents little of special interest, although the number of wintering Red-breasted Nuthatches is noteworthy. To many the number of Cardinals here recorded may seem rather high, when one takes into account the fact that this species was unrecorded in this county 40 years ago. Late in any afternoon last winter, however, the writer could count nearly 60 Cardinals as they made their way to a roost near London, and a survey of four such gatherings early this spring (1937) netted a total of nearly 180 birds. — McILWRAITH ORNITHOLOGICAL CLUB, per KEITH REYNOLDS, *Chairman Census Committee.*

MEAFORD, ONT.—December 28; visibility good, temp. about 40°, 8 observers, visiting the shore line at Meaford and one mile and a half eastward. American Golden-eye, 18; American Common Merganser, 3; Ruffed Grouse, 4; Common (Ring-necked) Pheasant, 1; Gulls (mostly Herring Gulls, but including also a few Ring-billed Gulls), 122; Great Horned Owl, 1; Hairy Woodpecker, 3; Downy Woodpecker, 2; Blue Jay, 6; Black-capped Chickadee, 110; White-breasted Nuthatch, 12; Brown Creeper, 2; Common Starling, 9; House Sparrow, 19; Common Purple Finch, 1; Pine Grosbeak, 1; Common Redpoll, 25; Tree Sparrow, 1; Snow Bunting, 200. Total, 20 species, 540 individuals. Other species reported commonly during Christmas week are: Snowy Owl, Pileated Woodpecker, Red-breasted Nuthatch. — L. H. BEAMER for *Meaford Natural History Club.*

BRANDON, MAN. — December 22. Common (Ring-necked) Pheasant, 2; Hairy Woodpecker, 1; Downy Woodpecker, 2; Canada Jay, 3; Blue Jay, 7; Chickadee (sp. ?), 5; White-breasted Nuthatch, 3; American Robin, 1; Bohemian Waxwing, 9; Evening Grosbeak, 3; Redpoll (sp. ?), 5. Total, 11 species, 41 individuals.— (MISS) G. I. TODD.

CAMROSE, ALTA.—December 29; 10 a.m to 4.30 p.m. (dusk). Clear and cold, windy, 10 in. of snow on ground, temp. all day 15°. By train to Battle River, six miles south of Camrose, then on foot through spruce woods east and west from bridge, a total of six miles. Ruffed Grouse, 2; Sharp-tailed Grouse, 1; Gray Partridge, 10; Snowy Owl, 1; Hairy Woodpecker, 2; Downy Woodpecker, 2; Arctic Three-toed Woodpecker, 2; Canada Jay, 2; Blue Jay, 1; Magpie, 5; Black-capped Chickadee, 25; Brown-headed Chickadee, 3; Bohemian Waxwing, 10; Pine Grosbeak, 50. Total, 14 species, about 116 individuals, excluding House Sparrows.

The most outstanding event in the winter bird-life of this part of Alberta this year is the unprecedented invasion of Canada Jays into the settled parts of the parkland country. They have taken up residence on many farms and seem to be quite at home and are able to procure satisfactory food around the buildings. These wanderers have been reported from as far south as Donalda, 30 miles south of Camrose. Some have fed in Camrose at feeding stations provided for Chickadees and Woodpeckers. No reason can be given for the wide-spread invasion from their usual haunts, the spruce and tamarack muskegs. Red-breasted Nuthatches are winter-

ing in the spruces along the Battle River, but were not encountered when taking the census. From 20 to 25 Rusty Blackbirds are spending the winter on a farm at the south end of Dried Meat Lake, about 20 miles south of Camrose. — EDWARD ENGSTROM and F. L. FARLEY.

EDMONTON, ALTA.—January 2, 1938. Sky partly overcast, light north-west wind, temp. 25°. 7 miles on foot along North Saskatchewan River and White Mud Creek and back along the top of the bank. Downy Woodpecker, 1; Canada Jay, 2; Blue Jay, 6; American Magpie, 3; Long-tailed Chickadee, 12; Brown-headed Chickadee, 12; Bohemian Waxwing, 6; Evening Grosbeak, 11; Pine Grosbeak, 18; Common Redpoll, 16; White-winged Crossbill, 29. Total, 11 species, 116 individuals. —ALBERT L. WILK and HARMAN BURPPE.

VEDDER CROSSING, B. C.—December 26, 10.30 a.m. to 2 p.m. Sky mostly clear, but partly cloudy with snowflurries about 1.30 p.m., strong south-west wind, 20 in. snow on ground, temp. 36°-38°, following several days at about 20°. One observer, northwest shore of Cultus Lake, to Vedder Crossing by way of logging railway, returning by the main road, 6 miles on foot. Numbers greater than 15 are estimated. Mallard Duck, 2; Ring-necked Duck, 4 (one examined in the flesh); Lesser Scaup Duck, 2; American Golden-eye, 8; Barrow's Golden-eye, 6; Turkey Vulture, 1; Bald Eagle, 4; American Coot, 110; Glaucous-winged Gull, 30; Gulls (not further identified), 300; Red-shafted Flicker, 3; Hairy Woodpecker, 1; Downy Woodpecker, 4; Steller's Jay, 5; Raven, 1; American Crow*, 40; Black-capped Chickadee, 3; Brown Creeper, 1; American Dipper, 4; Winter Wren, 2; Bewick's Wren, 1; Varied Thrush, 10; Golden-crowned Kinglet, 80; Spotted Towhee, 15; Oregon Junco, 25; Song Sparrow, 12. Total, 25 species, about 674 individuals. — W. E. RICKER.

*I believe these are the same as the "Northwestern (Fish) Crow" listed in last year's census of Brooks and Pearse, being small and feeding on dead salmon along the river.

CRESCENT DISTRICT, SURREY MUNICIPALITY, B. C.—December 27, 9 a.m. to 12.30 p.m. and 2 p.m. to 4 p.m. Snowing in morning, changing to rain in afternoon, visibility poor, wind north-east, 4 in. snow on ground, temp. 30°. In the morning walking eastward through second-growth timber to Elgin and back to Crescent along the Elgin Road. In the afternoon from the south end of Crescent Beach along the shore line in a northerly direction to the end of Blackie's Spit, then east along the dyke to the Great Northern track, turning south to Crescent Station. Distance covered, about 10 miles. Two observers, together. Common Loon, 3; Horned Grebe (?), 6; Western Grebe, 1; Northwest Coast Heron, 4; Black Brant, 100; Mallard Duck, 8; Pintail, 1; Green-winged Teal, 2; Canvas-back, 1; American Golden-eye, 6; Buffle-head, 2; Surf Scoter, 12; Ducks (not further identified), 100; Marsh Hawk, 1; Pigeon Hawk, 1; Hawk (sp. ?), 1; Killdeer Plover, 2; Black-bellied Plover, 2; Sandpipers (not further identified), 1000; Short-billed Gull (?), 50; Red-shafted Flicker, 1; Gairdner's Woodpecker, 1; Western Crow, 42; Oregon Chickadee, 9; Western Winter Wren, 1; Seattle Wren, 1; Varied Thrush, 29; Kinglet (sp. ?), 25; Brewer's Blackbird, 7; Oregon Towhee, 10; Savannah Sparrow, 1; Slate-coloured Junco, 1; Oregon Junco, 25; Rusty Song Sparrow, 10. Total, 32 species, 1466 individuals. Subspecies determined geographically. Larger numbers estimated. American Robin seen December 28, when weather much milder. — MARTIN W. HOLDOM *and* MARY W. HOLDOM.

WILLIAM HERRIOT, BOTANIST

By H. GROH

Contribution No. 528 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

IT IS FITTING that those who have contributed from their obscurity to the sum total of our existing knowledge should share with others, more officially placed, in our grateful recognition of services rendered. It is already more than seven years since the passing of William Herriot, respected citizen of Galt, Ontario, keen and competent student of the natural history of his locality, and erstwhile member of the Ottawa Field-Naturalists' Club, to the present members of which organization these belated notes are offered.

As almost a fellow townsman of the late Mr. Herriot I might have come to know him personally, to participate in the pleasures of exploration of our adjoining townships; but before I even heard of him my absences from home had begun, and it is one of my real regrets that I never met him, and have to draw now, for some of my information, on an appreciation which appeared in the Eighteenth Annual Report of the Waterloo Historical Society, 1930.

Only for one brief period did Mr. Herriot engage in wider exploration, when "by government appointment, he accompanied Prof. Macoun on a three months' investigation to the Rockies and British Columbia". The fruits of this expedition are to be seen in the National Herbarium at Ottawa. Most of his botanizing was done in the vicinity of Galt, and papers based on this work appeared in the Ontario Natural Science Bulletin during the eight year span of its publication at Guelph.

They comprised the following titles:

Some New or Little Known Canadian Plants.

The Cyperaceae of the Vicinity of Galt, Ontario.

The Grasses of Galt, Ontario, and Vicinity.

The Ericaceae and Orchidaceae in the Vicinity of Galt, Ontario.

The Compositae of Galt, Ontario, and Vicinity.

The Rosaceae and Leguminosae of Galt Ontario, and Vicinity.

The Crowfoot and Poppy Families and their Allies around Galt.

To the reports of the Waterloo Historical Society, of which he was a member, papers were contributed on "Trees of Waterloo County" and "Aboriginal Agriculture in South Western Ontario."

The Ottawa Naturalist, for a period around 1908, was favoured with a number of notes, ornithological as well as botanical, indicating, what is known of him, that his interest included the fauna, butterflies, etc., of his field. In the March, 1916, issue of *The Naturalist*, a valuable paper "Data on Seed Maturity of Some Ontario Plants", reports a piece of work done at the instance of the Seed Branch, Ottawa.

"Born in Galt, February 21st, 1870, Mr. Herriot served his apprenticeship in the machine shops of Messrs. Goldie and McCulloch. There he became an expert workman and won the respect and confidence of the firm which he served for forty-five years". His botany was therefore the labour of love of his spare hours. It is said of him that he was a born naturalist with whom it was a rare pleasure to tramp the woods. His quick eye detected anything out of the ordinary, and enabled him to add not a few records to the Canadian flora, along with a most creditable volume of regular plant survey.

The death of Mr. Herriot on October 10th, 1930, followed two years of rather poor health, but was the immediate result of a paralytic stroke. He was survived by his wife and two daughters.

NOTES AND OBSERVATIONS

A WOLF RECORD FROM THE WINNIPEG AREA. — On Saturday, 13th November, 1937, a large wolf was killed at Dacotah, Manitoba, twenty miles south-west of Winnipeg, Manitoba, by W. & J. Rasmussen. The animal was an extremely large male, weighing 92½ pounds and measuring 68 inches. It was a dark grey, almost black, and showed a silver tipping on the guard hairs. The Rasmussen brothers sighted the wolf on a stubble field and gave chase in their car. They wounded the animal with a shotgun fired at close range and then succeeded in running over it and killing it. Although coyotes are still seen occasionally in the Winnipeg district timber wolves have been practically unknown for many years.—BURT GRESHAM.

NOTE.—Wolves are so widely ranging that it is risky to make subspecific determinations without specimens. From the locality the specimen would likely belong to *Canis lupus nubilis*, the Buffalo Wolf of the prairies. — R. M. ANDERSON.

REVIEWS

THE MICROSCOPE, *by Simon Henry Gage, Sixteenth Edition. Comstock Publishing Company, Ithaca, New York, U.S.* $4.

There was a time, and not so long ago was it either, when the field man depended largely upon his rifle, his traps and his vasculum, but today he is growing to realize ever more clearly the necessity of calling the microscope to the aid of his eyes. The last ten years or so have seen great advances in microscopy; not only in the instruments themselves, but also, and more especially, in the technique of their use. To the man who uses his microscope only occasionally and for certain routine work, a textbook will often be a necessity, for on it he must rely for methods of preparation and examination outside his normal field. Dr. Gage's "The Microscope" has long been the standard text, and the appearance of the sixteenth edition (1936) marks another milestone on a long avenue of successes. Fully illustrated, clearly written and adequately indexed, thoroughly up-to-date with chapters on ultra-violet microscopy and micro-incineration, it leaves nothing to be desired as a standard reference book. The section on photomicrography and the bibliographical notes are particularly useful, and the final chapter, (historical) is of great interest.—D. L.

SNAKES ALIVE AND HOW THEY LIVE *by Clifford H. Pope. The Viking Press, 18 East 48th Street, New York,* $2.50.

This is without doubt the best of the recent popular books about snakes. Raymond L. Ditmars, a world authority on reptiles, says: "Here is a book that will long endure, as it should be a part of every reptile student's library and of interest to any one keen about natural history". Mr. Pope has not confined his attention to the snakes of the United States but ranges the world over in his search for interesting facts and new and valuable information. The numerous illustrations are not merely good pictures, — they actually *illustrate* and clarify the point under discussion. Many of the old myths and superstitions are exploded, let us hope, for the last time, but they die very hard. The chapters on the homing instinct and hibernation are of particular interest and recalled the occasion on which I saw a sluggish "tangle" of a hundred and thirteen rattlesnakes hibernating in a rock slide in the southern interior of British Columbia. They were uncovered by a steam-shovel during the construction of the Canadian National Railway. The technical matter, including a key to the species occurring in the United States, is appended to the end of the book. A recent letter from Mr. Pope leads me to hope that the next edition will extend this key to cover Canadian distributions also. Altogether a very fine book and decidedly one to own.—D. L.

BIRD PORTRAITS IN COLOR; *Text by Dr. Thomas Sadler Roberts; Illustrations by various artists. Published by the University of Minnesota Press, Minneapolis, Minn., U. S.* $3.50.

A belated review needs no apology; not only does it call to the book the attention of readers who missed it on its first appearance, it serves often enough to re-awaken a determination to "get a copy of that". This book is one that should appeal not only to the man interested in birds as such, but to all those who value and appreciate fine painting Here are shown in their authentic colouring nearly three hundred species of the birds of North America occurring east of the Rockies. The plates are large enough (6½ x 7½) to do the birds full justice and to give the artists room to work in, and the result is perhaps the most representative collection of the work of leading North American bird artists that has ever appeared. The list includes Allan Brooks, George Miksch Sutton, Walter Alois Weber, Francis Lee Jaques, John Walter Breckenridge, and there is even one plate by the late Louis Agassiz Fuertes. Each plate is faced with a full page of text by Dr. Roberts describing the birds, their range and individual characteristics. Its large size makes the book particularly useful in the schoolroom, its accuracy and artistic beauty will make it a treasured possession of every bird man wise enough to secure a copy.—D. L.

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The Canadian Field-Naturalist

VOL. LII OTTAWA, CANADA, MARCH, 1938 No. 3

A STUDY OF THE SNOWSHOE RABBIT

By STUART CRIDDLE
Treesbank, Manitoba

THE FOLLOWING ARTICLE, with some alterations and additions, is part of a report prepared for the Dominion Entomological Branch of the Department of Agriculture, Ottawa, which, besides the life history notes as given here, dealt with the economic importance and control of the rabbits. These studies are to be continued throughout the next cycle which started towards the end of April, 1936. The experiments on control are reserved for another paper.

Most of the wooded and semi-wooded parts of Canada are inhabited by different geographical races of hares which are closely related to the species *Lepus americanus* Erxleben. These hares are commonly known as snowshoe rabbits, varying hares or bush rabbits. The information given in this paper deals only with the geographical race *Lepus a. phaeonotus* Allan which is the common rabbit found in the deciduous and mixed forests of southern Manitoba.

The following data have been procured during part of my spare time which has been devoted to the study of the wild animals of the district over a number of years, but perhaps more especially with the snowshoe rabbits during the last great periodic cycle of their life history which started in 1923 and ended soon after the close of 1935.

I do not wish it to be thought that I consider the information given to be in any way complete, as it is realized that years of close study will have to be spent before we can hope to learn the finer details which govern the life habits of the rabbit when living under natural conditions. However, the table showing the actual birth rate, made through a study of pregnant females, is, I think, sufficient to show that there was no sudden increase or decrease in the number of litters or young brought forth at any time during the whole cycle given. In fact, it clearly shows that the birth rate of the individual rabbit remains the same during years of abundance and scarcity. The chart (p. 37) showing the relative yearly abundance of the rabbits in the district is approximately correct. It is hoped that these points, with those dealing with the life habits of the rabbit, will be of some little interest to our readers and a help to those who are making similar studies of this and other closely related races.

Acknowledgment of assistance is made to Dr. Arthur Gibson, Dominion Entomologist and Dr. R. D. Bird, Entomologist in Charge for Manitoba, who secured some financial aid for the advancement of the work during the winter of 1935-36 and gave other help during part of the study. As usual, all members of the Criddle family at Aweme gave valuable assistance. To one and all I wish to tender my grateful thanks.

Distribution

While the general distribution of the snowshoe rabbit in Canada is closely governed by the suitability of her forests, that of *phaeonotus* is restricted more closely to the mixed and deciduous forests, probably commencing in the southwest corner of Ontario, thence in a northwesterly direction across Manitoba into the adjoining parts of Saskatchewan. My Manitoba records for the race are: South Junction, Winnipeg, Belmont, Ninette, Wawanesa, Stockton, Treesbank, Aweme, Spruce Woods Forest Reserve, Brandon Hills and Kenton. Specimens from Sandilands Forest Reserve, Geysia and Riding Mountains are referred to as *L. a. americanus*. However, there is such a marked variation in the individuals of each race that it is impossible to define an exact boundary for either. It is thought that the most satisfactory boundary in Manitoba is that which more or less divides the coniferous and deciduous forests.

GENERAL CHARACTERISTICS

A rusty or greyish brown rabbit with large ears and feet, much smaller than the jack rabbit, seldom weighing more than four and a quarter pounds, while the jacks occasionally weigh over eleven pounds. Both are hares and turn white in early winter. Larger than the cottontail rabbit which remains greyish or greyish brown throughout the year and has much smaller ears and feet than those of the hares.

COLOUR

Summer.—The coloured phases of this race of rabbits are so varied that no attempt is made to enumerate them all here. Roughly speaking, they embrace the rusty and greyish browns, with an occasional specimen being lighter or darker than these colours would indicate. Seldom are two seen of the same shade. This has been found true of adults, young and foetus a day or so before birth. The colours are always darkest along the back and on top of the head. These dark colours become imperceptibly lighter as they recede down the sides until they meet the chaste white of the belly. There is an indistinct colour pattern on the face and upper parts of the body. This is often intensified by the dark guard hairs being separated in some places and drawn together in others. These indistinct patterns and the dull brownish colours harmonize to a marked degree with the rabbit's surroundings of decaying leaves, wood and the ever-changing shadows cast by the surrounding vegetation.

Winter.—The long guard hairs of the summer coat lose their dark colour and change to almost snow white late in the fall or early in the winter, the old rabbits making the change some weeks before the young of the year. In fact, the young born towards the middle of September do not turn fully white until late in December. The under fur retains its band of dark colour which varies from a yellowish buff to almost a blue grey. The ears are usually tipped with black and the front feet washed with brown. Early in spring the white guard hairs of the back break, or are rubbed, off, so that the dark colours of the under fur are exposed, thus making the rabbit harmonize more closely with its drab surroundings.

MEASUREMENTS

The average measurements given below were made from carefully selected rabbits which showed that they were fully mature and at least one year of age. They were taken soon after death and are of fifteen males and fifteen females, and the largest of each sex. Linear measurements are in millimetres

	Total Length	Tail Vertebrae	Hind Foot	Ear	Weight
Average male	472	41.77	124.65	82.12	
Average female	483	48	139	83.12	
Largest male	499	42	138	87	3 lbs. 10 oz.
Largest female	498	49	146	81	4 lbs. 1½ oz.

A mixed lot of 75, sex undetermined, weighed 231 pounds. These were killed during February and March, 1934, and the majority of them were young of the previous year and so were not fully grown.

RUNWAYS

Well-kept runways are, perhaps, of greater importance to the welfare of the snowshoe rabbit than is its protective colouring as by their aid the rabbits are able to dash through the thickest underbrush at great speed and so escape their fleetest enemies. Thus, we can understand the necessity for the intricate network of runs made and the importance of their being kept free of all obstructions. If we examine the runways in different woods we shall see a marked similarity in each. This might lead to the belief that the rabbits have come to adopt a plan which has proved most satisfactory after generations of experience. There are always several main runways which lead, more or less directly through the thickest parts of the wood. At short intervals cross runs connect these and form the whole into an intricate maze. Besides these, a well kept run follows closely round the edges of the wood or thicket. This enables the rabbits to double back and so get behind any predator which might be hunting them.

Summer work.—The amount of work required to keep the runways free of obstructions during the summer is very great. To do so the rabbits work for many hours each night and often during cloudy days. I have repeatedly watched rabbits cutting the vegetation from what had become overgrown runways. Everything which might interfere with them when running is cut off close to the ground, the rabbits moving slowly forward as the work proceeds. Short stops are made every few minutes when the rabbit sits up, looks about and listens. Seldom is as much as fifty yards cleared before the rabbit takes alarm, usually at some imaginary danger and scuttles away to cover where it will remain for some time, to either return to its work or dash off to some other part of the wood where work is waiting to be done.

Winter work.—This commences with the first fall of snow and for some time consists of keeping the snow packed firmly along the runways. It is most important, as, even with their large, snowshoe-like hind feet, they have no chance of escaping from a wolf, fox or lynx if once driven from their runways into the soft snow. It is quite interesting to watch rabbits packing the snow down. It appears as if they were hopping up and down in an aimless sort of way yet a slight advance is made at each hop. The work done in this way by a single rabbit is so good that it looks as though it might have been done by a dozen rabbits. During prolonged and heavy snow storms the rabbits work day and night in an effort to keep it packed down along their main runways. If the snow is deep and soft, the rabbits may dig or shove themselves through it, often tunnelling under leaning trees and overhanging brush which have partly held the snow up. When an opening has to be crossed the rabbits do so on the run, taking leaps of thirty or forty inches. In returning, they jump into the first tracks and so after a few crossings have firm places to land in and take off from.

As the snow deepens and the runways become built up, many overhanging branches and other obstructions have to be cut away or avoided and so the winter work continues until the spring thaws remove the snow and once again expose the summer runways for the rabbits to work upon.

Use of Holes

While the snowshoe rabbit does not dig holes in the ground, it makes full use of those made by other animals, if these are large enough for it to crawl into This is clearly shown by the runways which lead to them, by the worn appearance of their mouths and the amount of hair caught on projecting roots. However, their greatest value is only shown on those rare occasions when we have an almost snowless winter and the rabbits are abundant. The pure white of their winter coats then shows up in clear relief against their dark surroundings. A few of the rabbits which have procured holes may be partly concealed in their mouths, but the majority will be fully exposed to view, sitting well out on the earth which has been thrown from the hole. If we approach one of these rabbits it will bound away along a runway, but should a hawk be seen approaching the rabbit will back into the hole or even dash down head first if suddenly alarmed.

During winters when the snow is deep the rabbits dig holes into it. Such holes are usually found among tangled scrub which has partly held the snow up. In such places there may be several holes connected by passages beneath the snow. Holes are also dug into snow banks and under leaning trees. If we examine such holes we find that there are well worn forms at their entrances, but that there are no signs of the rabbits' having made any prolonged stay beneath the snow or at the lower end of the hole.

Snowshoe rabbits seldom take refuge in holes when pursued by dogs or wolves and will only do so when other means of escape are practically impossible. This has led us to conclude that their chief value to rabbits is that they afford safe retreats when danger is threatened from birds of prey.

Sexual Activities

The sexual development of the male snowshoe rabbit usually becomes noticeable by the middle of March and mating takes place two or three weeks later. This depends somewhat on the weather. The melting of the snow which take place during warm, dry springs, exposes an abundance of more succulent food which may advance the mating period by as much as two weeks, while a late, cold, damp spring often retards it by nearly as much.

Pre-mating activities are quite pronounced, although the term, "as mad as a March hare", cannot be applied to the snowshoe rabbit with the same amount of truth as it can to the European hare or our Jack rabbit. However, the snowshoe rabbit does go through some strange antics. It is a common sight when the rabbits are abundant to see several males following a female, drumming and chasing one another in rather a fantastic manner. On one occasion I had nine rabbits pass sedately within a few feet of me doing their rather queer-looking kick hop, that is, kicking the ground resounding blows, drumming at each rather high jump. It was thought that this strange procession was made up of eight males following a rather large female but this was not verified.

Drumming is done by both sexes and may have different meanings. It is heard most often during the mating season, so may be done at that time for the purpose of attracting mates. If so, it may be of some value to the species especially when they are rare and widely scattered, as the strange thump, thump, thump, can be heard at a considerable distance on a

favorable night. Both sexes often give a few drumming hops as they dash from cover and the female repeatedly does so to attract enemies away from her young. Males do it as a warning or threat to other males and it is often done before a fight and by the victor when the fight is over.

Fighting seems to be a matter of the combatants' striving to deliver a smashing kick with their hind legs as they jump over their opponent who does his best to avoid the blow and deliver one himself. When a kick is fairly landed it can be heard fifty yards away and usually ends the fight. A good deal of squawking goes on during the fight which seldom lasts longer than a few seconds. I have never seen rabbits stand up to each other during a fight, nor have I seen any sign of their attempting to bite one another. Rabbits with torn ears, or other signs of having been bitten about the head, have not been recorded here and they must be extremely rare. Fighting seems to be only indulged in during the breeding season, and even then it seems to be a very harmless affair.

MOTHER AND YOUNG

The snowshoe doe is, in many respects, an ideal mother and like most mothers of the wild, will repeatedly risk her life in an effort to save that of her young. I have often had an anxious doe come bounding back and forth only a few feet from me, kicking the ground resounding, drumming blows in an endeavour to attract my attention to her and away from the young which I was examining. On one occasion a very excited mother rushed right at me when one of her babies, which I was handling, screamed with fright. I have often seen our dog led away from the vicinity of young and have no doubt coyotes and other predators are led off in a like manner.

Considering the severe climatic conditions under which the young are born, especially in early spring, we might expect the snowshoe rabbit to prepare a well-made nest for her young but the most she does is to make a shallow, saucer-shaped depression, in the dead leaves beneath a fallen or leaning tree or even among some tangled scrub which affords little or no protection from above. The reason for this apparent neglect is found in the fact that the young are born with a thick coat of fairly long, fluffy hair which provides them with sufficient warmth even when covered by snow and the temperature near to, or even, below zero. Then, also, the young usually leave the place of birth when only a few days of age to scatter among the undergrowth where they are much safer than they would be if huddled together in a well-made nest for a prolonged time.

The young of the snowshoe rabbits, like those of all hares, are born in a high state of development. They are fully clothed in thick, fluffy hair and their eyes open soon after birth, though it is doubtful if they can see sufficiently well to identify any object until they are two or three days old. This is borne out by many close observations, of which the following is an example. Five young, found by Percy N. Criddle on the morning of June 8, 1933, were only able to squirm about in a weak manner. On the second day they were just able to stand. Two of them were brought up and weighed 79.34 grams and 64.95 grams respectively. The third day they were much firmer on their feet but made no attempt to walk. They showed no objection to being handled and when placed back in their depression snuggled down together. At this stage they showed no sign of being able to distinguish objects by sight. When the place was visited late on the fourth day they had gone. A close search in the surrounding scrub failed to reveal any of them or their mother who was usually seen close around. We are unable to say how they left or were removed but evidence pointed to their having been found by some predator.

NATURAL INCREASE

An attempt to find out the natural increase of the snowshoe rabbit through a study of pregnant females, was started in 1923. During the thirteen years this work has been carried on we were able to procure a few records each year. Those for April, May and June are perhaps sufficient to give us a fairly accurate conception of the rate of increase which does take place during those months, but the other three, July, August and September, hold far too many blanks for any conclusion to be arrived at other than that the rabbits do continue breeding well on towards the end of September and perhaps occasionally into October, as young not half-gown and still partly in their juvenile pelage have been taken well on towards the middle of December.

While these records do not perhaps give relative monthly increases, they do show that as long as the rabbits are in a normal state of good health, the birth rate remains the same through the years of scarcity as in those of great-

SNOWSHOE RABBIT
BREEDING RECORD CHART

Year	April		May		June		July		August		September		Remarks
	Female	Embryos	Female	Embryos	Female	Embryos	Female	Embryos	Female	Embryos	Female	Embryos	
1923	1 3 1	1 6 3	3 9 4	3 18 12	Rabbits rare by August.			End of cycle. Drop from abundance very sudden.					April 14. — 5 females all about to have young. Embryos fully developed.
1924	2 1	4 3	1 1	4 5	**1**	**4**	1	5 Start of cycle.					April 17. — A female with two small embryos.
1925	1 4 6 1	1 8 18 4	2 1	8 5	1	4	1	4	1	4			April 2.—1st pregnant female. April 23.— 2 females with embryos fully deveoped.
1926	5 6 1	10 18 4	2 1 3 1	6 4 15 6	1 1 4	3 4 20							April 14.—2 pregnant females with embryos well developed.
1927	1	3	1 1	4 5	1 1 1	4 5 6	1	5			1	3	April 14. — 1st embryos. Last breeding record September 23.
1928	1	3	1 1	3 4	1 1	4 5	1	4					April 28.—1st pregnant female, embryos well developed.
1929	2	6	1	5	1	4							April 23. — Embryos fully developed.
1930	1 1	2 3	1 1	4 5	1	5	1	4					April 23.—2 females with well developed embryos.
1931	2	6	1 1	4 5	1	4			1	3			April 19.—2 females with embryos well developed.
1932	4 2	8 6	2 1	8* 5	**5**	5	1	4	1	4			April 3.—1st pregnant female.
1933	1 2 2	1 4 6	1 1 1	3 4 8**	3 3	12 15	1 4	2 16	1 1	3 4			April 4.—1st pregnant female. June 8. - P. N. Criddle found 5 young.
1934	2 1	4 3	1 1 2 1 1	3 4 10 7*** 8***	1	4					1	4	April 4.—1st pregnant female. April 26.— 2 young a few days old. May 24. - young nearly half grown.
1935	2	6	1 1	4 5	End of cycle of abundance								December 31—Rabbits quite rare. Reached their lowest point in April, 1936.
13 years	56	141	51	194	24	108	11	44	5	18	2	7	

* Shot May 26.
** Shot May 31.
*** Shot May 15.

Total females—149
Total embryos—512

est abundance. There is nothing to indicate that there is a decline in the birth rate during years of scarcity or anything to prove it is accelerated as they approach and reach their greatest abundance

There are several important reasons for a much greater number of records being made during the early months of the breeding season than for the later ones, the most important of which is, a limited amount of time for collecting which becomes less as the season advances. This restricts the size of the area hunted over, and means that the number of rabbits within it become fewer as the season draws to a close. Besides these factors, the rabbits are much easier to see and, therefore, shoot before the vegetation is in leaf than when the plants are well grown and their leaves fully expanded. Lastly, harvesting starts in July and continues until the breeding season is over so that the few records made during August and September have been procured more by chance than by careful hunting. These reasons will at least partly explain the discrepancies which are shown in the list of monthly records.

We are unable to state definitely how many litters are brought forth during the breeding season. Our records would indicate that there are at least three, often four and occasionally five. Probably the age of the rabbit has some influence on the number and size of the litters. The two records for September were from fully adult females, probably two or three years of age.

CYCLE OF ABUNDANCE

In this study of the numerical yearly fluctuations of the snowshoe rabbits made during the last great periodic cycle, I have had the hundred acres of wood in which the studies have been carried on under fairly constant observation through the whole period The cycle has been rather unusual in some ways, more especially in its length, in the evenness of the yearly increase, and in there being no sudden increase or decrease in numbers during the whole cycle like those which are supposed to have occurred during earlier periods.

The figures given for the yearly number of rabbits per hundred acres are only approximately correct, as it was found impossible to make an exact count of them even when they were relatively rare so that the number of errors made when they were abundant may have been quite large. However, I am inclined to think that I rather over-estimated their numbers than under-estimated them.

The relative abundance of the rabbits from 1922 to 1936 is shown on the accompanying graph which has been made from the information as stated above. See page 37.

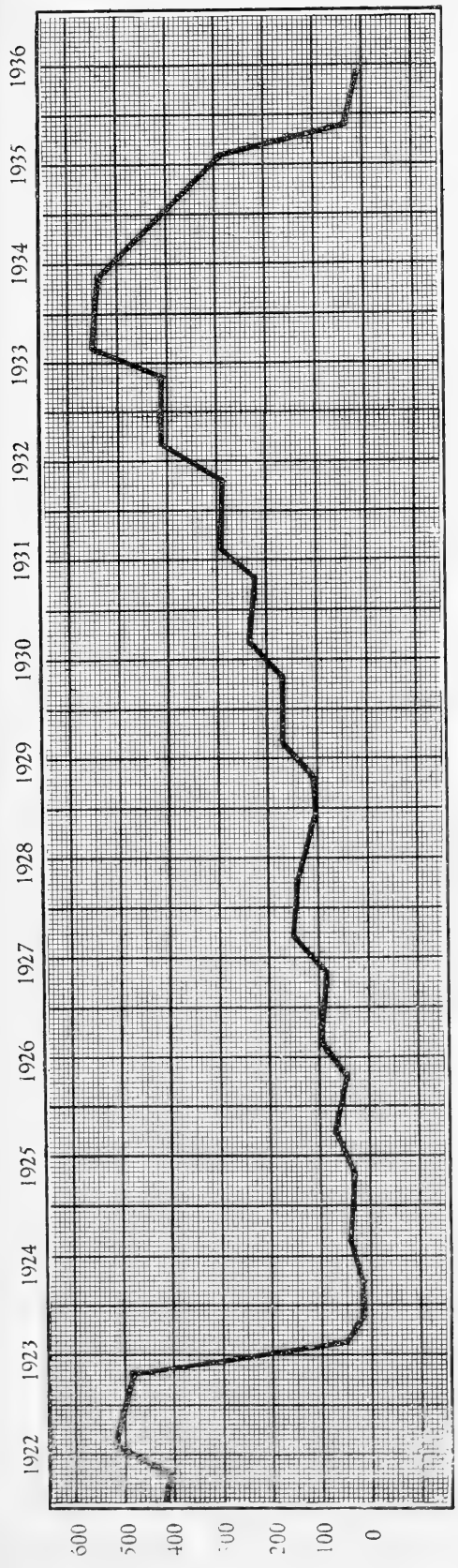
FOOD

The great variety of plants which are eaten by the snowshoe rabbit during the summer months are so different from their winter food of bark and twigs that it is thought advisable to treat the two seasons under separate headings, (1) summer food and (2) winter food. Summer food is that provided by growing vegetation and plants which remain green and are available until they become covered by snow. Winter food consists of bark, small branches, twigs and young shoots of many kinds of trees and shrubs.

(1) *Summer food.*—A full list of the different species of plants eaten by the snowshoe rabbit during the summer months would include most of those growing in the district. In fact, it would be hard to find a dozen that were not fed on at some time or another. Many are eaten only when in certain stages of growth, while others are fed on during the whole of their growing period. The blue grasses, *Poa* spp., are outstanding examples and in districts where the woods have been pastured for some years and the blue grass has become established it provides a large percentage of the rabbits' food. Brome, timothy and a host of other kinds of grasses are eaten quite largely. Growing oats, wheat and barley are eaten when sown in rabbit country and fall rye is greatly liked during early winter and spring. In fact it is keenly sought when well covered by snow.

Among the broad-leaved plants, the dandelion has of late years become a favourite in the spring, and when it can be had alfalfa is greatly appreciated. Clovers, vetches, peas and wild asters hold a strong place as food plants. Many kinds of garden vegetables are liked and eaten when opportunity affords. The plants mentioned above, with the host of others eaten to a lesser degree, furnish the rabbits with an ample supply of food during the summer even when they are in their greatest numbers.

(2) *Winter food.*—The number and variety of plants available for food during the winter are much more restricted than in summer. However, there is always a thick stand of young trees and shrubs which have grown up during the previous season. These provide the rabbits with an abundance of choice food during the years when they are in normal numbers and



only fail to do so when the rabbits are in their greatest abundance or the winter is unusually long.

Snowshoe rabbits show a decided preference for certain trees and shrubs. This is governed to some extent by the tree, or trees, which are most common to the district. Here, where the white poplar, *Populus tremuloides,* predominates, it seems to be preferred, with the bur oak, *Quercus macrocarpa*, a close second. In the mixed forests to the north the white spruce, *Picea canadensis,* is fed upon nearly as largely as poplar. Besides these, all other trees provide their share of food excepting the Manitoba maple, *Acer negundo,* which is seldom or never eaten.

When we examine the shrubs we notice that the rabbits show a decided preference for the hazelnut, *Corylus* sp., bog birch, *Betula glandulosa*, wolf willow, *Elcagnus argentea*, rose, *Rosa* spp., and all of the different kinds of willow, *Salix* spp., hawthorn, *Crataegus* spp., plum, *Prunus* spp., cherry, *Prunus* spp., and most of the lesser shrubs are eaten to a large extent. High-bush cranberry, *Viburnum opulus*, is seldom eaten and saskatoon, *Amelanchier alnifolia*, and snowberry, *Symphoricarpos*, only rarely.

Trees which are exceptionally rare, strangers in a district, are usually so severely and persistently cut back that they rarely manage to grow to maturity.

Strange foods.—During the winter of 1933-34 a horse died among some willows on the side of a road I was using daily. Soon after the horse became frozen rabbits commenced eating its ear and nose. In three nights the ear, a large hole in the head, and most of the nose were eaten, and tracks showed that more and more rabbits were coming to the horse each night. The horse was removed on the fourth day so I am unable to say how much of it would have been eaten if it had been allowed to remain where it was for the rest of the winter and had not been found by coyotes or dogs. A ruffed grouse put in one of my poison stations was eaten in a few days during the same winter. Deer antlers and bones have been found partly eaten by rabbits and leather straps and old boots will be gnawed when opportunity offers.

MIGRATION

To what extent snowshoe rabbits migrate is not known but from general observations it

has been noticed that there are two distinct periods when migration takes place. The first of these commences towards the middle of February and continues until the first week in April. This migration is probably brought about by the approach of the breeding season, although sexual development does not commence until a month later. The second period of migration is largely a matter of the rabbits' leaving the outlying bushes and thinner parts of large woods for those which will afford them better protection. It starts in October about the time the trees shed their leaves and, if the rabbits are abundant, continues well on into December. This depends somewhat on the season and depth of snow.

I have not been able to determine how far rabbits travel in a night or to what distance they may ultimately go during their migration. However, we have often seen tracks which showed that they go back and forth across the three to five miles of prairie dividing our woods from those along the Assiniboine River. In November, 1933, I found the tracks of seventeen rabbits which had crossed the large plain northwest of here in a wave. They had evidently travelled from eight to fifteen miles that night.

During the time when the rabbits are abundant a certain amount of migration takes place throughout the year but more especially during the winter months. This is caused by overcrowding and a lack in variety of food.

Home Radius

When living in dense woods or willow thickets rabbits may travel only a few hundred yards from a central point, but if the trees are sparse and the underbrush thin, they often have a home radius of a mile or more. This has been seen in the sand hills when the rabbits are white and the ground free of snow. By having one or two hunters following along the valleys, one will see from the hills the rabbits below running, stopping, standing bolt upright, listening, looking back and then dashing on again. In such places they follow the valleys for a mile or more before cutting across a ridge in an effort to circle back to their starting point. By their actions, one can see that they are well acquainted with the whole district travelled and that every runway is well known to them.

Dusting

Rabbits, like most mammals and birds, like rolling, or dusting, in the sand. What the rabbits' object is in doing this, I am unable to say but there is no doubt that a good deal of old hair is rubbed off, and it may be of some value against ticks. Outside of these objects there is the probability that it is done for the pure joy it affords.

Swimming

Snowshoe rabbits, like all hares, are good swimmers and can travel quite long distances in water. There is not much water for them to swim in here but along the Assiniboine River they often swim back and forth from the main land to islands well out in the stream.

Predators: Today and Yesterday

In the past many species of predators were in sufficient numbers to influence the life cycles of the snowshoe rabbit to a much greater extent than they do today. They increased and decreased with the rabbits, and caused the fluctuations to be much more severe than anything shown on the chart given for the last cycle. Today many of the predators that were rare fifty years ago, "yesterday", are now extinct in the district while others that were then common are now rare, so rare indeed, that the only time when their influence has any effect on the rabbit population is when the rabbits are rare. This was noticed quite clearly during the latter part of one winter: February and March, 1936. Eight or ten wolves, coyotes, and several large horned owls were in the district, evidently having a hard time finding sufficient food for their daily requirements. Owls were seen hunting early and late, and coyotes' tracks showed that they were searching the woods very thoroughly in the hope of finding a rabbit or so. Their search was so thorough that by April there were not more than two or three rabbits left in our woods. In the denser woods and willow thickets they managed to survive in larger numbers. While the rabbits are relatively safe in such thickets today, they were not so when the lynx, martin and other predators were common and most of them on the verge of starvation. Their search for rabbits must have been terrific then and the wonder is that sufficient survived to carry on the race.

Disease: Ticks and Cysts

No scientific study of rabbit diseases has been possible, or attempted here, although diseased rabbits have been found on a number of occasions; these have been opened up and investigations made. The most striking instance

of disease was that which occurred in 1923. It reduced the rabbits from almost the peak of their abundance to great scarcity in a few months. During April and May some forty rabbits were examined. All showed marked signs of internal disease of the liver and lower intestines in different stages of development. The diseased parts were dark and appeared to be highly inflamed. Those in which the diesase was far advanced had an unpleasant, rotten appearance inside and were very thin. It was evident that the rabbits lived for several weeks after catching the disease, as many of the females brought forth their young which evidently survived them. All the rabbits killed by us later on, or in October and November, were young of the year in perfect health, and from close observations it appeared as though all the adults had been killed by the disease.

Ticks and tapeworm cysts were recorded during the cycle as follows:

1923—ticks severe and cysts common
1924—ticks and cysts below normal
1925—ticks and cysts rare
1926—ticks and cysts below normal
1927—ticks severe, especially on young, and cysts fairly common
1928—ticks and cysts common
1929—ticks and cysts rather severe
1930—ticks and cysts rare
1931—ticks and cysts rare
1932—ticks and cysts rare
1933—ticks and cysts very rare
1934—ticks and cysts rare
1935—ticks and cysts below normal

SUMMARY

The experiments and observations made at Aweme, Manitoba, during the last fourteen years have enabled us to gain a much better understanding of the life habits of the snowshoe rabbit than was possible before. This is especially true of those habits relating to their natural increase, resulting from the study of 149 pregnant females collected through the breeding seasons of a complete cycle of their life history. These observations were made in a suitable wood in which I was able to check the actual yearly increase which took place during the whole period. This showed that while the birth rate was constant through the whole cycle, it may have little influence on the actual increase which takes place due to the fact that disease, ticks, and to a lesser degree, predators often kill a much larger percentage of young during certain years than they do in others, so that an expected increase which has been indicated by early breeding records may be turned into a decided decrease by these causes before the winter sets in.

Very little was known about these questions when the work was started. Since then, some excellent work has been done with rabbits kept in captivity. However, observations made under such conditions do not always agree with those made with the same animals living under natural conditions in the wilds. For example, Mr. W. B. Granger in his capable article published in the Journal of Mammalogy, Vol. 13, No. 1, 1932, found that the gestation period was approximately 36 days and that the young were suckled from six weeks to two months. My breeding records would lead us to the belief that the gestation period was not more than thirty days and that the mother seldom suckles her young for as long as three weeks. This is borne out by the fact that the young become widely separated soon after leaving the place of their birth, eat green food when very young, and that we have often watched them feeding about our grounds when not more than two weeks old without their mothers being seen anywhere within their vicinity. This has led us to the belief that the young snowshoes are well able to take care of themselves when not more than three weeks old and that they can probably do so when less than two weeks of age.

The old fallacy, or belief, that the great increase which takes place in the snowshoe population just preceding and during the years of greatest abundance was brought about by there being a sudden increase in the number of young born at a time, and in there being a greater number of litters during the seasons of abundance than there were when the rabbits were scarce, has been proven to be erroneous here. This is shown by the table giving the number of embryos carried by pregnant females during the months and years of the last cycle. The great increase which does take place is brought about through there being a greater number of rabbits to breed and the absence of ticks and disease. We can well understand that when there are only six rabbits to one hundred acres their increase of perhaps twenty mature young would only be noticed by an expert, while when there are a hundred or more in the same area the increase from them is such that the most casual observer would notice it.

The work of recording the number of rabbits killed, the examination of females during the breeding season, the increase and decrease which may take place from year to year with the study of the general habits of the snowshoe rabbits is being continued with that of other mammals occurring in the district. It is hoped that by these records we shall eventually be able to foretell the years when they will be abundant and those when they will be rare. These, with other data which are being collected about each species, may, we hope, prove of some biological value in years to come.

COLD-BLOODED VERTEBRATES OF GRIPPEN LAKE, LEEDS COUNTY, ONTARIO

By G. C. TONER AND W. E. EDWARDS

THROUGHOUT Ontario are lakes that are heavily overfished at the present time. The increase in the number of anglers and the resulting decrease in the catch for the time expended have brought to the fore the question of maintaining the fishing in them. Means must be found to stop this constant drain, either by increasing the yield or by decreasing the number of anglers. The last named could be regulated by legislative action but other means must be found to change the yield. Various methods have been suggested but, whatever these may be, an inventory of the number of species present is of prime importance.

In 1934 the authors were asked to report on the fishes of Grippen Lake, Leeds County, Ontario. Several days were spent on the lake at various seasons each year between 1934 and 1938. In the course of the survey other forms in addition to the fishes were collected and recorded. The reptile and amphibian records are included in this paper but the birds and mammals must wait until further field work has been done.

Grippen Lake is moderate in depth, largely spring fed and with very clear, cold water. The chemical and physical features, the plants and invertebrate animals are unknown and until these are investigated only a provisional stocking policy should be formulated. In the past this lake was noted for its good angling and even now good catches are made but considerably more fishing effort is needed for comparable results.

The main axis of the lake is northeast and southwest, nearly two miles in length and the greatest width is about three quarters of a mile. Topographic survey maps were used to estimate the size and gave a total area of 1.4 square miles.

The deep basin of the north end of the lake follows the shore contour rather closely. Between the shore and the basin is a wide shelf the outer edge of which drops from ten to sixty-five feet very rapidly. The depth at the south end of the lake is rather less, not over forty-five feet in the deepest portion and averaging much less. It is estimated that eighty per cent of the lake is over forty feet deep and only ten per cent is less than ten feet deep.

Fringing the north and west shores of the lake are gravel hills, the remains of a glacial moraine. Springs from these hills are the main source of the water entering the lake for only three streams flow into its basin, one at the north end and the other two at the southwest corner. The outlet, Grippen Creek, flows into Long Point Bay of the Furnace Waters of the Gananoque River.

The north shore is sandy, the east and west are rocky, while the south end contains extensive areas of fairly shallow water. In the shallows around the shores, except where there are sand beaches or rocks, *Typha* is the predominant plant, with *Scirpus* occurring in beds along the west and south shores.

The so-called forage fishes, suckers, cyprinids and darters, are almost entirely lacking in Grippen Lake. Over thirty species of these fishes have been recorded from Leeds County,* but only *Hyborhynchus notatus*, one of the cyprinids, was found during the survey. Possibly, their place in the economy of the lake is taken by the killifish, *Fundulus diaphanus*, and the brook silverside, *Labidesthes sicculus*. These occur in great numbers and while no food studies were made they are the

*Toner, G. C. Preliminary studies on the fishes of Eastern Ontario. Bull. East. Ont. F. & G. Pro. Assn. 1937, Vol. 2, Supp. 2:1-24.

only source available in sufficient amount. Considering the number of game fishes taken each year the food value of both species must be high. Further studies on this important problem are necessary.

The authors wish to thank W. Slack of Montreal and C. L. Gordon of Kingston for assistance and information while making the survey. Prof. J. R. Dymond and E. B. S. Logier of the Royal Ontario Museum of Zoology gave invaluable help in confirming identifications. Among others who helped in many ways were Ray Sweet and Wilmer Tye. The work was done at the request of the Grippen Lake Fish and Game Protective Association.

1. HERRING. *Leucichthys artedi* (Le Sueur). —These fish were taken by E. O. Ebersole during the course of the Department Survey in 1932. We were unable to obtain specimens and the subspecies present is unknown.

2. BROWN TROUT. *Salmo trutta* Linnaeus. —Residents told us that brown trout had been planted but we could find no verification of this either in the literature or by the taking of specimens.

3. BROOK TROUT. *Salvelinus fontinalis* (Mitchill). — We were told by one of the cottagers that he took a brook trout from the small spring creek near the north end of the lake.

4. LAKE TROUT. *Cristivomer namaycush* (Walbaum). — The Game and Fisheries Department made a plant in 1924 of 10,000 fry but is was evidently a failure as none have been taken since.

5. BLUNT-NOSED MINNOW. *Hyborhynchus notatus* (Rafinesque). — This cyprinid was the only one we could find despite the fact that numerous seine hauls were made at various times by both authors. This minnow was very common on the stony beaches at the east side of the lake where it was usually found hiding among the boulders. Our specimens were identified by Prof. J. R. Dymond.

6. BROWN BULLHEAD. *Ameiurus nebulosus.* (Le Sueur). — The brown bullhead was found to be common all over the shallow portions of the lake. Seine hauls in July along the sandy beaches yielded numbers of fingerlings.

7. YELLOW BULLHEAD. *Ameiurus natalis* (Le Sueur). — The yellow bullhead was present in fair numbers but few fingerlings were taken in the seine hauls. Nearly all our specimens came from the hoop net sets on the slope of the deep basin of the north end. The residents do not distinguish between the two species of *Ameiurus.*

8. MUD PIKE. *Esox vermiculatus* (Le Sueur). — This little pike was found to be common in the inlet brooks and appeared to be the only fish that occurred regularly in these streams.

9. COMMON PIKE. *Esox lucius* Linnaeus. — This pike is an important angler's fish in Grippen Lake and many are taken each year.

10. EEL. *Anguilla bostoniensis* Le Sueur. — Eels are sometimes taken by the anglers but are not very common.

11. KILLIFISH. *Fundulus diaphanus* (Le Sueur). — We found the killifish very abundant on both sand and rock beaches. They seem to prefer water a few inches in depth and in this lake find conditions very much to their liking.

12. PERCH. *Perca flavescens* Mitchill. — We found the perch to be very abundant in the shallows at the north end of the lake and also took it in fair numbers in the gill nets. It grows to a large size here and would be caught more frequently if there were not so many game fish in the lake.

13. PIKE-PERCH. *Stizostedion vitreum* (Mitchill). — Pike-perch were reported to us by the anglers but we were unable to find them during the survey.

14. SMALL-MOUTH BLACK BASS. *Micropterus dolomieu* Lacepede. — The small-mouth black bass is very common in the lake and the stock has been kept up by frequent plants made by the Department. Seine hauls made in late July over the beaches yielded numbers of fingerlings that varied in length from one to two inches.

15. LARGE-MOUTH BLACK BASS. *Aplites salmoides* (Lacepede). — The large mouth black bass is common and frequently taken by the anglers. Young of the year were plentiful over the beaches in late July.

16. BLUEGILL. *Helioperca macrochira* (Rafinesque). — Bluegills were taken in moderate numbers during the survey.

17. COMMON SUNFISH. *Eupomotis gibbosus* (Linnaeus). — The common sunfish was found to be very abundant. Like the other Centrarchidae it is sought by the anglers as a panfish, for all of these grow to a large size in this lake and farmers will drive for miles to fish here using a long cane pole and baiting with worms.

18. ROCK BASS. *Ambloplites rupestris* (Rafinesque). — The rock bass grows very large in size and immense numbers are present. They seem to favour the slope of the shore shelf where they can range either into deep water or up into the shallows. Most of those taken during the survey came from the hoop net sets.

19. CRAPPIE. *Pomoxis sparoides* (Lacepede). — The crappie is eagerly sought by the angler as a panfish and as it is abundant many are taken each year.

20. BROOK SILVERSIDE. *Labidesthes sicculus* (Cope). — The brook silverside is the most common forage fish in the lake. In early September examination of the bottom at night showed these fish in great numbers particularly over the sand shoals at the north end. An examination of several areas with a flashlight disclosed from ten to twenty in each circle of the light.

21. LING. *Lota maculosa* (Le Sueur). — Ling were reported as present in great numbers. They are said to spawn on the gravel of the bays in the east shore. The Protective Association has asked the government to remove some of these during the spawning run.

AMPHIBIANS

1. MUD PUPPY. *Necturus maculosus* (Rafinesque). — The mud puppy may be present as we have records from Seeleys Bay, about three and a half miles west of the lake.

2. SPOTTED SALAMANDER. *Ambystoma maculatum* (Shaw). — The spotted salamander was taken by the senior author at Black Rapids, four miles east, near the Furnace Waters into which Grippen Creek empties. On April 21st, 1932, they were spawning in a woodland bog pool associated with wood frogs. Much ice still remained under the debris. Specimens secured at this pool were sent to the Royal Ontario Museum of Zoology.

3. JEFFERSON'S SALAMANDER. *Ambystoma jeffersonianum* (Green). — Jefferson's salamander was seen once near the lake concealed under a flat stone in the woods. It may be common but its secretive habits cause it to be overlooked.

4. AMERICAN TOAD. *Bufo americanus* Holbrook. — The toad is common about the lake. It may spawn along shore or in nearby ponds for very small transformed specimens were noted near the lake during our survey.

5. SPRING PEEPER. *Hyla crucifer* Wied. — The spring peeper is rather common in the vicinity of the lake.

6. TREE TOAD. *Hyla versicolor* (LeConte). — Specimens of the tree toad were sent to the Royal Ontario Museum from Black Rapids.

7. BULLFROG. *Rana catesbiana* Shaw. — The bullfrog is common in the lake. Comparatively few tadpoles were seen during the survey but adults could always be found around the shores. A few are taken each year by the campers.

8. GREEN FROG. *Rana clamitans* Latreille. — The green frog is very common and although tadpoles were not taken we have reason to believe that it spawns in the lake. Specimens from Black Rapids are in the Royal Ontario Museum

9. MEADOW FROG. *Rana pipiens* Schreber. — The meadow frog was found in numbers in the wet meadows near the inlet brooks and was taken in many other situations around the lake. The anglers sometimes use them for bait.

10. WOOD FROG. *Rana sylvatica* LeConte. — The wood frog is the most abundant amphibian of the region. On April 21, 1932, they were calling in a woodland pool near Black Rapids, associated with spotted salamanders. In one instance a wood frog was taken while clasping a salamander. The breeding chorus sounds very much like the quacking of ducks.

REPTILES

1. SMOOTH GREEN SNAKE. *Liopeltis vernalis* (Harlan). — This snake is rare in this region but the senior author noted one specimen at the south end of the lake.

2. PILOT BLACK SNAKE. *Elaphe obsoleta obsoleta* (Say). — The senior author has discussed the occurrence of the pilot snake in eastern Ontario.* It is rather common in the woods surrounding the lake. Specimens were given to us on two occasions by nearby residents.

3. MILK SNAKE. *Lampropeltis triangulum triangulum* (Lacepede). — The milk snake was noted at various times in the vicinity of the lake. A specimen from here is in the Museum of Zoology, University of Michigan.

4. WATER SNAKE. *Natrix sipedon sipedon* (Linnaeus). — The water snake, known locally as the black water snake, is abundant despite the constant persecution by the campers and others. In Grippen Creek they grow to an immense size.

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*Toner, G. C., Pilot black snake, ***Elaphe o. obsoleta***, in Ontario. *Copeia*, 1934:47.

5. RED-BELLIED SNAKE. *Storeria occipitomaculata* (Storer). — We did not take any specimens of the red-bellied snake but are including it on reports of residents who gave us good descriptions of it.

6. GARTER SNAKE. *Thamnophis sirtalis sirtalis* (Linnaeus). — This species is quite abundant all through the region.

7. SNAPPING TURTLE. *Chelydra serpentina* (Linnaeus). — Snapping turtles are common. In July, 1934, three small specimens were taken in the lake. They are often killed on the nearby roads while wandering away from the water.

8. PAINTED TURTLE. *Chrysemys belli marginata* (Agassiz). — This small turtle is common throughout the region.

NOTES ON INTRODUCED CAPERCAILZIE

By WILLIAM J. K. HARKNESS

February 6, 1937.

Dear Mr. Editor:

I have recently had my attention drawn to a notice of the release of eight Capercailzie in Ontario which has not been recorded. Although I have had this information at hand for some years, I have neglected to forward it to you.

I believe that it should be reported as it will doubtless be of interest to many people.

The Honourable Wallace Nesbitt is now dead. I have obtained permission from Mr. C. W. Beatty, 121 St. George Street, Toronto, to publish this extract from the Tadenac Club record book.

The Tadenac Club is on the Georgian Bay shore between Midland and Parry Sound, at about latitude 45°4′ N. and longitude 79°58′ W.

(Signed) WILLIAM J. K. HARKNESS.

Copy of entry for November 6, 1903, from The Tadenac Club Record Book:

"On this day were released eight capercailzie imported from Sweden consisting of five hens and three cocks. They were confined in large boxes during the voyage from Copenhagen which port they left about the 12th of October, arriving at the Club in good condition. The boxes were taken to the lagoon just East of Shanty Hollow and landed on the South side at about latitude 45°4′ N. and longitude 79°58′ W. The fastenings were then loosened and the party concealed themselves as well as possible and long strings were used to remove the coverings. On emerging one of the hens at once rocketed and took flight over the trees. The largest cock walked into the dense cover followed by one of the hens. The other three hens flew off in a moment through the trees. The remaining two cocks took each a short flight, one falling near the water, and thence running on into cover being apparently unable to use his wings through weakness, the other alighting at once and running into cover. An informal meeting of the Club being held it was decided that the birds should have a close season till the year 1909. (Nineteen hundred and nine). The party consisting of Drs. Davison and Walker and Messrs. Mitchell and Mickle had an excellent view of the birds. The hens are a good deal lighter in colour than the ruffed grouse and nearly twice as large. The breast is ash coloured and general appearance like the hen pheasant properly so called. The cocks are magnificent birds 8 to 11 pounds in weight, old birds weighing more than 11 lbs at times and are of a glossy purplish black colour about the head and upper parts assuming much the colour of the wild turkey about the lower parts, beak is grey with a yellowish skin about it on the upper mandible. W. S. G. Beatty having offered to bet that in the year 1909 no member of the Club will see any capercailzie upon the Club property and that neither in that nor in the following year will any member of the Club kill one while at the Club his bet is taken by W. Mickle the stakes being a case of Burgundy to be provided for the deer shooting party of 1910.

(*Copy of letter from Wallace Nesbitt, K.C.*)

WALLACE NESBITT, K.C.
801 DOMINION BANK BUILDING
TORONTO

May 9, 1929.

My dear Professor Harkness:

The Capercailzie apparently flew to the North Pole on the first occasion they were disturbed and were never seen again, and I think the other party to the bet never drew Mr. Mickle's attention to it, and now payment of the bet would be prohibited by law. At least, Sir Henry Drayton would think so.

Sincerely,
(signed) WALLACE NESBITT.

GEORGE FREDERICK DIPPIE

1873 - 1935

There died at Calgary, Alberta, on February 14th, 1935, a man whose good fortune it was to have been a pioneer in natural history collecting in Manitoba, Saskatchewan and Alberta.

Fred Dippie was born on September 3rd, 1873, at Scarborough, Yorkshire; he early came under the influence of the Scarborough naturalist, W. J. Clarke, and from him learned something of taxidermy, and a great deal of general natural history. Coming to Toronto with his parents in 1892, he found employment with Oliver Spanner and soon became a competent taxidermist under that able tutor. A knowledge of Canadian birds was quickly gained from field collecting and from the material passing through Mr. Spanner's establishment. In 1893, Fred Dippie collected birds and eggs at Reaburn, Manitoba, with short trips to Lake Manitoba, returning to Toronto on June 23rd. 1894 was spent at Toronto, with short collecting trips. During 1895 Fred Dippie was absent from Toronto from June 15th to September 18th, collecting in Alberta, principally at Blindman River, Buffalo Lake and Red Deer; returning to Calgary in August, he visited Banff, making important collections there of birds and small mammals.

May to October, 1896, were spent at Calgary, at the shack of his friend Fred Milner on the Blindman Rive , and at Burnt Lake near Red Deer. This was repeated in 1897. In 1898 collections were made at Rush Lake in Saskatchewan and at Banff, Alberta. At the latter place, special attention was paid to small mammals.

In 1899, collections were made at Banff. I have no record of 1900 but the summer was probably spent at Calgary. In 1901, Fred Dippie settled permanently at Calgary, forming a partnership with W. Grant Mackay under the name of Mackay and Dippie Ltd., Fur Dealers and Taxidermists. From this time on, there was little field collecting; the firm had a branch at Banff and here Fred Dippie spent most of his summers. In Calgary he was known as a successful business man but there were few who knew of his contributions to the natural history of the Canadian west.

Fred. Dippie was careful in all he did, his specimens were well prepared and his data accurate.—J. H. FLEMING.

NOTES AND OBSERVATIONS

BOTANICAL MEETING IN NOVA SCOTIA. — A joint meeting of the Botanical Society of America and the American Society of Plant Taxonomists was held at Acadia University, Wolfville, Nova Scotia, August 18-21, 1937.

Ideal weather favoured the carrying out of a programme which consisted largely of field excursions. Informal discussions and the care of plants presses occupied the evenings.

Registration was held during the afternoon of Wednesday, the 18th, and was followed by an inspection of the laboratories of the Biology Department. In the evening, Dr. F. W. Patterson, President of Acadia University, and the Honourable John A. MacDonald, Minister of Agriculture for the Province of Nova Scotia, welcomed the visitors to Acadia and to the province. Dr. E. W. Sinnott, President of the Botanical Society of America, and Dr. H. A. Gleason, President of the American Society of Plant Taxonomists, replied to the words of welcome and gave short botanical addresses. Following this formal meeting, interest centered about an interesting exhibit of about 125 species of fleshy fungi prepared by Mr. K. A. Harrison of the Dominion Experimental Station at Kentville.

On Thursday morning there was an excursion to the Dominion Experimental Station at Kentville. Dr. W. S. Blair, Superintendent, conducted the party about the Farm and during the picnic luncheon period gave an interesting talk on the history of the Kentville Station. The afternoon was featured by field trips, first to a new salt marsh being formed at Wolfville from

flooded dyke-land and later to a "sunken forest" at Long Island. This is one of the Minas Basin regions showing forest stumps *in situ* 33 feet below high tide level and exposed only at low tide.

An all day trip on Friday took the party to the *Corema* barrens at Auburn, then to the extensive bogs of Aylesford, and later to Halls Harbour on the Bay of Fundy. Following a picnic lunch, there was intensive collecting of marine algae and of shore plants. Finally, a visit to a sphagnum bog at Centerville gave an opportunity to study a particularly rich and varied bog flora. Those with a paleobotanical interest visited Horton Bluffs and returned with large collections of fossils.

Motor trips to Blomidon, through the surrounding orchard country, to the Wolfville Ridge and to Grand Pré rounded out a full programme for the visitors.

Registration showed an attendance of over sixty members. Prominent among those from the United States were: E. W. Sinnott, Columbia University; L. C. Petry, L. H. MacDaniels and H. H. Whetzel, Cornell University; J. B. S. Norton, University of Maryland; F. H. Steinmetz, University of Maine; G. S. Avery, Connecticut College; R. H. Wetmore, Havard University; N. C. Fassett, University of Wisconsin; R. P. Wodehouse, Yonkers; H. A. Gleason, New York Botanical Garden. Canadian botanists attending were: J. Adams and H. Groh, Central Experimental Farm; C. W. Argue, University of New Brunswick; A. E. Roland, Nova Scotia Agricultural College; Margaret Brown, Halifax; H. P. Bell, Dalhousie University; Constance Macfarlane, Charlottetown; Frances Wallace, Montreal; J. F. Hockey, K. A. Harrison and L. Grant, Kentville Experimental Station. — MURIEL V. ROSCOE, *Chairman of the local committee.*

AN EXTRALIMITAL RECORD OF THE MAGPIE IN ONTARIO — Recently the Museum received for identification the skin of a Magpie (*Pica pica hudsonia*) which had been killed near Mammamattawa (or Mammawemattawa or Mammawimatta) Cochrane District, Ontario. This place is some fifty miles northeast and down the Pagwachuan River from Pagwa River station on the C.N.R.

Mr. J. L. Charlton, Manager of the Hudson's Bay Company's Post in the area forwarded the specimen and stated that "it was caught in the early spring of 1937 by an Indian, who said it was in very poor condition." Mr. Charlton further remarked that he had "never seen any similar bird up in this part of Northern Ontario and neither have the Indians." The specimen represents another of those strange extralimital occurrences of the Magpie which are occasionally reported. — L. L. SNYDER, *Royal Ontario Museum of Zoology.*

REVIEWS

A BEAST BOOK FOR THE POCKET *by Edmund Sandars, Oxford University Press, London, England and Toronto, Canada.* $2.25

There are some books from which one cannot avoid quoting, some books whose matter is presented either so well or so vividly or whose matter is so interesting that it doesn't matter a whit how it is presented. Listen to this: (All references are to animals in Great Britain.)

Mole. They have a special, blind flea. Food, chiefly worms; the Mole bites off the tail, turns the worm round, takes the head in its mouth and squeezes all earth out at the tail end. Can swim, even long distances, high in water, tail up.

Hedgehog. During hibernation the blood alters in character, nearly all the white corpuscles going to the stomach to absorb all bacilli of decay and returning to the blood when this is done. Kill vipers by biting tail, rolling up and allowing the snake to kill itself on the spines. Can run quite quickly. Will roll or drop, ballwise, down steep slopes, or from high ledges, landing on spines.

Horse. Some horses sleep afoot, but this is a vice, as they often fall and hurt themselves. He will make repeated efforts at an impossible task, even unto death.

Mule. Without pride of ancestry or hope of posterity. Unlike horses, mules will test a strain once and, if they fail, refuse to try again.

Ass. The reputation for stupidity is utterly undeserved.

Brown Rat. Nests formed of any soft material — 1,728 shredded napkins were found when the old Gaiety Restaurant was destroyed. Omnivorous. Believed once to have nibbled the toes off Elephants at the Zoo!

Black Rat. Regret has been expressed at the extermination of the noble old English Black Rat by the Hanover (*norvegicus*) Rat — the Brown. The Black Rat has not been exterminated; he is not noble; but a nuisance second only to the Brown Rat, which did not come from Hanover (or Norway), and the only matter for regret is that they did not behave as *Felis kilkennicus.*

Toad. A large Toad will even eat a Mouse. Wo.ms are gripped in the hand while eaten. Invaluable in gardens, only fools kill them.

Man. A Man usually produces nothing for his own use, very rarely much. He gets everything as the result of a highly complex system of ownership, contract, payment and credit. This enables him to exchange his work for that of others, or for property which he or his children can exchange. Men clothe, shave, paint and adorn themselves; they build, tunnel and mine; they speak, sing, make music, draw, paint, and record by writing, photography, phonography, and wireless, so as to inform and mislead, soothe and excite, amuse and annoy. The voice of the Males is louder and deeper, of Females higher pitched and, perhaps, less usually silent.

I fear that I have trespassed on a reviewer's privilege of quotation but, as I said, there are some books from which one can not avoid quoting. The distribution, both in space and density, is shown by means of an inset map for each species and this book really will fit in your pocket. When you get your copy don't show it to your friends if there is bridge to be played or other duties await you.—D. L.

THE LORE OF THE LYRE BIRD *by Ambrose Pratt* (5*s*). KOALA *by Charles Barrett* (2*s*). THE CALL OF THE KOALA *by Ambrose Pratt* (6*s*). AUSTRALIA'S ENTAIL *by A. O. Barrett* (6*s*). *All published by Robertson & Mullens,* 107-113 *Elizabeth St., Melbourne, Australia.*

Two of the best known members of the antipodean fauna (the lyre-bird, pictured on the recent shilling stamps of Australia, and the koala, made famous by the teddy-bear), are here treated at length by Ambrose Pratt, who now has a long list of books to his credit. As President of the Royal Zoological and Acclimatization Society of Victoria, the author is in a position to draw on many sources for assistance and for information to supplement his own observations. The photographs of the lyre-bird in singing posture and dancing are excellent, while the story of the voluntary semi-domestication of one of these usually shy birds makes fascinating reading. The photographs of koalas, too, are remarkably good. It is with a good deal of pleasure that one notes that the proceeds from the sale of "The Call of the Koala" are to be devoted to the preservation of this rapidly disappearing animal and the eucalyptus tress on which it feeds. "Australia's Entail" by A. O. Barrett is devoted to conservation, especially to soil erosion prevention, which seems to be just as serious a problem there as on this continent, and, perhaps, equally due to man's lack of foresight.—D. L.

PLANT ECOLOGY *by Hilda Drabble. Longmans, Green & Co., Toronto, Ontario,* $2.25.

Ecology is rapidly assuming its rightful position in the forefront of field research, but to many of our readers it remains largely unknown, partly because of the lack of adequate textbooks. The present volume deals with the ecological aspect of botany in England and its clear style and the excellent photographs of typical habitats provide an excellent introduction to the subject. Some of the typical habitats in England have their corresponding physiographic areas here in Canada and, though the actual plant species are not the same, the general ecological principles do not differ. The sections on moorland, grassland, marsh and aquatic plants, sand dunes and pine woods are of especial interest to us in this part of the world.—D. L.

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Meetings are held each Monday evening, except on holiday from October to April, in the physics theatre of the University Winnipeg. Field excursions are held each Saturday afternoon during May, June and September, and on public holidays during July and August.

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Meetings held the second Monday of the month, except during the summer.

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The Canadian Field-Naturalist

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NOTES ON BIRDS OF THE LABRADOR PENINSULA IN 1936 AND 1937.

By HARRISON F. LEWIS

OBSERVATIONS of birds along the southern shore of the Labrador Peninsula, between Shelter Bay and Blanc Sablon, in Saguenay County, Quebec, were made by me in 1936 from May 26th to August 29th and in 1937 from May 25th to August 28th. The records contained in this paper are based on the more significant of those observations and, in some cases, as indicated by appropriate statements, on specimens taken.

The name of a species not hitherto recorded from the Labrador Peninsula is marked herein with an *.

Oceanodroma leucorhoa leucorhoa. LEACH'S PETREL.—I seldom see more than one or two individuals of this species near the southern shore of the Labrador Peninsula in the course of a summer. On June 23, 1937, however, the species appeared to be fairly common in the area immediately to the westward of Long Point of Blanc Sablon and Greenly Island, at the western entrance of the Strait of Belle Isle. In coming from the westward, we saw the first Leach's Petrel about four miles west of Long Point. In a direct course from the place of this observation to Long Point we observed more than ten Leach's Petrels, scattered here and there. When sailing over the eastern part of the same area on June 24th, we found no Petrels.

Phalacrocorax carbo carbo. EUROPEAN CORMORANT.—I observed occupied nests of this species as shown in the following tabulation.

No. of occupied nests of European Cormorants

ear	Lake Id.	Outer Wapitagun Ids.	Cliff Id.	Total
936	73 (June 12)	25 (June 12)	32 (July 6)	130
937	58 (June 12)	48 (June 12)	55 (July 7)	161

Several foxes spent the summer of 1936 on Lake Island and were very destructive to the eggs and young of the European Cormorants and Double-crested Cormorants (*Phalacrocorax auritus auritus*) nesting there. Although these birds nest on ledges of the cliff that forms the southern side of the island, the foxes were able to reach most of the nests. Broken egg-shells scattered here and there formed evidence of their activities. Apparently they affected first the smaller species, the Double-crested Cormorant, for, on June 12, 1936, when I did not suspect what was taking place, I recorded in my notes, after examining the cliff in detail to count the occupied nests of European Cormorants, that the number of Double-crested Cormorants nesting on the cliff was greatly reduced, as compared to the number found there in 1935. Only about half-a-dozen nests of each of these species of Cormorant successfully produced fledged young on Lake Island in 1936. Foxes have summered on Lake Island in some previous years without having any observable adverse effect on the Cormorants nesting on the cliff. The foxes that were there in 1936 were trapped during the following winter and there were no foxes on Lake Island in 1937, yet the population figures recorded above appear to indicate that, in the latter year, a number of pairs of European Cormorants that had previously nested on Lake Island nested on Outer Wapitagun Islands, about a mile farther east. This may have been due to their experiences on Lake Island in 1936 and to their failure to raise young there in that year. It is practically certain that the increase in the breeding population of European Cormorants on Outer Wapitagun Islands in 1937 was not entirely composed of birds that had been hatched at that place, for European Cormorants had not nested there for many years prior to 1935, when 12 pairs nested there. The young of this species do not nest before the second summer after hatching. The increase in nesting European Cormorants at Outer Wapitagun Islands in 1937 was 23 pairs, or 46 birds, and it is quite incredible that so

many, or even half of them, should have been survivors from the production of 12 pairs in 1935.

On Cliff Island, in St. Mary Islands Bird Sanctuary, Double-crested Cormorants nested with the European Cormorants in 1937 for the first time since the latter species re-established itself there in 1930. There were three nests of Double-crested Cormorants on the cliff of this island in 1937.

**Casmerodius albus egretta.* GREAT AMERICAN EGRET.—A fine adult of this species in breeding plumage was shot a short distance below the first falls of the Little Mecatina River, in the vicinity of Harrington Harbour, on May 12, 1937, by Mr. Albert Monger, of Whale Head. Mr. Monger told me that this bird was first observed about May 1st in the same area in which it was taken. The skin is now in the collection of the National Museum of Canada. It is unusual for this species to move northward so early in the year. There was much snow and ice about the lower part of the Little Mecatina River when the Egret arrived there. This is the first record of the American Egret in the Labrador Peninsula and, except for one record from Lake Winnipegosis, Manitoba[1], is the northernmost record for this subspecies. An American Egret was seen on the Godbout River, south-west of the limits of the Labrador Peninsula, on June 9, 1882[2].

Querquedula discors. BLUE-WINGED TEAL.—A duck and a drake of this species flushed together, on June 9, 1937, from a small pool in the rock of the Gull Island near the mouth of Kegashka River. They alighted on the salt water near the island and flew about, here and there, so that I had good views of them, through X6 binoculars, both when they were in flight and when they were resting on the water. They were easily identified beyond question. This is apparently the second record of the Blue-winged Teal in the Labrador Peninsula.

Somateria mollissima borealis. NORTHERN EIDER.—An almost completely albinistic specimen of this race of Eider, presumably a female, was taken near Whale Head, Saguenay County, Quebec, by Mr. Cyril Mercier, of that place, a few days before Christmas, 1936. Its eyes were yellow and its feet were rosy. Its plumage is almost entirely pure white, but shows a faint brownish tinge on a few scattered feathers on back and flanks. It was alone when Mr. Mercier found it. Its skin is now preserved in the collection of the National Museum of Canada.

Haliaëtus leucocephalus alascanus. NORTHERN BALD EAGLE.—The nest of this species at Mascanin Bay[3] was visited on June 7, 1936. At that time it contained three eggs. Both adult Eagles were seen near the nest, but were very shy. One seen at close range was in ragged plumage. On the ground below the nest were several flight feathers, one tail feather, and numerous body feathers.

This nest was visited again on June 7, 1937, but on this occasion, on account of the progressive weakening of the dead tree in which the nest is placed, no one climbed to the nest. Only one Bald Eagle was seen in the vicinity on this date. It was silent and very shy and did not come near the nest nor near us while we were in the neighbourhood.

On June 8, 1937, a Bald Eagle was seen at Aguanish, about 15 miles east of Mascanin Bay.

Arquatella maritima. EASTERN PURPLE SANDPIPER.—One was observed at close range for some time on June 2, 1937, as it moved slowly about the rocky shore of Sugar Loaf Islet, in Birch Islands Bird Sanctuary, near Mingan.

Larus delawarensis. RING-BILLED GULL.—A nesting colony of about 200 birds of this species was found on July 2, 1936, on a small island, one of the group known as Flat Rocks, a short distance south-east of the eastern point at the entrance to Belles Amours Harbour (long. 57°21′ W.). From information obtained from residents in that vicinity, it is believed that this colony has been in existence for many years, but had previously been overlooked by me.

Hydroprogne caspia imperator. AMERICAN CASPIAN TERN.—I have previously recorded[4] that in 1935 the nesting colony of Caspian Terns on Fog Island, which is the only known colony of this species in the Province of Quebec, failed, presumably on account of unusual scarcity of small food fishes in that vicinity, to raise any young. Whether because of this fact or for some other reason, no Caspian Terns nested on Fog Island in 1936 or 1937.

Directed by Mr. Daniel Stubbert, I visited, on June 10, 1936, a group of these Terns that had chosen a nesting area on a hill-top on an island known locally as Frenchman's Bay Gull Island, about four and one-half miles north-east of Fog Island. Here I counted 25 of their nests. I doubt if this group included all the

1 Seton, *Auk*, 25:451.
2 Merriam, *B.N.O.C.*, 7:239.
3 *Can. Field-Nat.*, 51:103.
4 *Can. Field-Nat.*, 51:100.

survivors of the former Fog Island colony, for there were 84 adults in that colony in 1935[5]. I do not, however, know of any other nesting group of Caspian Terns on the north shore of the Gulf of St Lawrence in 1936 or 1937.

On June 11, 1937, I counted 35 nests of Caspian Terns on Frenchman's Bay Gull Island.

Uria lomvia lomvia. BRUNNICH'S MURRE.—On June 11, 1936, I had an excellent view of an individual of this species at a distance of about 20 feet. The bird was resting on rough water in Wolf Bay Bird Sanctuary and I observed it from a rowboat. An Atlantic Murre on the water only two or three feet from it made comparison easy. The blacker head and neck and the shorter bill of the Brünnich's were very clearly seen and were very distinctive.

In 1937 I observed Brünnich's Murres along the southern coast of the Labrador Peninsula as follows:

June 7—Mascanin Bay, 1.

June 8—Mascanin to Natashquan, 7 (about 5 additional individuals reported by other members of the party).

June 9—Natashquan to Kegashka River, 2.

June 23—Several miles west of Long Point of Blanc Sablon, 1.

June 24—Vicinity of Long Point of Blanc Sablon, 2.

June 25—Blanc Sablon to Belles Amours, 5.

Brünnich's Murre is well known as a breeder on the eastern and northern coasts of the Labrador Peninsula and is often numerous as a non-breeder on the southern coast of the peninsula in autumn, winter, and early spring. Prior to 1936 I had not, however, succeeded in finding it along the southern coast in late spring or in summer, although I had spent a good deal of time in that region each year since 1921 and had sought particularly for this species. It seems evident that the numerous occurrences of Brünnich's Murre along the south coast of the peninsula in June, 1937, were unusual. The individuals seen appeared to be lively and well.

Fratercula arctica arctica. ATLANTIC PUFFIN.—On July 7, 1937, Mr. Hiram Osborne showed to me, on Cliff Island, in St. Mary Islands Bird Sanctuary, where many Puffins breed, an unusual nest of this species. It is well known that the nests of Puffins are usually placed at the ends of subterranean burrows, commonly excavated by these birds themselves, and that some nests are situated in sheltered places under boulders or in clefts in the solid rock. The nest shown to me by Mr. Osborne was, however, entirely above ground. It was in an old nest of the Southern Eider (*Somateria mollissima dresseri*), which formed a slight concavity in the soil beneath the densely intertwined branches of a stunted black spruce tree (*Picea mariana* (Mill.) B.S.P., f. *semiprostrata* (Peck) Blake) that was growing against the foot of the slope of a low bank of earth. This dwarfed tree, though doubtless many years old, was not more than eight inches high at any point, and its gnarled, outspread branches, with their dense growth of twigs and "needles", evidently provided a shelter so substantial as to be acceptable to the Puffin. Scattered spruce trees as stunted as this one, or even more so, are frequent in the region[6]. The nest was composed of a few straws and contained one egg. The incubating Puffin was present when we examined the nest. When the sheltering branches were parted to enable us to see nest, egg, and bird, the bird slipped off its egg turned its back to us, and moved away as far as the dense growth of twigs would permit (two or three inches), so that it was resting on the edge of the nest hollow.

When the site was re-visited, on July 17, 1937, no Puffin or egg was present.

Chordeiles minor minor. EASTERN NIGHTHAWK.—At Mingan I saw one Nighthawk on August 26, 1937, and seven Nighthawks in one group on August 27, 1937. The birds were entirely silent and were flying about the village in the evening, in foggy, rainy weather. The dates are surprisingly late in the season for the occurrence of this species so far north (lat. 50°18′ N.).

Archilochus colubris. RUBY-THROATED HUMMINGBIRD.—Mr. and Mrs. Robert Ross, of Seven Islands, inform me that one of these birds, with white throat, frequented their garden, in Seven Islands village, for a fortnight or more in August, 1934, and again in August, 1935, and in August, 1937. I questioned them at some length about these occurrences and am satisfied that what they saw in their garden was indeed a Hummingbird. There are one or two earlier records of the accidental occurrence of the Ruby-throated Hummingbird in the Labrador Peninsula, but this is the first indication that, in the extreme southwestern part of the peninsula, it occurs with some regularity.

5 *Can. Field-Nat.*, 51:52.

6 *Can. Field-Nat.*, 45:178 and 199.

Colaptes auratus. YELLOW-SHAFTED FLICKER.—At Sandy Harbour Mr. Thomas Francis Lessard showed to me on August 10, 1937, the skin of a Yellow-shafted Flicker which he said he had caught in a muskrat trap on a post, on the north-west branch of the St. Augustin River, about 75 miles inland from St. Augustin Post, in the latter part of May, 1937. He told me that he had several times seen Flickers in that general region.

Iridoprocne bicolor. TREE SWALLOW. — On August 17, 1937, a hazy, sunny day, with a strong south-west wind, at least eighty Tree Swallows, including both adults and young, grouped in several flocks, were seen coursing about, high and low, over a marshy area on Hospital Island, at Harrington Harbour. It is unusual to see so many Tree Swallows together as far east on the southern shore of the Labrador Peninsula as Harrington Harbour.

Hirundo erythrogaster. BARN SWALLOW.—On May 26, 1937, a handsome adult Barn Swallow was clearly seen and identified as it coursed back and forth over the beach at Seven Islands. The deeply forked tail, the characteristic colours of upperparts and underparts, and the characteristic manner of flight were all noted. This species has been recorded only a few times in the Labrador Peninsula.

Sturnus vulgaris. COMMON STARLING. — A flock of 6 was seen on the outskirts of Seven Islands village on May 29, 1937. A flock of 5 was seen at Mingan on June 2, 1937.

In a letter dated October 30, 1937, Mr. J. W. Osborne, of Kegashka, Saguenay County, Quebec, informed me that a pair of Starlings nested in a cavity in his house at that place in 1937. They were first seen in the latter part of May. On July 7th they successfully brought out a brood of six young. They remained in the vicinity until some time in August. Kegashka is 25 miles farther east than Natashquan, the easternmost place in the Labrador Peninsula at which Starlings have previously been known to nest.

Mniotilta varia. BLACK AND WHITE WARBLER.—At about 7.00 o'clock on the morning of June 21, 1937, a Black and White Warbler was repeatedly heard singing, in dense fog, in a small tract of woodland near the salmon cannery at St. Augustin. Pressing duties prevented any attempt to find the singer.

Dendroica tigrina. CAPE MAY WARBLER.—A male in song was well seen and identified, early in the morning of May 31, 1937, in spruce and fir woods at Pointe aux Basques, at the eastern entrance to Seven Islands Bay. This is the second record of this species in the Labrador Peninsula. The first record was made, on June 2, 1935, at a place about a quarter of a mile east of where this bird was seen in 1937[7].

Dendroica palmarum. YELLOW RED-POLLED WARBLER.—In the vicinity of Seven Islands this Warbler is much more common that I have found it elsewhere on the north shore of the Gulf of St. Lawrence. Curiously enough, the birds of this species about Seven Islands do not live in sphagnum bogs, as Yellow Palm Warblers do in Nova Scotia, but are inhabitants of the extensive dry, sandy plains covered with a growth of Jack Pine (*Pinus Banksiana* Lamb.). Two male specimens taken near Seven Islands on May 29, 1937, and now in the collections of the National Museum of Canada, are not as strongly yellow on belly and under tail-coverts as specimens from Nova Scotia, but are nevertheless considered to be Yellow Palm Warblers (*D. p. hypochrysea*).

Agelaius phoeniceus. RED-WINGED BLACKBIRD.—On the morning of May 27, 1936, a fine, cool day, an adult male Red-winged Blackbird was seen in a wet, boggy clearing beside the road, about three and one-half miles north of Seven Islands village. It was observed through X8 binoculars and its characteristic size, epaulets, etc., were clearly seen, both when it was perched and when it was flying. The only note that it was heard to utter was *"chuk"*, frequently repeated.

This is the second record of the Red-winged Blackbird in the Labrador Peninsula, the first being that of a specimen obtained by Mr. Johan Beetz and observed in his collection, at Baie Johan Beetz, by Dr. Charles W. Townsend[8].

Molothrus ater ater. EASTERN COWBIRD.—On August 12, 1937, I saw and identified a male Cowbird at close range near buildings on the mainland at Bradore Bay. Mr. William Vatcher, of that place, said that this bird and another one, lighter in colour (a female?) had been in the neighbourhood for about a week and that they commonly accompanied either his horse or his cow. This is the third record of the Cowbird in the Labrador Peninsula, and is much farther north-east than the previous occurrences, which were at Matamek and Harrington Harbour.

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7 *Can. Field-Nat.*, 51:122.
8 *Auk*, 34:136.

Acanthis linaria linaria. COMMON REDPOLL.—On August 11, 1937, in the village of Lourdes du Blanc Sablon, on the north side of the western entrance to the Strait of Belle Isle, an adult Redpoll was seen feeding two young birds well able to fly. This species is present every summer in this general vicinity.

THE OV POSITION AND CANNIBALISTIC HABITS OF THE NARROW-WINGED KATYDID (*Phaneroptera pistillata Brunner*)

By F. A. URQUHART, M.A.
Royal Ontario Museum of Zoology

WHILE collecting Orthoptera at Constance Bay, Ontario, on September 8th, 1937, a number of specimens of *Phaneroptera pistillata,* Brunn., which were abundant among the willows and deep grass, were taken. Eight females and six males were placed in live jars and taken back to the Department of Agriculture at Ottawa where they were transferred to larger jars. A variety of food plants including leaves of red oak, willow grass, sheep laurel, blueberry, aspen poplar and sugar maple (all of which were common at Constance Bay) were offered to them and a marked preference for poplar and grass was noticed. However, any of the above leaves were readily eaten when offered alone.

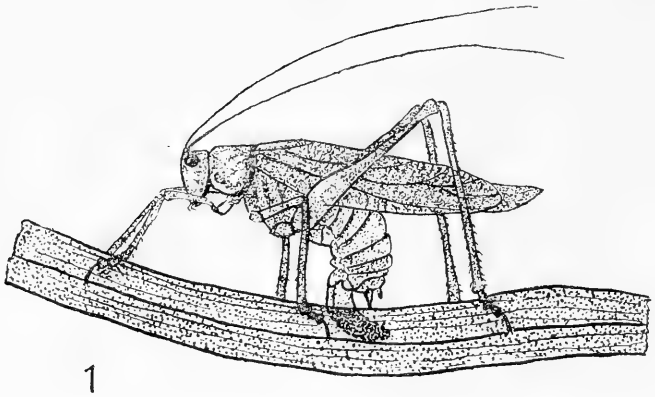
On September 12th a female was observed ovipositing and, on examining the leaves contained in the jar, a marked preference on the part of the katydid for grass and poplar leaves in which to deposit her eggs was noticed. (Table I)

	Oak	Willow	Grass	Sheep Laurel	Blueberry	Poplar	Maple
No. of Eggs	4	1	16	2	0	14	0

It was later shown that the katydid would deposit her eggs in any of the other leaves if single representatives of each kind of leaf were present. In one case, in which only oak leaves were supplied, a female katydid deposited twenty-two eggs in a single leaf. Partly withered or dried leaves were rejected if fresh leaves were present.

It had always been a source of wonder to the author as to the method of oviposition of the katydid. The peculiar shape and size of the ovipositor, together with the fact that it is turned upwards, did not appear to lend itself to its insertion into the stems or leaves of plants. The method of oviposition was therefore studied and a brief account of this interesting phase of the life history of the katydid is now offered.

Before selecting one of the leaves in wihch to deposit her eggs, the female katydid first tested the various leaves present. This testing appeared to be in the nature of a slight pinching of the leaf with her mandibles since no injury to the tested leaf could be found. Dried or partly withered leaves were rejected when fresh leaves were present. In the absence of fresh leaves, however, the katydid would deposit her eggs in withered or partly dried leaves. A suitable leaf having been selected, the katydid commenced to chew away a portion of the outer edge of the leaf (Fig. 3) in preparation for the insertion of her ovipositor. This preliminary preparation accomplished, she then crawled slowly along the edge of the leaf until the prepared portion of the leaf was directly beneath her abdomen. Then grasping the leaf firmly with her feet the ovipositor was drawn beneath her abdomen so that the latter was bent at right angles. The apex of the ovipositor was then inserted into the prepared opening in the edge of the leaf and, by a series of downward thrusts of the abdomen, assisted by the opening and closing of the valves of the ovipositor, the latter was gradually inserted into the leaf (Fig. 1; from a drawing made at the time of observation). Except for slight pulsations of the abdomen the katydid remained motionless in this attitude for some few minutes. Finally, with a slow jerky motion, the ovipositor was



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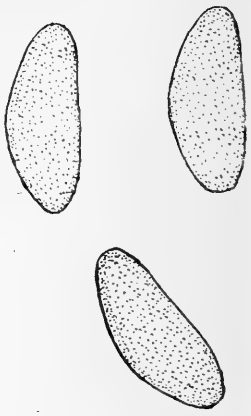

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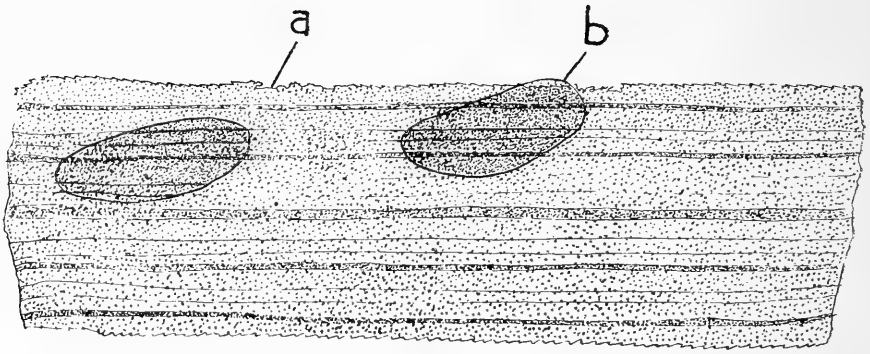

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Fig. 1—*Straight-winged katydid with ovipositor embedded in blade of grass.* (*X* 1.25)

Fig. 2—*Eggs* (*X* 5.)

Fig. 3—*Eggs deposited in blade of grass* (*X* 5.)
a; edge of grass chewed away.
b; portion of egg protruding.

gradually withdrawn and at the same time an oval-shaped egg was deposited in the cavity thus made in the leaf. Riley (1) (1874) describes a similar procedure in the oviposition of *Phaneroptera furcata* Brunner, under the name of *Scudderia curvicauda.* Unlike the latter, however, *Phaneroptera pistillata* did not appear to guide the insertion of her ovipositor by means of the mandibles and maxillae. No attempt was made by the katydid to close the opening in the edge of the leaf as described by Hancock (2) (1904) for *Orchelimum glaberrimum* Burm. and, in some cases, a portion of the egg protruded from the edge of the leaf. (Fig. 3)

Having deposited this solitary, oval-shaped egg in the leaf, the katydid then set diligently to clean her ovipositor. This process was most amusing to observe. The abdomen was bent in a manner previously described to that the ovipositor was brought towards the mouth of the katydid The ovipositor was held in position by

1 Riley, C. V., 1874—Katydids; Sixth Ann. Rep. on the Insects of Missouri, 150-169.

2 Hancock, J. L. 1904—The Oviposition and Carnivorous Habits of the Green Meadow Grasshopper (*Orchelimum glaberrimum* Burmeister) Psyche, 11. 69-71.

means of the front legs and the entire surface of this egg-laying apparatus was judiciously cleaned. Such an operation is probably necessary since the juice exuding from the wound made in the living leaf would tend to cling to the surface of the ovipositor thus hindering its future operations. When the katydid had cleaned the ovipositor to her thorough satisfaction, she walked slowly along the edge of the leaf and, choosing another likely spot, she again went through the performance, laying a second egg.

The eggs of *Phaneroptera pistillata* are oval in shape and yellow in colour. Their extreme flatness may be judged by the fact that if they are laid between the upper and lower layers of a blade of grass there is only a slight distortion of the plane surface of the latter. The eggs are approximately 5 mm. in length and 2 mm. in width, tapering slightly towards the anterior pole and broadly rounded at the apex. The dorsal edge of the egg is relatively straight and the ventral edge is broadly rounded (Fig. 2)

CANNIBALISTIC HABITS

Although the specimens of *Phaneroptera* were given an ample supply of fresh leaves yet on two occasions a female was observed eating the body of a male. It had not been my good fortune to witness the struggle, if such took place, between the female and its unfortunate companion but, in both cases, the male was still living and feebly attempting to crawl while the female gnawed away at its body. It is doubtful whether such a habit is normal or due to confinement, but I have never witnessed such cannibalism in the field. Hancock (1904) describes a similar occurrence in the case of *Orchelimum vulgare* Harris (*O. glaberrimum*, Burm. of Hancock) and explained the presence of long spines on the first and middle tibiae of this grasshopper as of use in holding its prey in connection with this carnivorous habit. Blatchley (1920) describes the carnivorous habit of *Orchelimum vulgare*, Harris, stating that it has been found "feeding upon the bodies of small moths which in some way it had managed to capture." It is quite likely that a similar carnivorous habit is exhibited among certain members of the Phaneropterinae although I have never witnessed such in nature.

LIST OF GRASSES (Gramineae) OF THE OTTAWA DISTRICT

By W. G. DORE and H. GROH

*Contribution No. 522 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

THE LIST following represents the results of a study of specimens in the National Herbarium, Ottawa, and in the herbarium of the Division of Botany, Central Experimental Farm. It is doubtless still incomplete for the district, which is taken to be the area within a 30 mile radius of the city. This area includes a variety of features: Laurentian plateau, flat St. Lawrence plain, and gently rolling terrain, as well as some bog, sand dune and other diversification. The city of Ottawa at the centre, and the agriculture surrounding it, together contribute numerous adventive species, indicated by an asterisk. The considerable proportion of these which have been introduced as cultivated grasses is a reflection of the economic importance of the family. Native grasses, on the other hand, have come but little into use, belonging largely to the flora of originally forested country rather than of meadow and arable land.

The alphabetical arrangement of names makes for convenience, since botanical sequence in recent works has been undergoing change. Nomenclature is according to A. S. Hitchcock, *North American Flora*, Vol. 17, and *Manual of the Grasses of the United States*, 1935.

Agropyron pauciflorum Schur. (=*A. trachycaulum* var. *tenerum*, var. *trichocoleum*, and var. *novae-angliae*) — rare.

**Agropyron repens* (L.) Beauv.—very common.

Agropyron subsecundum (Link) Hitchc. (=*A. trachycaulum* var. *unilaterale*, var. *ciliatum*, and var. *glaucum*) — rare.

**Agrostis alba* L. (=*A. stolonifera* var. *major*) — common.

Agrostis hiemalis (Walt.) B. S. P. (=*A. scabra*) — frequent, light soils.

**Agrostis palustris* Huds. (=*A. stolonifera* var. *compacta*; *A. alba* var. *maritima*) — frequent, wet land.

Agrostis perennans (Walt.) Tuckerm. — frequent.

Agrostis stolonifera L. — rare.

Alopecurus aequalis Sobol. (=*A. geniculatus* var. *aristulatus*) — frequent, stream banks and wet places.

**Alopecurus pratensis* L. — rare, meadow, Exper. Farm.

Andropogon furcatus Muhl. (=*A. provincialis*) — rare, river-banks.

Andropogon scoparius Michx. (var. *septentrionalis* and var. *neo-mexicanus*) — rare, river-banks.

**Anthoxanthum odoratum* L. — rare, Beechwood.

**Avena fatua* L. — rare, in cultivated oats.

**Avena sativa* L. — escaped from cultivation.

Brachyelytrum erectum (Schreb.) Beauv. (=*Diplepyrum*) — frequent, woods.

Bromus ciliatus L. — frequent.

**Bromus inermis* Leyss — frequent, fields and waste places.

Bromus Kalmii A. Gray — rare, Rockcliffe.

**Bromus secalinus* L. — rare, introduced.

Calamagrostis canadensis (Michx.) Beauv. — frequent, marshes.

Calamagrostis neglecta (Ehrh.) Gaert. — rare, Aylmer.

Cinna arundinacea L. — frequent, woods.

Cinna latifolia (Trevir.) Griseb. — rare, woods.

**Dactylis glomerata* L. — common, naturalized in fields and roadsides.

Danthonia compressa Austin — rare, Chelsea.

Danthonia spicata (L.) Beauv. — frequent, light soils.

Deschampsia caespitosa (L.) Beauv.—frequent.

**Digitaria Ischaemum* (Schreb.) Muhl. (=*D. humifusa*) — frequent, lawns.

**Digitaria sanguinalis* (L.) Scop. — rare, gardens.

**Echinochloa crusgalli* (L.) Beauv. — frequent, waste places.

Elymus canadensis L. (including *E. Wiegandii*) — frequent.

Elymus glaucifolius L. (=*E. robustus* var. vestitus) — rare, Tetreauville.

Elymus villosus Muhl. (=*E. striatus*) — frequent.

Elymus virginicus L. (including var. *hirsutiglumis* and var. *submuticus*) — frequent, moist places.

**Eragrostis cilianensis* (All.) Link (=*C. megastachya*) — rare, Exper. Farm.

Eragrostis hypnoides (Lam.) B. S. P. — rare, wet ground, Hull.

Eragrostis pectinacea (Michx.) Nees — rare, railway, Ottawa.

**Eragrostis poaeoides* (L.) Beauv. (=*E. minor*) — frequent, railways.

**Festuca elatior* L. (=*F. pratensis*) — frequent, meadows.

Festuca obtusa Spreng. (=*F. nutans*) — frequent, woods.

**Festuca ovina* L. — rare, introduced, sandy soil.

**Festuca rubra* L. — rare, lawn, Ottawa.

Glyceria borealis (Nash) Batchelder—frequent, shallow water.

Glyceria canadensis (Michx.) Trin. (including var. *parviflora* Malte) — frequent, moist places.

Glyceria grandis S. Wats. — frequent, along streams.

Glyceria melicaria (Michx.) F. T. Hubb (=*G. Torreyana*) — rare, moist woods.

Glyceria neogaea Steud. (=*G. pallida* var. *Fernaldii*) — rare, wet ground.

Glyceria striata (Lam.) Hitchc. (including var. *stricta* (Scribn.) Fern.) (=*G. nervata*) — common, moist soil.

Hierochloë odorata (L.) Beauv. — rare, Shirley Bay and Aylmer.

Hordeum jubatum L. — frequent, waste places.

Hystrix patula Moench (var. *Bigeloviana* (Fern.) Deam) — frequent, moist woods.

Leersia oryzoides (L.) Swartz (including forma *inclusa* Eames) — common, along streams.

Leersia virginica Willd. (var. *ovata* (Poir.) Fern.) — frequent, wet woods.

**Lolium perenne* L. — rare, sometimes seeded.

Milium effusum L. — frequent, wet woods.

Muhlenbergia foliosa (Roem. & Schult.) Trin., including var. *setiglumis* (S. Wats.) Scribn. — common, waste land and on shore of Ottawa river.

Muhlenbergia racemosa (Michx.) B. S. P. — rare, Gatineau River.

Muhlenbergia sylvatica Torr. (=*M. umbrosa*) —frequent, moist woods.

Oryzopsis asperifolia Michx.—common, woods.

Oryzopsis pungens (Torr.) Hitch. — rare, Constance Bay, Aylmer.

Oryzopsis racemosa (J. E. Smith) Ricker — frequent, woods.

Panicum boreale Nash — frequent, open ground.

Panicum Boscii Poir. — rare, Kingsmere.

Panicum capillare L., including var. *occidentale* Rydb. — common weed.

Panicum depauperatum Muhl. (var. *psilophyllum* Fern.) — rare, Constance Bay.

Panicum flexile (Gattinger) Scribn. — rare, along River above Ottawa.

Panicum huachucae Ashe, var. *fasciculatum* (Torr.) F. T. Hubb. (=*P. lanuginosum* var. *fasciculatum*) — common, fields.

Panicum implicatum Scribn. (=*P. lanuginosum* var. *implicatum*) — common, fields.

**Panicum miliaceum* L. — frequent, waste places.

Panicum tennesseense Ashe (=*P. lanuginosum* var. *septentrionale*) — frequent, fields.

Panicum Tuckermani Fern. — rare, thin soil.

Panicum Werneri Scribn. (=*P. linearifolium* var. *Werneri*) — rare, Aylmer, Ironsides, Rockcliffe.

Panicum xanthophysum A. Gray — rare, Aylmer, Wakefield, Constance Bay.

Phalaris arundinacea L., including var. *picta* L. — frequent, moist soil.

**Phalaris canariensis* L. — frequent, waste land in city.

Phragmites communis Trin. (var. *Berlanderi* (Fourn.) Fern.) — rare, Rideau River, Ottawa.

**Phleum pratense* L. — very common, meadows.

Poa alsodes A. Gray — rare, woods.

**Poa annua* L. — common, roadways, lawns, gardens.

**Poa compressa* L. — common, dry soil.

**Poa nemoralis* L. — rare, Arboretum, White Bridge.

Poa palustris L. (=*P. triflora* Gilib.) — frequent, moist ground.

**Poa pratensis* L. — very common, lawn, pastures, roadsides.

Poa saltuensis Fern. & Wieg. — rare, woods.

Schizachne purpurascens (Torr.) Swallen (=*Melica striata*) — frequent, woods.

**Secale cereale* L. — rare, escape from cultivation.

**Setaria italica* (L.) Beauv. — rare, waste places.

**Setaria lutescens* (Wiegel) F. T. Hubb (=*S. glauca*) — common weed.

**Setaria viridis* (L.) Beauv. — common weed.

Sorghastrum nutans (L.) Nash — frequent, along rivers.

**Sorghum vulgare* Pers. var. *sudanense* (Piper) Hitchc. — rare, escaped from cultivation.

Spartina pectinata Link (=*S. Michauxiana*) — frequent, along rivers.

Sphenopholis intermedia (Rydb.) Rydb. (=*S. pallens*) — rare, moist woods.

Sporobolus cryptandrus (Torr.) A. Gray — rare, sand, Constance Bay.

Sporobolus heterolepis (A. Gray) A. Gray — rare, Little Chaudière.

Sporobolus neglectus Nash — frequent, sandy soil.

Sporobolus vaginiflorus (Torr.) Wood (var. *inaequalis* Fern.) — rare, dry soil, Merivale and Bell's Corners.

Trisetum melicoides (Michx.) Scribn. (=*Graphephorum melicoideum* var. *Cooleyi*) — rare, Chelsea.

Trisetum spicatum (L.) Richter var. *molle* (Michx.) Piper — rare, rocky shores.

**Triticum aestivum* L. — rarely escaped from cultivation.

Zizania aquatica L. var. *angustifolia* Hitchc. — frequent, shallow water.

ON THE NEST OF THE SORA RAIL (*Porzana carolina Linn.*)

By A. C. NICOL

THE USUAL type of nest built by the Sora Rail is a basket-like structure of dry leaves fastened at its circumference to reed or cat-tail stems several inches above the surface of the water. As a rule it is composed of last season's dead leaves of aquatic plants such as the blue flag (*Iris*), bur-reed (*Sparganium*), cat-tail (*Typha*), and others. Surrounding vegetation is usually bent over the nest so as to form a canopy, which effectively conceals the eggs and protects the brooding bird beneath.

Eggs covered.

Eggs exposed

NEST OF THE SORA RAIL

On June 17, 1934, while investigating a local swamp, I found an interesting variation of the above nest-type. It was situated in a rather open part of the swamp on a bed of twigs and branches which formed a strong foundation and raised the nest above the surface of the water. The plants round about, mainly water plantain (*Alisma Plantago-aquatica* Linn.), were rather short and scanty and consequently the sora had been unable to build the usual canopy of over-arching leaf-blades above its nest. To conceal its eggs when away from the nest, therefore, it had carefully covered them with a layer of leaf-scraps, probably raked up from the edges of the nest. At first glance the nest seemed nothing more than a mass of sodden vegetation but on closer scrutiny patches of light brown could be seen peeping through the leafy covering. The above habit of covering the eggs at once brings to mind analagous cases, such as the Pied-billed Grebe (*Podilymbus podiceps* Linn.) and other birds which regularly cover their eggs with nest material before leaving.

In the nest were seven whole eggs and fragments of two more, while floating in the water below were two others which had been accidently dislodged by the brooding bird. I have observed a similar loss of eggs on another occasion, this time from a sixteen-egg clutch. Again in this case two eggs had fallen out and were floating in the water beneath the nest. Such large sets are usually arranged in two or three layers or tiers so that all the eggs can be covered by the incubating bird. Shifting and rearranging such a mass of eggs so that all may mature equally must present a task of considerable difficulty to the parent bird. A large set literally fills the nest, and it is easy to see how an egg may be accidently dislodged when the bird is settling down on the nest, or hurriedly preparing to vacate it when alarmed

In the first case I replaced the two dislodged eggs and was surprised to find on returning several days later (June 22) that all the eggs had hatched. It is probable that the two eggs had not been out of the nest for long, although the eggs of some birds show a remarkably degree of vitality even when removed from the nest for several days, provided that they are not too greatly chilled.

ADDITIONS TO THE AGARICACEAE OF THE OTTAWA DISTRICT[1]

By J. WALTON GROVES

APPROXIMATELY three hundred species of mushrooms have been reported from the Ottawa district by Mr. W. S. Odell[2]. In view of the approaching summer meeting of the American Association for the Advancement of Science to be held in Ottawa in 1938, it has been thought desirable to bring the list of recorded species up to date and make it as complete as possible. During the last two summers the writer has spent considerable time on the collection and identification of mushrooms, and several new records have been found. In addition there are in the herbarium of the Division of Botany, Central Experimental Farm, a number of collections made by the late John Macoun, and which include a number of species not reported by Mr. Odell[3]. In many instances the specimens are in poor condition, and since they lack notes on the fresh condition, they may be considered of doubtful authenticity. These specimens have been submitted to Dr. John Dearness of London, Ontario, and in cases where he has indicated that he felt satisfied with the identification, the records have been included.

All of the species reported in this paper are represented by specimens deposited in the herbarium of the Division of Botany, Central Experimental Farm, and the numbers cited with the records below, refer to the herbarium numbers. The collections have been made within a radius of approximately twenty-five miles of Ottawa, and except where otherwise stated, the determination of the species has been made by the writer.

WHITE SPORED

Amanita russuloides Peck

F. 5581. Burnet, Que. July 14, 1935. Det. M. Timonin.

F. 7636. Graham Bay, Ont. Aug. 12, 1937.

Amanitopsis strangulata (Fries) Roze

1 Contribution No. 530 from the Division of Botany, Central Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

2 Victoria Memorial Museum (now National Museum of Canada) Bull. No. 43, Biological Series No. 11, Ottawa, 1926.

3 *Canadian Field-Naturalist*. 45:139-141. 1931.

F. 7582. Eardley, Que. Sept. 22, 1937.

Amanitopsis vaginata var. *fulva* (Schaeff.) Fries
F. 6986. Graham Bay, Ont. Sept. 18, 1936.

Amanitopsis vaginata is a very variable species and several different varieties have been described, based chiefly on the colour. The writer has found two colour forms in this district, one gray, the other brown. Odell has reported *A. vaginata* and since Lange in a recent work has indicated that he considered the gray form to be typical of the species and called the brown form var. *fulva*, this interpretation is followed here.

Cantharellus umbonatus Fries
F. 7556. Eardley, Que. Oct. 10, 1937. Det. H. A. C. Jackson.

Clitocybe adirondackensis Peck
F. 7916. Wakefield, Que. Aug. 20, 1903. Conf. J. Dearness.

Clitocybe carnosior Peck
F. 7917. Wakefield, Que. Aug. 16, 1903. Det. J. Dearness.

This species is very closely related to *Clitocybe clavipes* Fr. from which it may be distinguished by the forked gills.

Clitocybe cartilaginea (Bull.) Bresadola
F. 7001. Driveway, Ottawa, Ont. Oct. 5, 1936.
F. 7173. Driveway, Ottawa, Ont. Oct. 15, 1936.
F. 7584. Green's Island, Ottawa, Ont. Oct. 8, 1937.

This species seems to be very similar to *Clitocybe multiceps* Peck, but darker in colour, dark brown rather than whitish.

Clitocybe dealbata (Sowerby) Fries
F. 7590. Central Exp. Farm, Ottawa, Ont. Sept. 29, 1937.

Clitocybe decora Fries
F. 7559. Eardley, Que. Oct. 10, 1937.

Clitocybe ectypoides Peck
F. 7515. Burnet, Que. Aug. 22, 1937.
F. 7578. Eardley, Que. Sept. 22, 1937.
F. 7918. Wakefield, Que. Aug. 6, 1903. Conf. J. Dearness.
F. 7919. Wakefield, Que. Aug. 24, 1903. Conf. J. Dearness.

Clitocybe fragrans (Sowerby) Quelet
F. 7503. Burnet, Que Aug. 22, 1937.

Clitocybe morbifera Peck
F. 7012. Central Exp. Farm, Ottawa, Ont. Sept. 24, 1936.
F. 7583. Central Exp. Farm, Ottawa, Ont. Oct. 2, 1937.

This is a small, white species growing on lawns. It is similar to *Clitocybe dealbata* Fr. but differs in being slightly hygrophanous. It is said to be poisonous.

Clitocybe sinopica Fries
F. 7435. Burnet, Que. July 1, 1937.
F. 7547. Eardley, Que. Sept. 22, 1930. Det. W. S. Odell.

Collybia aquosa Fries var. Kauffman
F. 7415. Burnet, Que. June 21, 1937.

These plants agreed with Kauffman's description of a variety of *Collybia aquosa* Fr. which he did not name.

Collybia conigenoides Ellis
F. 7920. Rockcliffe Park, Ottawa, Ont. Sept. 14, 1898. Det. J. Dearness.

Collybia myriadophylla Peck
F. 6030. Chelsea, Que. Sept. 1935 Det I. L. Conners.
F. 7921. Kingsmere, Que. Aug. 8, 1934. Det. I. L. Conners.

Collybia stipitaria Fries
F. 7922. Wakefield, Que. July 23, 1903. Conf. J. Dearness.

Collybia stipitaria var. *setipes* Peck
F. 7923. Wakefield, Que. July 27, 1903. Conf. J. Dearness.

Collybia zonata Peck
F. 7509. Burnet, Que. Aug. 21, 1937.

Hygrophorus chlorophanus Fries
F. 7931. Wakefield, Que Aug. 14, 1903. Conf. J. Dearness.

Hygrophorus cuspidatus Peck
F. 7933. Wakefield, Que. July 30, 1903. Det. J. Macoun

Dr. Peck's description of this species was based on specimens sent him from Ottawa by Macoun. This is a later collection named by Macoun and presumably authentic.

Hygrophorus immutabilis Pk.
F. 7914. Wakefield, Que. July 27, 1903. Conf. J. Dearness.

Hygrophorus miniatus Fries
F. 7942 Kingsmere, Que. Aug. 8, 1934. Det. I. L. Conners.
F. 7943. Wakefield, Que. Aug. 14, 1903. Conf. J. Dearness.

Hygrophorus cantherellus Schw.
F. 7434. Ottawa, Ont. July 14, 1937.

Hygrophorus pratensis var. *pallidus* Berkeley
F. 7506. Arboretum, Central Exp. Farm, Ottawa, Ont. Aug. 20, 1937.

Hygrophorus sordidus Peck
F. 7958. Burnet, Que. Sept. 20, 1934. Det. M. Timonin.

Laccaria laccata var. *amethystina* Bolt.
F. 7445 Central Exp. Farm, Ottawa, Ont. July 19, 1937.

Laccaria striatula Peck
F. 7501. Dow's Swamp, Ottawa, Ont. Aug. 18, 1937.

Lactarius aspideus Fries
F. 7574. Eardley, Que. Sept. 22, 1937.

Lactarius cilicioides Fries
F. 7697. Green's Creek, Ont. Sept. 18, 1928. Det. W. S. Odell.

Lactarius minuscula Burlingham
F. 7561. Eardley, Que. Sept. 22. 1937.

Lactarius oculatus (Peck) Burlingham
F. 7588. Dow's Swamp, Ottawa, Ont. Sept. 30, 1937.

Lactarius trivialis var. *viridilactis* Kauffman
F. 5702. Burnet, Que. Sept. 30, 1934. Det. I. L. Conners.

Lentinus spretus Peck
F. 5670. Burnet, Que. Aug. 19, 1935.
F. 7637. Ottawa, Ont. Aug. 10, 1937.

Lentinus tigrinus (Bull.) Fries
F. 1349. Woodroffe, Ont. July 16, 1930. Det. J. Dearness.

Lepiota glischra Morgan
F. 6956. Central Exp. Farm, Ottawa, Ont. Oct. 1, 1936.

Lepiota rubrotincta Peck
F. 7632. Ottawa, Ont. July 22. 1937.

Marasmius siccus (Schw.) Fries
F. 7961. Rockcliffe Park, Ottawa, Ont. Sept. 6, 1892. Conf J. Dearness.
F. 7962. Rockcliffe Park, Ottawa, Ont. Sept. 7, 1898. Conf. J. Dearness.
F. 7963 Wakefield, Que. July 24, 1903. Conf. J. Dearness.

Marasmius velutipes Berkeley and Curtis
F. 7964. Rockcliffe Park, Ottawa, Ont. Sept. 28, 1898. Conf. J. Dearness.

Mycena immaculata Peck
F. 7443. Ramsayville, Ont. July 21, 1937.

Mycena polygramma (Bull.) Fries
F. 7965. Old Chelsea, Que. Aug. 26, 1934. Det. M. Timonin.

Panus operculatus Berkeley & Curtis
F. 7966. Fairy Lake, Que. Oct. 20, 1902. Conf. J. Dearness.

Panus salicinus Peck
F. 7967. Ottawa, Ont. 1892. Conf. J. Dearness.
F. 7968. Aylmer, Que. Oct. 30, 1898 Conf. J. Dearness.
F. 7969. Britannia, Ont. Oct. 10, 1902. Conf. J. Dearness.

Pleurotus applicatus (Batsch) Fries
F. 6945. Chelsea, Que. Oct. 9, 1936.
F. 7981. Fairy Lake, Que. Oct. 20, 1902. Conf. J. Dearness.

Pleurotus porrigens (Pers.) Fries
F. 7535. Eardley, Que. Oct. 10, 1937.

Russula compacta Frost and Peck
F. 7456. Ottawa ,Ont. July 27, 1937.
F 7517. Ottawa, Ont. Aug. 20, 1937.

Russula cyanoxantha (Schaeff.) Fries
F. 7572. Eardley, Que. Sept. 22, 1937.

Russula flava Romell
F. 7634. Burnet, Que. Aug. 14, 1937.
F. 7982. Ironsides, Que. July 31, 1903. Det. J. Dearness.

Russula fragilis (Pers.) Fr.
F. 7048. Chelsea, Que. Oct. 9, 1936.

Tricholoma arcuatum (Bull.) Fries
F. 7983. Arboretum, Central Exp. Farm, Ottawa, Ont. Nov. 1935. Det. H. T. Güssow.

Tricholoma imbricatum Fries
F. 7984. Rockcliffe Park, Ottawa, Ont. Sept. 22, 1898. Conf. J. Dearness.

Tricholoma nudum (Bull.) Fries
F. 6957. Central Exp. Farm, Ottawa, Ont. Sept. 16, 1936.
F. 6959. Central Exp. Farm, Ottawa, Ont. Sept. 24, 1936.

This species must be carefully distinguished from the common *Tricholoma personatum*. It is a deeper blue, has slightly smaller spores and the spore point is a slightly different colour.

PINK SPORED

Clitopilus undatus Fries
F. 7507. Chelsea, Que. July 28, 1937.

Entoloma grayanum Peck
F. 7924. Wakefield, Que. Aug. 13, 1903. Conf. J. Dearness.

Entoloma sericeum Fries
F. 7587. Arboretum, Central Exp. Farm, Ottawa, Ont. Sept. 27, 1937.
F. 7925. Burnet, Que. Sept. 20, 1934. Det. M. Timonin.

Leptonia asprella Fries
F. 7440. Dow's Swamp, Ottawa, Ont. July 14, 1937.

Nolanea papillata Bresadola
F. 6975. Arboretum, Central Exp. Farm, Ottawa, Ont. Sept. 9, 1936.

Pluteus admirabilis Peck
F. 7454. Chelsea, Que. July 28, 1937.

Pluteus granularis var. *umbrosellus* Atkinson
F. 7020. Burnet, Que. Oct. 11, 1936.

Pluteus leoninus Fries
F. 6978. Burnet, Que. Sept. 13, 1936.

Volvaria pusilla (Pers.) Fr.
F. 5721. In greenhouse, Arboretum, Central Exp. Farm, Ottawa, Ont Aug. 19, 1932. Det. H. T. Güssow.

OCHRE SPORED

Bolbitius vitellinus Fries
F. 7446. Constance Bay, Ont. June 30, 1937.

Cortinarius semisanguineus (Fries) Kauffman
F. 7006. Graham Bay, Ont. Sept. 18, 1936.

Hebeloma Colvini Peck
F. 7926. Ottawa, Ont Sept. 25, 1934. Det. M. Timonin.

Inocybe caesariata Fries
F. 7409. Tenaga, Que. May 25, 1937.

Inocybe excoriata Peck
F. 7959. Cascades, Que. Aug. 13, 1903. Conf. J. Dearness.

Inocybe fastigiata (Schaeff.) Fries
F. 6988 Arboretum, Central Exp. Farm, Ottawa, Ont. Sept. 2, 1936.

Inocybe geophylla Fries
F. 7960. Rockcliffe Park, Ottawa, Ont. Sept 29, 1896. Conf. J. Dearness.

Pholiota albocrenulata Peck
F. 1359. Arboretum, Central Exp. Farm, Ottawa, Ont. July 18, 1930. Det. I. Mounce.
F. 7635. Graham Bay, Ont. Aug. 12, 1937.

Pholiota aurivella (Batsch.) Fries
F. 1643. Central Exp. Farm, Ottawa, Ont. Sept. 6, 1930. Det L. O. Overholts.
F. 3650. Central Exp. Farm, Ottawa, Ont. Sept. 22, 1933.

Pholiota destruens Brond
F. 1388. Arboretum, Central Exp. Farm, Ottawa, Ont. Aug. 25, 1930. Det. E. Eardley.
F. 7014. Burnet, Que. Oct. 11, 1936.

Pholiota discolor Peck
F. 7016. Burnet, Que. Oct. 11, 1936.

Pholiota ombrophila Fries
F. 6961. Central Exp. Farm, Ottawa, Ont. Sept. 8, 1936

Pholiota squarrosa (Mull.) Fries
F. 1550. Arboretum, Central Exp. Farm, Ottawa, Ont. Sept. 20, 1930. Det. L. O. Overholts.

PURPLE BROWN SPORED

Hypholoma capnoides Fries
F. 7562. Burnet, Que. Oct. 11, 1937.
F. 7539. Eardley, Que. Oct 10, 1937.

Hypholoma incertum var *sylvestris* Kauffman
F. 7046. Burnet, Que. Sept. 20, 1936.

Psalliota comtula Fries
F. 6983. Central Exp Farm, Ottawa, Ont. Sept. 16, 1936.

Psalliota micromegetha Peck
F. 6968. Ottawa, Ont. Sept. 24, 1936.

BLACK SPORED

Psathyrella disseminata Fries
F. 7025. Ottawa, Ont. Sept. 16, 1936.

NOTES AND OBSERVATIONS

THE INFLUX OF THE RED FOX AND ITS COLOUR PHASES INTO THE BARREN LANDS.—From Fort Churchill on the west side of Hudson Bay, the timber line runs roughly northwest till about 120 miles due west of Eskimo Point, (which is about 160 miles north of Churchill); from here it bears away to the west. The fringe of the timber line is composed of sparse clumps of spruce, varying in height from three to ten feet.

In 1926, (when I first came to Eskimo Point) and until 1932, the only fur caught and traded at this point was the white fox. During the winter of 1932, one or two red foxes were caught and traded into the inland post of Padley. These came from the timber line, or at least near it. Though this was unusual, it was not surprising as such an event might possibly be due to these foxes straying from the bush.

The following year, several more were caught, and of these two were caught close to the coast. Since then, year by year the number has increased, and with a northward spread. Just how rapid this has been can be seen from the fact that during the winter of 1933-34 several red foxes were traded at Chesterfield. These were caught in an area well over 160 miles north of here and stretching in, half way to Baker Lake Post. In 1934-35, seven or eight red foxes were caught in this area. The increase has naturally been correspondingly great in the area around Eskimo Point, for last year (1936-37) about 60 red, silver, black and cross foxes were caught.

That the increase is not due to 'runs' into the country from the bush, is proved by the fact that in 1934 a pair of coloured foxes (a silver and red) reared a litter of pups near Tavanne, (90 miles north of Eskimo Point). Again in 1935, and 1936 other litters were noted in this vicinity.

About 40 miles to the south of Eskimo Point, coloured fur was exceptionally thick in the winter of 1935-36, but few were caught. As many as 13 to 15 were seen in one day.

These figures do not give a fair idea of the increase of coloured foxes in the country, for the Eskimos set their traps for the white fox which, compared with the red, is a foolish animal. Each year, on the edge of the timber, many tracks of coloured fur are noted.

This autumn (1937) it is most noticeable, that there are no white foxes in those portions of the country where red foxes have their dens The Eskimos often find that a red fox has attacked a white in the trap and, more often than not, killed it.

As to the result of this incoming migration and the trend northward of the coloured fox, time alone can give the answer.—DONALD B. MARSH.

The natural cycles of the fluctuations in numbers of both white and red foxes are not mentioned in this paper and should be considered by naturalists in drawing deductions from the interesting statement of facts presented by the author.—ED.

WINTER BIRDS IN NOVA SCOTIA.—The following observations were made from the train which leaves Sydney, Cape Breton, N.S. at 7 a.m. and arrives in Halifax that evening. The average temperature was approximately 10° above zero and there were about 6 to 10 inches of snow on the ground. Birds observed: Black-backed Gull, 2; Herring Gull, 14; Eastern Crow, 26; Golden-eyes (Sp. ?), 5; White-winged Scoter, 2; Mergansers (probably American), 150 to 200; Northern Hairy Woodpecker, 1; Black Duck, 10; Pine Grosbeak, 1; Northern Raven, 2; Sharp-shinned Hawk (carrying some victim), 1; Old Squaw, 18; House Sparrow, 17; "White-winged" Gulls, 75 to 100. In addition to the foregoing several small flocks of birds were seen flying over the country-side which might have been Goldfinches, Redpolls, or possibly Crossbills. All ducks reported above were seen along the Bras d'Or Lakes, Cape Breton. A number of ducks in rafts off-shore were seen but I was not able to identify them because they did not take flight. The "White-winged" Gulls were seen while crossing the Strait of Canso, concentrating around the ports of Mulgrave and Port Hawkesbury.—R. W. TUFTS.

ALBINO WHITE-CROWNED SPARROW (*Zonotrichia leucophrys nuttalli*).—On April 29th, 1937, when driving in a car at Surrey Centre about 12 miles southeast of New Westminster, British Columbia, I noticed a small white bird in the bushes at the side of the road which I look at first sight to be a Snow Bunting. Closer investigation proved it to be a White-crowned Sparrow. Albinism was complete, except for the black crown and white median stripe. The general colour of the bird was cream and slightly darker on the wings and back. It was in company with a couple of other White-crowned Sparrows in normal plumage. These birds are very common in this area. The sight gave me a great deal of pleasure as it was beautiful and I should think rare.—M. W. HOLDOM, *Crescent, British Columbia.*

RARE GULLS AT FORT ERIE ON THE NIAGARA RIVER.—It is probable that there are few places so eminently well suited to the close study of water fowl, and gulls in particular, as is the Niagara River bank in the vicinity of Fort Erie, Ontario. Here from late summer until the following spring may be seen an ever changing pageantry of the family Laridae. Bonaparte Gulls, Ring-billed Gulls, and Herring Gulls are the three commonest forms, the predominance of one or the other of these species varying as the season advances. Three other species of Gulls occur more or less regularly; namely the Great Black-backed Gull, the Iceland Gull, and

the Glaucous Gull, the occurrence of the two last mentioned species being considerably less frequent than that of the black-backed bird which in some years could almost be considered common.

Any other species of Gull occurring on the Niagara river can only be considered as an extreme rarity, and it is with such that this note is now concerned:—On January 29, 1937. an excellent view was obtained of an undoubted Kumlien's Gull (*Larus kumlieni* Brewster) at a point between the Peace bridge and the Ferry docks. at Fort Erie south. When first seen the bi d was standing on a rock jutting out from the water. only a few yards from the river bank. It allowed a close approach and was studied carefully through 8X glasses at twenty yards, and at even closer range with, and without, the aid of glasses. The general plumage closely paralleled that of a fully adult Herring Gull in winter plumage; but was somewhat paler on the mantle, while the primaries which were white at the tips, showed only a few well-defined dusky blotches or spots when the bird was at rest Attention was first drawn to the bird by its unusual appearance for as it stood on the rock with a background of pale silvery-grey water, it seemed to be foreshortened as though it had lost a large part of its tail and the tips of the wings. A closer approach soon dispelled this illusion which was apparently caused by the pure white tail, and the long white tips on the outer primaries, and the shorter white tips of the inner flight feathers, not showing up against the background of pale water. The bird was alone when first observed, but upon taking wing, after our very close approach, a passing adult Herring Gull provided excellent comparison and striking contrast of wing-tip pattern.

Harold D. Mitchell (*Auk*, 51: 393, 1934) was seemingly the first to draw attention to the occurrence of Kumlien's Gull on the Niagara River, and in writing of this species he mentions that two or three were seen during the winter of 1933-34, and that a specimen was collected at Buffalo, N.Y., on March 25, 1934. Since that time Kumlien's Gull has been reported quite a number of times by members of the Buffalo Ornithological Society; but the order and sequence of the reports, as appearing in the Society's mimeographed journal "The Prothonotary", would tend to indicate that at least several of the records referred to the same bird seen at approximately the same location on different days by different members of the club.

While searching for shore birds, or anything else in the bird line that might offer, along the river bank near old Fort Erie, on September 18, 1937, in company with Mr. G. J. Clout of St. Catharines, excellent views were obtained of a Laughing Gull (*Larus atricilla* L.). The bird stood out very conspicuously among a large flock of Ring-billed, and Bonaparte, Gulls, which were resting on rocks along the shore line. The Laughing Gull, a brown mantled bird, appeared to be in transition plumage, with the suspicion of a dusky head, the dusky area exactly covering that portion of the head which would be sooty black in summer plumage. In size, it appeared to be approximately midway between the two species with which it was so closely associated, while the general colour was greyish on head, neck, and under parts, with the wings and back brown of an earthy shade. When at rest, some whitish edging to the secondary wing feathers was noted, and when in flight, the white edging to the entire inner edge of the wings showed up very conspicuously against the otherwise uniform dark wings and mantle.

Although according to Eaton (*Birds of New York* Vol. 1, p. 133, 1910) the Laughing Gull was reported as occurring near Buffalo by Dr. Bergtold (apparently in that ornithologist's "List of the Birds of Buffalo and Vicinity" 1889), there would appear to be no further available records of this species in the Niagara River area until some forty six years later when one was seen at Niagara Falls on October 21, 1935, by Roger Peterson, Warren Eaton, and others, while on their way to the A.O.U. meeting in Toronto. The following year, on September 6, 1936, H. D. Mitchell of the Buffalo Ornithological Society saw a Laughing Gull at Fort Erie and recorded the observation in that Society's mimeographed journal "The Prothonotary", (Vol. 2 No. 9, 1936).—R. W. SHEPPARD, *Niagara Falls, Ontario.*

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The Canadian Field-Naturalist

VOL. LII OTTAWA, CANADA, MAY, 1938 No. 5

THE SNOWSHOE RABBIT ENQUIRY 1936-37

By DENNIS CHITTY and CHARLES ELTON

1. GENERAL INTRODUCTION.

WHEN THE Snowshoe Rabbit Enquiry was begun in 1931, the cycle was approaching its peak, and it was possible to follow and map during the next four years the progress of the periodic crash which affected snowshoe rabbits in most parts of Canada. By 1935-36 there was almost universal scarcity. The present report, which is the sixth to be issued, shows that in 1936-37 there were signs of the beginning of an upward trend once more in certain regions, mostly in the prairie provinces and British Columbia. 1935-36 was therefore the bottom of the cycle, in the country as a whole, and continued recovery may be expected during the next few years.

The two main sections of the present report, (which is based upon the results of questionnaire enquiries mapped in the Bureau of Animal Population, Oxford University) deal with Canada, and with the United States and Alaska respectively. Altogether, a considerable sample of the whole area of distribution of *Lepus americanus* and some of its allied species has been covered.

Previous reports are to be found in *The Canadian Field-Naturalist*, 47:63-69, 84-86, 1933; 48:73-78, 1934; 49:79-85, 1935; 50:71-81, 1936; and 51:63-73, 1937. To these reference should be made for the details of the methods used in drafting the questionnaire and compiling the maps. We need only note here that the replies give observers' estimates of comparative abundance from year to year, which are mapped in as objective a manner as possible by a method which makes allowance for the area covered by each observer. A great deal of other information is also elicited, about habitats, predators, disease, etc. The replies and working maps are available for consultation in the Bureau of Animal Population; while the Canadian data are also deposited in duplicate in the National Parks Bureau, Ottawa.

2. CANADA, (D.C.)
INTRODUCTION AND ACKNOWLEDGEMENTS

Altogether 557 reports were available for 1936-37. None was received this year for Newfoundland or Anticosti, but the published notes of the Newsom-Watson expedition to Anticosti have been drawn upon. (Newsom W. M. (1936). *J. Mammalogy*, 18:435-42). The continued maintenance of the enquiry on a large scale has been due to the excellent replies sent in by observers and to the care with which several large organizations have managed the collection of data. Material has been obtained from the following sources:

1. 403 reports from observers through the National Parks Bureau of the Department of Mines and Resources, Ottawa. We are indebted to the Controller, F. H. H. Williamson, the Staff of the Parks Bureau, and the following, whose services made this result possible: the Royal Canadian Mounted Police; the Game Officers of the Provinces of Canada; Honorary Game Officers and Holders of Scientific Permits under the Migratory Birds Convention Act; Taxidermists; Superintendents and Wardens of the National Parks, and other observers throughout Canada.
2. 131 zoological reports from Hudson's Bay Company posts, supplied by courtesy of Mr. Ralph Parsons, the Fur Trade Commissioner of the Company in Winnipeg, and published by permission of the Governor and Committee in London.
3. 23 reports from officials of the Biological Board of Canada engaged on fishery work in the Maritime Provinces, obtained through the kind assistance of Dr. A. G. Huntsman.

We are once more indebted to Mrs. Jane Baden-Powell for copying the provincial map tracings from this enquiry. Mr. Hoyes Lloyd, of the National Parks Bureau, has continued to give valuable support and advice

METHODS.

The following changes have been introduced.

1. Observers are now asked to "attach a sketch map showing limits". A gratifyingly large number of such maps has been submitted, many of them drawn with considerable care and with attention to local variations in rabbit numbers. The ease and accuracy of mapping these replies has been greatly increased, and to such observers we wish to extend a special acknowledgement. (Mapping is done as before on tracing paper over large scale provincial maps.)
2. Question 3 now reads:
   Were snowshoe rabbits *more* abundant or less abundant this year than last year?
   (*a*) indicate one of the following:—
   "More abundant", "No change", "Less abundant".
   (*b*) "Remarks".
   The wording of 3 (*a*) has reduced the number of replies that cannot be used, because couched in ambiguous terms such as "yes" and "no", or "scarce" without stating whether this implies "no change" or "decrease". Some of the most useful "remarks" are those that give the number of rabbits seen within a stated period.
3. A new blank map has been prepared by the Bureau, based on the 1937 edition of the map of the Natural Resources of Canada issued by the Department of Mines and Natural Resources, scale 100 miles to 1 inch. This map has been ruled into squares, as before, with sides of 30 miles, but the orientation has been changed. (Corresponding squares cover the provincial maps and each square filled in on the final map has been overlapped entirely or in part by an observer's area.)
4. Areas covered by observers of the Hudson's Bay Company have been mapped as described in their reports and not (as hitherto) as circles of 50 miles radius.
5. Reports from several observers whose areas exceed 100 miles across (the previous limit to the size of areas mapped) have this year been included. A limit of 16 squares has been placed on the number that may be overlapped by one observer, and any number above this is omitted by striking out the squares least overlapped. Since 16 squares is the most usual number overlapped by a circle of 50 miles radius this convention, while permitting more reports on large areas to be used, does not in actual fact increase the effective area allowed to one person.
6. Where the observer gives as his area a river, road or railway, "from... to..." etc. these are mapped as lines, not as strips 10 miles wide (as hitherto). Such lines are in any case expanded in the final map into a series of squares with 30 mile sides.
7. Several technical changes have been made, designed to facilitate the work of mapping. These in no way affect the final result and need not be discussed here.

These changes have probably left the results comparable statistically with those of previous years, while the accuracy of the maps, it is hoped, has been increased. It should be noted that changes 4 and 5 do not affect reports at random but chiefly those from the north. However, it is not certain that this has made any difference to the relative extent to which the results are influenced by reports from the north and the south. The inclusion of more large areas of observation may have been offset, because the reports of some observers of the Hudson's Bay Company refer to areas less than that of the previous conventional circle allotted them.

Calculations are made as follows. The number of squares overlapped by one type of reply only (say "decrease") is counted. This number is expressed as percentage of all the squares overlapped, and is considered to be the minimum fraction of country to which that type of answer is applicable. Besides the squares reporting "decrease" only there will be others reporting "increase" and/or "no change" as well. The total number of "decrease" squares is expressed as percentage of all the squares to give an upper limit to the fraction of country over which decrease took place during 1936-37. The true value probably lies between these limits.

RESULTS.

As predicted in the last report there has been a notable increase in the amount of conflicting opinion. This is only to be expected when a population has reached a very low (or high) level. For example, the following two replies are not really in disagreement though they would appear so on the maps: "More abundant;

but very little change" and: "No change. Possibly a slight increase." More replies stating "no change" have yeen received than in any previous year. Regionally the situation presents several differences and a very arbitrary selection of replies has been made to illustrate these.

TABLE 1

State of the Snowshoe Rabbit population in Canada, 1936-37 (numbers of squares).

	Total	Increase	% Increase	Decrease	% Decrease	No Change	% No Change	Epidemic	% Epidemic
Yukon	60	19	**27-32**	44	**68-73**	0	**0**	10	**17**
Northwest Territories	182	17	**4-9**	165	**65-91**	51	**4-28**	16	**9**
British Columbia	241	97	**17-40**	149	**27-62**	104	**17-43**	9	**4**
Alberta	214	120	**18-56**	138	**25-65**	84	**10-39**	4	**2**
Saskatchewan	170	74	**12-44**	111	**34-65**	69	**14-41**	23	**14**
Manitoba	210	67	**16-32**	134	**36-64**	78	**16-37**	0	**0**
Ontario	331	77	**3-23**	285	**64-86**	82	**6-25**	12	**4**
Quebec & Labrador	266	12	***0-5**	257	**85-97**	27	**3-10**	48	**18**
New Brunswick	29	17	**7-59**	22	**21-76**	19	**3-66**	1	**3**
Nova Scotia	41	33	**15-80**	21	**2-51**	25	**10-61**	0	**0**
Total	1744	533	**10-31**	1326	**49-76**	539	**9-31**	123	**7**

* Actually 0.4%

(*a*) YUKON, NORTHWEST TERRITORIES AND BRITISH COLUMBIA.

In the Yukon decrease started in 1935-36 and had spread during 1936-37 to a few more areas, accompanied by epidemics. However, there still remained a few places (the last in Canada) in which rabbits had not yet passed their peak of abundance. In the Northwest Territories, where widespread decrease occurred suddenly in 1935-36, practically no recovery was reported. Signs of increase were apparent in British Columbia.

Dawson City, Y. T. and radius of 10 miles (No name):

"The peak of abundance would appear to have been reached during the period October 1936—December 1937. During the past six months or so very many remains of rabbits have been visible everywhere in the woods. While some few have doubtlessly been killed by hawks, the great majority are probably the victims of an epidemic disease."

Mayo District, Y. T. (A. Mason Rooke, R.C.M.P.):

"More abundant. There was great scarcity about 1930 or 1931 but there is now great abundance. Fieldmen (who spend much time snaring rabbits for dog feed etc.) forecast an epidemic this coming winter (1937-38) similar to those of 1904, 1913 and 1925."

Whitehorse District, Y. T. (L. S. Kingston, R.C.M.P.):

"Less abundant. Last fall (September-December) rabbits were to be found everywhere. Examination showed boils on neck and water blisters on liver."

Wood Buffalo Park, District No. 5 (a sketch map shows the trails covered) (L. H. Nice):

"Although I have not seen more than three rabbits in the past 12 months, I have seen a considerable number of tracks which shows that there are now more rabbits in my district than there were last year. Most of the trappers say rabbits have just started to come back again."

Fort Smith District, N.W.T.. (F. Cook, R.C.M.P.):

Fig. 1. *State of the snowshoe rabbit population in* 1936-37. *Dotted areas are groups of squares overlapped by areas of observers reporting relative INCREASE in* 1936-37 *over* 1935-36. *Larger black dots are Hudson's Bay Company posts. Broken lines in Canada show main vegetation zones. Thick black lines are Province or State boundaries*

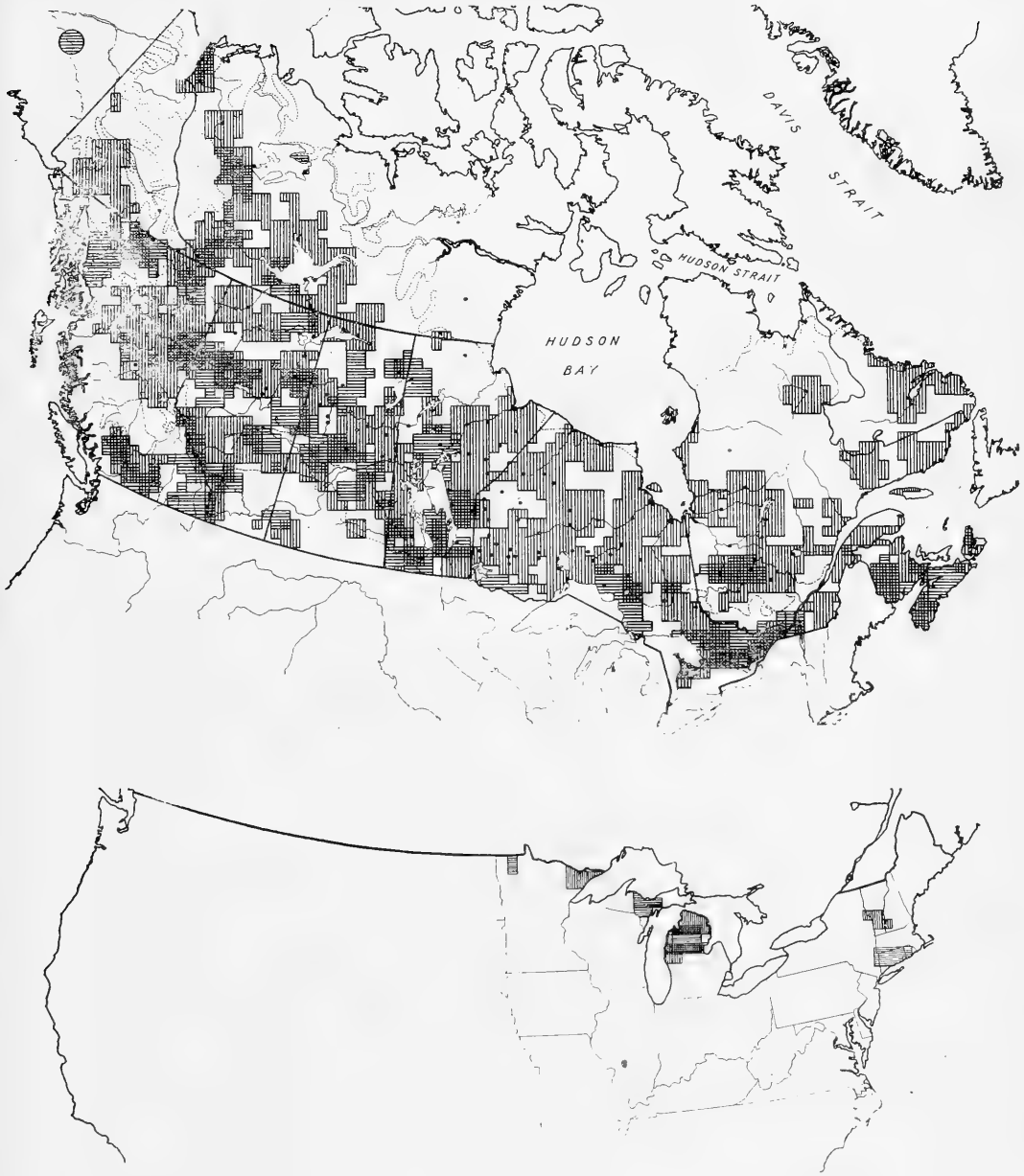

Fig. 2. State of the snowshoe rabbit population in 1936-37. Vertical hatched areas, are groups of squares overlapped by areas of observers reporting relative DECREASE in 1936-37 over 1935-36. Horizontally hatched areas, NO CHANGE. For Alaska see text. Larger black dots are Hudson's Bay Company posts. Broken lines in Canada show main vegetation zones. Thick black lines are Province or State boundaries.

"Less abundant. There were a few rabbitts last year; but except for an odd track, rabbits now seem almost extinct."

Lower Parsnip River, Peace River, Finlay River, B.C. (A. J. Jank, Game Warden):

"More abundant on jackpine ridges, less abundant on lowlands and swampy country, in some areas only. While passing through other parts of the district no signs of snowshoe rabbits could be seen."

Quesnel District, B.C. (J. P. Atwood):

"Inc easing in isolated spots (spruce swamps and jackpine reproduction). Still scarce in the district as a whole."

Revelstoke, B. C. & radius of 20 miles. (H. V. Morgan):

"Trappers coming from the northern part of the district report that there appeared to be more rabbits than for the last few years."

Lytton to Salmon Arm, B.C. (W. J. Ferguson):

"Less abundant. Haven't seen a rabbit in the past 12 months. They appear to be a thing of the past."

(*b*) ALBERTA, SASKATCHEWAN AND MANITOBA.

The large area of increase reported from these provinces shows that recovery had definitely started, though as indicated by the following replies, rabbits were still very scarce. That recovery was of a "patchy" nature is indicated by the amount of conflicting opinion as well as by definite statements to this effect.

Northern Alberta, Tps. 69-94, Rge. 3 W. 5th M. to B. C. Boundary. (*W. H Bannister.*):

"Much less abundant. I have never seen so few rabbits in 27 years. I have only seen about 20 rabbits in all my travelling since December 1st, 1936. It is almost a curiosity to see one now."

Northern Alberta, Tps. 69-73, Rges. 20-27 W. 5th M. (R. W Duff, R.C.M.P.):

"About the same. Very few rabbits have been seen in this district during the past few seasons."

Vicinity of Belvedere, Alta. (A. D. Henderson):

"Less abundant. Rabbits are now at lowest point in numbers in the cycle. In a day's walk I have seen one or two individuals. In a 21 days' collecting trip 35 miles north only one individual was seen. Young jackpine 1—2 feet high were abundant. These seedlings never survive when rabbits are numerous and it is then impossible to find a jackpine under 7 or 8 feet high."

N. W. corner of the Prince Albert National Park, Saskatchewan. (No name):

"Less abundant. In some localities rabbits were plentiful, then one could drive for miles without seeing a single track."

Tps. 50-55, Rges. 13-18 W. 3rd M. Saskatchewan. (*J. Barnett*):

"No change, very scarce. They do not seem to be coming back very fast."

Interlake District in Manitoba. (E. S Norman):

"For the whole winter generally: no change. Within the last month I have seen more than during any month this winter."

(*c*) ONTARIO AND QUEBEC PENINSULA.

The noticeable recovery in the prairie provinces is in marked contrast to conditions generally in Eastern Canada. In most places a third year of decrease is said to have been experienced, though it is likely that much of this should more correctly have been stated as "no change, great scarcity".

Weenusk, Ont. 80 miles N., 20 miles S., 100 miles inland. (R. B. Carson, H. B. Co. post manager):

"Rabbits have been exceptionally scarce, not more than 10 being killed by the whole Weenusk Band, who cover a large stretch of country. Have never seen rabbits so scarce as they have been here for three winters now."

Fort William to Ignace, Ont. (A. E. Frazer, Overseer, Game and Fisheries):

"Less abundant. There has been a gradual decrease for the past three years. They are scarcer now than at any other period that I can remember."

Between Tatnal, mile 216 Algoma Central Railway and Franz: W. to White River and E. to Lochlash on the C.P.R. S. to mile 103 A. C. R. (O. D. Lewis):

"Possibly a very small gain. Some small localities have a considerable number of rabbits and within two miles there appear to be only a very few."

Algonquin Park, Ont. (J. R. Dymond, Director Royal Ontario Museum of Zoology):

"None seen in a quite extensive trip through the park. None seen last year either. Probably no change."

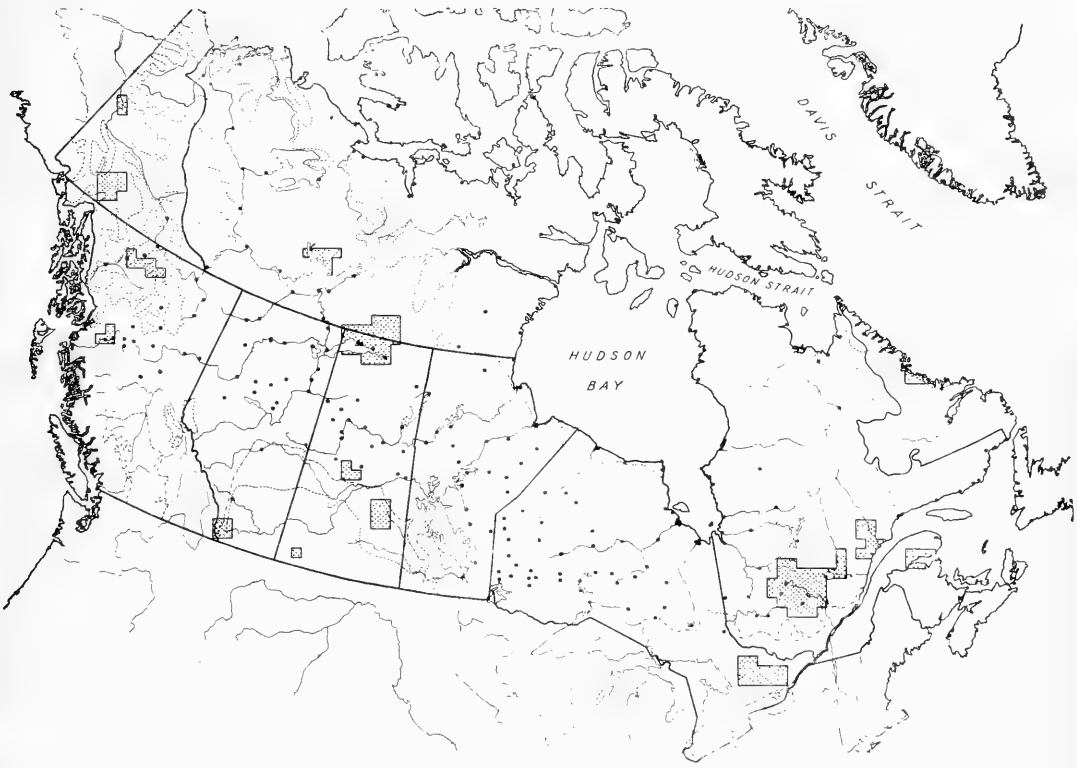

Fig. 3. Epidemics among snowshoe rabbits. Dotted areas are groups of squares overlapped by observers reporting EPIDEMICS in 1936-37. Larger dots are Hudson's Bay Company posts, etc. Broken lines show main vegetation zones. Thick black lines are Province boundaries.

Fort George, P.Q. and 100 miles radius. (W. T. Watt, H. B. Co. post manager):

"Not more than 100 rabbits have been caught amongst a population of over 700 Indians this outfit."

Vicinity of Oskelaneo, P. Q. (E. J. Haight, H. B. Co. post manager):

"Snowshoe rabbits continued to die off during the early part of the year from the same disease which has killed them off in the past."

Up the St. Marguerite R., E. to L. Ashuanipi & L. Atikonak, down the Romaine R. to St. Jean and the St. Lawrence. (J. A. Bourdeau, R.C.M.P.):

"It is reported that there have been less rabbits this year than ever before. What few rabbits there were in the interior were not eatable: they had some sort of disease which affected their lungs. Hunters stated that when they were opened there was pus gathered in and around the lung of each."

(*d*) NOVA SCOTIA AND NEW BRUNSWICK.

Such huge local differences are again apparent in the Maritime Provinces that it is practically impossible to draw any conclusions from the present analysis. Particularly in Nova Scotia, however, there appear to be areas where rabbits have reached an appreciable density.

S. Inverness Co., N.S. (P. W. Smith):

"More abundant. Snowshoe rabbits are at present very plentiful, more so than for the past number of years."

Two important papers on the ecology of the snowshoe rabbit have recently appeared. These give the results of careful studies carried out in Manitoba and in Ontario. Unfortunately, it is impossible here to do more than cite the references which are: Criddle, S. (1938) *Can. Field Nat.* 52:31-40; and MacLulich, D. A. (1937): *Univ. Toronto Stud. Biol.* 43: 1-136.

3. UNITED STATES AND ALASKA (C.E.)

UNITED STATES.

The U. S. Bureau of Biological Survey for a third year sent out questionnaires to their agents in various states, and to certain organizations who cooperated. We wish to thank the Chief of the Biological Survey, Dr. Ira N. Gabrielson; the Chief of the Division of Wildlife Research, Dr. W. B. Bell; and Dr. H. H. T. Jackson of the Section of Wildlife Surveys, who handled the enquiry. The Michigan State Department of Conservation again obtained some well-documented replies, while other useful information was obtained through the U. S. Forest Service. Copies of the questionnaire replies are on file with the Biological Survey at Washington, D.C. and at Oxford.

Since the first two years' results from the United States had established fairly clearly that periodic regional fluctuations are not strongly marked in the Western (especially the mountain) part of the country, it was decided to confine the enquiry this year to the Eastern and Central States. Although fluctuations do undoubtedly occur in areas like the Rocky Mountains, the reports afforded the strongest evidence that these were rather slight, and that the questionnaire method would therefore not yield a reliable running record of the changes in numbers. However, in so far as the present enquiry is designed to study the distribution of the main and well-marked ten-year cycle in snowshoe rabbit numbers, it has achieved its object. We are now in a position to state that the cycle operates over most of Canada and in these Central and Eastern United States where snowshoe rabbits occur. This statement requires, of course, the qualification that fluctuations may be very slight at the southern limits of the range, where the population is in any case rather sparse.

The results for 1936-37 are based on a much smaller number of observers than those for Canada; but counterbalancing this is the fact that the observers were in most instances highly trained field men, accustomed to study wild life conditions, and familiar with their area of country. Accordingly some of the areas on the map are larger than those normally accepted in mapping the Canadian data. The total number of observers was 22, and the total number of thirty-mile sided squares overlapped by them was 114. As one square cut by the State boundary of Vermont and New Hampshire had "decrease" reported for the former and "increase" for the latter, this has been counted as two separate squares, bringing the total up to 115. For estimating total area the lower figure is to be used. This gives a maximum square mileage of about 103,000. The actual area covered by observers is, owing to the convention adopted (marking any square on the grid overlapped at all, as a whole square) probably less than half this figure. In making comparisons between different categories of relative abundance, this exaggeration does not matter.

TABLE 2

Records of the Snowshoe Rabbit population in the United States, 1936-37. (*Number of squares*).

	No. of observers	Total no. of squares	Increase	% Increase	Decrease	% Decrease	No change	% No change	Epidemic	% Epidemic
Connecticut	1	7	0		0		7		0	
Maine	2	28	28		0		0		0	
Massachusetts	1	3	3		0		0		0	
Michigan	11	48	14-19		15		14-19		0	
Minnesota	4	12	3		7		2		0	
New Hampshire	1	13	13		0		0		0	
Pennsylvania	1	3	3		0		0		0	
Vermont	1	1	0		4		0		0	
Total	22	115	61-69	**56-60**	22	19	23-28	**22-24**	0	**0**

The detailed results are given in Table 2. The figure for percentage increase, 56-60%, is high this year, comparing with 47-60% in 1935-36 and 5% in 1934-35. The figure may have been even higher than this, as certain parts of Northern Michigan that had no change, with possible slight increase, were counted as no change. This partly accounts for the relatively high percentage of no change, which appears as a feature also of the Canadian figures for this season. Although the figures are sufficiently small to be subject to fairly large errors (of opinion or the weighting of classes by single observers reporting from large areas), yet they indicate that the snowshoe rabbit cycle in the Eastern States was either near its bottom or on the upgrade once more, recovering from the last peak in the early thirties.

Space prevents quotation of more than one or two of the original replies, which contain many interesting observations. These will be incorporated into a more comprehensive report on the results of the three years' enquiry in the United States, which is being prepared.

As regards the northern counties of Connecticut, the report (Paul D. Dalke) indicates that the absence of change in numbers is due to the general scarcity of snowshoe rabbits there at all times, and not to the state of the cycle: "At no time is snowshoe abundant in Conn., southern limit of distribution in New England."

Some comparable reports from New York State were not mapped. They indicate either usual or periodic scarcity. W. J. Hamilton mentions that "there is a widespread belief among hunters, perhaps not unfounded, that the smaller cottontail is responsible for driving out the snowshoe when it invades the latter's range. It is true that the cottontail is spreading into the foothills of the Adirondacks and now occurs where it did not previously." Future research may show whether this connection is a coincidence or not.

Some reports from Wisconsin, Southern Michigan and Virginia provide useful information on the present limits of the range of the snowshoe rabbit, but have not been mapped.

Notes from Maine (B. E. Smith, L. F. Brackett) indicate that snowshoe rabbit increase has been seen in the cut-over areas and burnt lands, but not in the heavily timbered country. The normal habitats and possible periodic spread into others when density becomes high form an interesting subject on which these questionnaires will throw a good deal of light, when data have accumulated for a number of years.

A general report covering Northern Minnesota and the Upper Peninsula of Michigan (S. E. Aldous) states: "If any change took place during the past year, it was slight increase in Northern Michigan; but the animals are still at a very low point in the cycle." This conclusion is fully confirmed by the detailed reports supplied by the Michigan Department of Conservation.

In regard to the situation in Minnesota, and the question of the nature of the snowshoe rabbit crash, special attention is drawn to the Minnesota Wildlife Disease Investigations that have been carried on for several years by R. G. Green in cooperation with other workers, and in particular to the remarkable evidence that is accumulating about "shock disease". The Report by C. M. Aldous (*J. Mammalogy*, 1937, 18:46-57) gives additional data from this investigation, on habits, movements and reproduction. These data suggested that there was no abnormally high reproductive rate associated with the peak of the cycle in numbers, a conclusion also reached by Criddle in the paper already mentioned.

The conclusions tentatively reached from the United States enquiry are (1) the snowshoe rabbit has a marked periodic cycle in northeast and north-central United States (2) the period is probably the same (round about ten years) as that of the main Canadian populations (3) the bottom of the cycle has been passed in many areas (4) the Eastern United States snowshoe rabbits are showing recovery sooner than those in Ontario and Quebec

The United States enquiry is being continued by the Bureau of Biological Survey for the next year.

ALASKA.

In view of the evidence obtained through the Canadian enquiry that snowshoe rabbits were still high in some parts of Northwest Canada in 1936-37, the following report from an observer in Alaska, who has followed the cycle for several years is of great interest.

From Otto W. Geist, of the University of Alaska, transmitted through the U. S. Bureau of Biological Survey: "*Period* 1936-37. *Area*: Central Alaska: vicinity of Fairbanks, bordered approximately by Chatnika on the N., Ester towards the W., Chena Hot-springs towards the E., and Richardson towards the S. *Habitat*: Chiefly brush country with small stands of black spruce, birches, alders, but chiefly consisting of low alder and willow brush scattered throughout

ravines in tundra country and low hills. *Numbers*: Apparently no change from last year. Rabbits are plentiful. *Disease*: No epidemic whatsoever. Dissections of rabbits this summer showed in many cases that the majority of rabbits are infected with tapeworms as well as ticks." Two boys hunting on 17 October 1937 for about seven and a half hours shot with rifles 64 snowshoe rabbits over a distance of some seven miles from Fairbanks. About three-quarters of these were killed on less than a quarter of a square mile. On 17 October one man killed 11 rabbits within about an eighth of a square mile.

SUMMARY.

557 reports for the season 1936-37 were received from Canada. In limited areas in the Yukon the crest of the cycle had not yet been passed In the Northwest Territories almost no recovery had occurred. In British Columbia and the prairie provinces, however, local but definite signs of increase were apparent. Over most of Eastern Canada (including Anticosti) snowshoe rabbits were extremely scarce. Except possibly for parts of Nova Scotia, signs of recovery were much less in evidence than further west. For the Dominion as a whole the bottom of the cycle was reached in 1935-36. 1936-37 thus marks the first of several years in which the reappearance of the snowshoe rabbit may be looked for in gradually increasing abundance. 22 reports from the United States provide evidence that a similar recovery had begun in some parts of the north-eastern and north-central States, although great scarcity still prevailed. One report from Alaska was received, stating that numbers were still high, as in some parts of the Yukon.

ERRATUM.

In the last report (*Canadian Field-Naturalist*, 1937, Vol. 51) there is one correction to be made.

p. 68 Omit "less" from report from Fort Simpson.

RED SPRUCE IN THE LOWER GATINEAU VALLEY

By C. HEIMBURGER and A. E. PORSILD

A NEW TREE was added to the flora of the Ottawa district recently when red spruce (*Picea rubens* Sarg.[1]) was discovered in the Gatineau district on the property of the Ottawa Ski Club. A few young trees were first seen in a small marsh on the "Pleasant Valley" trail, a short distance southwest of the "Top of the World". A search for the parent trees soon located fifty or more old and middle-aged trees. Later a second group of old and young trees was found growing just east of the Meach Lake road, not far from Old Chelsea There is reason to expect, from the occurrence of the trees seen, that further botanizing will show the red spruce to be tolerably common in the lower Gatineau district on well drained, but moist and well sheltered slopes.

Red spruce has been definitely recognized as native to the flora of Canada only in fairly recent times. The first Canadian record probably being from Prince Edward Island, *Macoun* Cat. v. p. 362, 1890 as *P. nigra* var. *rubra* Gray's *Manual*, for example, 7th ed., in 1907 gave its distribution thus: "Nfld. to Pa. south in the Alleghennies to Ga., west to Minn." although Sargent two years before in *Manual of Trees of North America*, p 41, had correctly said: "from P.E.I. and the valley of the St. Lawrence etc". In *Native Trees of Canada*, ed. 1933 (Forest Service Bull. 61), the range given includes Nova Scotia, New Brunswick and Quebec south of the St. Lawrence, incorrectly including Gaspé and Baie de Chaleur. Victorin, on the other hand, in his *Flora Laurentienne*, in 1935, merely states: "il se trouve probablement dans le sud de l'aire".

The occurrence of red spruce to the north of the St. Lawrence has long been suspected by foresters, but until now, as far as we are aware, no records have been officially verified. Thus in the autumn of 1932, C. Heimburger, during a trip to the headwaters of Montmorency River, P.Q., saw red spruce growing near Laval, at the southern edge of the Laurentians. During the same autumn he again found it on the middle Lievre

1 Fernald & Weatherby, *Rhodora* 34:211, 1932, have pointed out that according to the "homonym" rule of 1930, *P. rubra* (DuRoi) Link cannot be maintained and that Sargent's name, therefore, being *the first unequivocal* one, must be used

River, considerably west of its then known range. Again, in the summers of 1936 and 1937, it was found abundantly represented in the forests of the Lake Edward Forest Experiment Station, near Lac la Pêche, P.Q. Thus it seems that red spruce is found along the southern edge of the Laurentians, from Laval to the Lievre. The recent find on the lower Gatineau extends its range still further to the westward.

Picea rubens (Red Spruce), like *P. mariana*, (Black Spruce) is easily distinguished from *P. glauca* (White Spruce) by the finely pubescent young branches. The leaves of white spruce, also, have an unpleasant, pungent taste that, once learned, readily distinguishes fresh material. Typical material of red and black spruce may be distinguished by the following characters:

Picea rubens

leaves: long, slender, sharply pointed, lustrous fresh green.

cones: green when young, becoming light reddish brown and lustrous at maturity, ovate-oblong, gradually narrowed towards the acute apex, from 1¼ to 2 in. long, falling soon after maturity; scales obovate, entire or slightly denticulate.

P. mariana

leaves: shorter, somewhat curved, blunt, dull bluish-green.

cones: purplish when young turning dull brown at maturity, ovoid, ½ to 1½ in. long, persisting on the branches for many years; scales finely denticulate or erose on the notched, pale margins.

INFORMATION CONCERNING THE OCCURRENCE OF THE SNOWY OWL

The National Parks Bureau is gathering information concerning the occurrence of Snowy Owls in southern Canada during the winter of 1937-38.

It would be appreciated if persons who have observations to report in this connection would give any particulars concerning Snowy Owls observed since November 1, 1937, and any comments as to whether or not Snowy Owls were unusually abundant during the past winter.

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The Canadian Field-Naturalist

Vol. LII OTTAWA, CANADA, SEPTEMBER, 1938 No. 6

SUMMER NOTES FROM BLUE SEA LAKE, QUEBEC

By IRA N. GABRIELSON

A MONTH beginning July 3, 1937, spent on Blue Sea Lake, Quebec, lying in the Gatineau Valley, some 80 miles north of Ottawa, afforded me an opportunity to become acquainted with the summer birds of the eastern Canadian Zone. My interest was particularly directed to the breeding warblers, a group much less abundant than that with which I was familiar in the same zone farther west. As breeding was well advanced at the time, my interest turned toward fledgling plumages During the period July 3 to 31, inclusive, I spent some time each day in the field and noted 94 species of birds.

Blue Sea Lake lies in the Laurentian highlands and is similar to numerous other lakes in the vicinity. The surrounding rocky hills tend to produce precipitous banks, and the water is often deep at the shore line. The lake is about 10 miles long, 2 or more miles in width, and in places 200 feet deep. The adjacent country is wooded execpt where small farms have been cleared. Aspen, birch, and red maple are the most common deciduous trees, and the cut-over or burnt-over lands are usually revegetated by one or more of these species, sometimes in dense jungles of mixed brush. Raspberries and blueberries grow in profusion along the roads and in the more recent clearings. Most of the country has been cut over, and the original coniferous forest of spruce, pine, cedar, and hemlock are represented only by small islands of timber or scattered young second growth. The best sample of woodland was on Big Island, the largest of the numerous islands in the lake, and the one on which our cottage was built. A virgin forest of hemlock, yellow birch, cedar, black spruce, and some pine (both white and Norway represented mostly by younger trees) covered the slopes of this rocky bit of land. Balsam, butternut, basswood, ash, and other deciduous trees were fairly well distributed over the surrounding territory and pure or almost pure stands of red oak crowned several of the higher hills.

Most of the field excursions were by row boat on the shores of Blue Sea Lake. Trips to neighbouring lakes and north along the highway to Maniwaki, some 10 miles north of Messines post office on the eastern shore of the lake, also were made occasionally. On July 14 a trip was made by car to Mount Laurier about 50 miles to the northeast, stops being made to observe birds.

July 21 and 22 were spent on Little and Big Cedar Lakes in company with Dr. R. M. Anderson. These lakes lie immediately to the north of Blue Sea Lake and were reached by a short portage. On July 24 Anderson and I also visited Grant Lake, a small body of water connected with Blue Sea Lake by a short stream. On July 29 we drove to Lake Baskatong 60 miles to the north and returned the same day, stopping frequently to see the bird life in different types of vegetation.

The rest of the time was spent in the immediate vicinity of Blue Sea Lake, and most of the following notes were made within a mile of its shore line. To the west of this lake lies an almost unbroken second-growth forest with scattered small-farm clearings on its southern and northern ends and about adjacent small lakes. A fire tower on a hill in this vicinity afforded a good view of the surrounding country, and the trails and wood roads leading to it were good bird territory.

Bits of cedar swamps and an occasional rocky point covered with fir or hemlock broke the "brush" cover somewhat, but otherwise it was uniformly deciduous. The eastern side of the lake was more open and contained more farm and pasture lands. The territory along the northern shore of the lake and from the town of Messines to Maniwaki, especially the immediate vicinity of Messines, harboured most of the open country forms recorded.

The first few days of study revealed that many of the young warblers were already fledged. The black and white, magnolia, black-throated

blue, and Canada warblers were already leading their youngsters through the bush along the lake shores.

By July 15 the majority of the broods had left their nesting sites and were concentrated in small mixed companies. A rain storm on July 16 and 17 was followed by the first evidence of migration. On July 18 the tree tops on Big Island were filled with warblers, difficult to see because of the dense foliage tossed about by the wind. Moving bands of warblers, evidently migrants, were frequently seen from that time on, the most notable being a flight of redstarts on July 19, and a second on July 26 composed largely of redstarts and Blackburnians. Flights of swallows arrived on July 27 and July 29. Northern migrants in general were becoming much more common by August first, at which time field work ceased.

Gavia immer immer (Brünnich). COMMON LOON. — The loon was the most conspicuous water bird of the region. Four pairs lived on Blue Sea Lake, and every one of the large lakes visited had one or more breeding pairs. I saw three pairs with young on Blue Sea Lake, a pair on Little Cedar Lake, and one pair with young on Big Cedar Lake. Other birds were noted on several other lakes but no young were seen. Not a day passed during the stay there but that loons were seen and heard, although toward the end of the month they became much less noisy. Every day several were noted high over the lake as they circled about in morning flight. On July 4 a pair with two downy young were noted for the first time, though they were seen frequently later. On July 5 a nest containing two eggs was discovered on a little island across an arm of the lake from our cottage. These eggs hatched on July 8, and on the same day the old loon, which as we approached had been slipping quietly from the nest to swim under water for a safe distance before coming to the surface, made a great fuss and stayed close to the boat. One egg was then pipped and on the following morning, when we again went by the island, the nest was empty.

On July 21 a pair of loons on Little Cedar Lake became greatly excited when Anderson and I tried to get close to them and their three-to-four-weeks-old babies. One led the two young away while the other stood up in the water with breast pushed forward and neck arched. This performance, accompanied by wild cries, was repeated many times, sometimes interspersed with short dives and a somewhat sketchy "wounded-bird" performance.

At 6:30 on the morning of July 31 six adult loons in front of the cottage were holding a meeting which, judging from the cries, was not all peace and harmony. As we rowed away we saw two other adults and two half-grown young, so that 10 birds, the greatest number seen at one time, were in sight.

As I left the lake on the morning of August 3 a loon resting quietly on the water was the last bird I saw in this area.

Podilymbus podiceps podiceps (Linnaeus). PIED-BILLED GREBE. — The only pied-billed grebes noted were on a tiny pond just north of Messines on Highway 11. A single bird, possibly the same individual, was seen there on July 14, 28, and 29.

Ardea herodias herodias Linnaeus. GREAT BLUE HERON. — Herons were not common anywhere in the region. Single birds were noted on five different days as follows: July 8 and 12 at Blue Sea Lake; July 21 at Little Cedar Lake; July 22 at Big Cedar Lake; and July 24 at Grant Lake.

Botaurus lentiginosus (Montagu). AMERICAN BITTERN. — Only three bitterns were noted during the entire month. The first, on July 22, was flushed from a little swampy spot on the north end of Blue Sea Lake as we returned from the Cedar Lake trip; the second was at Grant Lake on July 24; and the third at Lake Baskatong on July 29.

Anas rubripes Brewster (Subsp. ?). BLACK DUCK. — Single individuals were seen flying over the lake on three days, July 4, 14, and 30. All were in the part of the lake nearest to Grant Lake, a small pond with weedy margins and bits of marsh along the shore. I visited this place several times but found no evidence of the breeding of the black or any other ducks.

Dafila acuta tzitzihoa (Vieillot). AMERICAN PINTAIL. — Six pintails were seen in a shallow pond near Lake Baskatong on July 29.

Nettion carolinense (Gmelin). GREEN-WINGED TEAL. — A flock of 12 green-winged teals was observed in a small pond near Lake Baskatong on July 29.

Lophodytes cucullatus (Linnaeus). HOODED MERGANSER. — Hooded mergansers were not common, being observed only on three occasions. Two were seen at close range on

July 4 on Blue Sea Lake, a single bird on Big Cedar Lake on July 21, and an adult female and four half-grown young on a tiny woods pond northeast of Maniwaki on July 29.

Mergus merganser americanus Cassin. AMERICAN MERGANSER. — Mergansers were seen frequently and were presumably of this subspecies. An adult followed by 30 or more young, probably two families, was seen on Big Cedar Lake on July 21, and three adult males were noted at close range on July 22. A female merganser and 11 young were herded by boat for a couple of hours on Blue Sea Lake July 29 and finally allowed close approach and observation.

Mergus serrator Linnaeus. RED-BREASTED MERGANSER. — The only certain record of the red-breasted merganser is of an old male observed on Blue Sea Lake late in the evening of July 27. This bird was accompanied by either two well-grown young or females that kept well inshore in the shadows. The next morning efforts again to find the birds to learn definitely whether they were young as yet unable to fly were unsuccessful.

Accipiter velox velox (Wilson). SHARP-SHINNED HAWK. — On July 12, while I was walking near the top of Big Island, a sharp-shinned hawk made such a fuss that it was obvious her nest was in the vicinity. The next day the nest was located about 30 feet up in a dense hemlock. On July 18 Anderson climbed to the nest and found four downy young, two of which were taken and fed until July 24, at which time they had well-developed quills in both tail and wings and were spotted over back and breast with new feathers showing through the down. On July 27 the young remaining in the nest left at our approach and flew some distance into a hemlock thicket. On the 24th and again on the 29th, the male was found sitting on a tall, dead snag on the opposite side of the island from the nest. He was evidently using it as a lookout because frequent sallies through surrounding areas always ended in a return to the perch. The sharp-shins did most of their hunting on an adjoining island and were seldom seen about Big Island unless the nest was approached. In this event one or both parents soon appeared.

Accipiter cooperi (Bonaparte). COOPER'S HAWK. — A single individual, which dashed through the edge of a little clearing in pursuit of a small bird, was seen on July 10 — the only record.

Buteo platypterus platypterus (Vieillot). BROAD-WINGED HAWK. — A broad-winged hawk flew across the creek between Big and Little Cedar Lake just ahead of our boat on July 21, and a second individual was noted at Grant Lake on July 24.

Haliaeetus leucocephalus (subsp. ?). BALD EAGLE. — An adult bald eagle flew over our boat on the morning of July 26 as we fished near Big Island.

Circus hudsonius (Linnaeus). MARSH HAWK. — A single marsh hawk was seen on July 12 in a little clearing to the west of Blue Sea Lake, and a second was seen at Lake Baskatong on July 29. The first bird, a female, was being harried by four crows as I came into the edge of the little farm clearing. A lone white pine with a rather open top stood in the center of this 10-acre hay field. The marsh hawk paid little attention to the crows but continued hunting over the field. Gradually she worked her way toward the tree, the crows following somewhat perfunctorily. Suddenly the hawk swerved and darted toward the center of the tree, tipped until she stood almost in a vertical plane as she grazed the trunk, straightened out, and drove directly at a robin sitting on the end of one of the longer branches. The robin let out a startled squawk and took wing for the edge of the forest with the marsh hawk close behind. The hawk overtook the robin; there was a flurry of wings and the hawk passed from sight behind a screen of trees, carrying the bird I could not see exactly what happened but did note that as the predator disappeared the smaller bird was clutched in its talons. A sharp-shinned hawk could not have made a neater catch.

Pandion haliaëtus carolinensis (Gmelin). OSPREY. — Single birds were noted over Blue Sea Lake on July 10, 13, and 26. Hawks were scarce through the district, and ospreys were no exception to the rule.

Falco columbarius columbarius Linnaeus. EASTERN PIGEON HAWK. — While fishing in Big Cedar Lake, Anderson and I saw a pigeon hawk fly to a small, heavily wooded island. After we tired of fishing we visited the island and soon located a female bird feeding a newly fledged male Though a careful search was made we failed to find others on the island. Later in the day two

shed primaries of a pigeon hawk were found back of our tent on the mainland, and it is possible that the rest of the family was somewhere in the dense forest growth, which at this point came to the water's edge.

Falco sparverius sparverius Linnaeus. EASTERN SPARROW HAWK. — Only two individuals were observed, the first near Messines on July 7 and the second north of Maniwaki on July 29.

Bonasa umbellus togata (Linnaeus). CANADA RUFFED GROUSE. — A single ruffed grouse was found on the west side of Blue Sea Lake on July 15, and an adult female and several half-grown chicks were flushed in the edge of a little cedar swamp on July 20. Others were heard in the same localities at various times.

Oxyechus vociferus vociferus (Linnaeus). KILLDEER. — The killdeer was not common, but one or two birds could usually be found in open fields between Messines and Maniwaki. Two birds were also seen near Lake Baskatong on July 29.

Actitis macularia (Linnaeus). SPOTTED SANDPIPER. — Spotted sandpipers and killdeers were the only shore birds noted, and neither was common. One pair of the present species was frequently noted on Big Island, and single birds, or at most two, were seen occasionally on other lakes in the vicinity.

Larus argentatus smithsonianus Coues. HERRING GULL. — Several herring gulls, including at least two adults and one in sub-adult plumage, were on the lake throughout the month. I never saw more than two at a time, although I suspect the total population was probably five or six. On several occasions two adults were noted, but never more than a single bird in gray plumage. The number of rocky islands used as roosts, however, made it impossible to be sure of the total population as individuals might be noticed either resting on the rocks or flying in any part of the lake. No evidence of breeding was found.

Coccyzus erythropthalmus (Wilson). BLACK-BILLED CUCKOO. — Cuckoos were not common. Single birds were seen near the railway station at Messines on July 14, 15, 28, and 30, and others were both seen and heard on Big Cedar Lake on July 22.

Antrostomus vociferus vociferus (Wilson). EASTERN WHIP-POOR-WILL.—Whip-poor-wills were heard calling on the north shore of Blue Sea Lake on July 18 and again on July 23, and four or more birds were calling near the tent that Anderson and I pitched on the shore of Big Cedar Lake on the evening of July 21.

Chordeiles minor minor (Forster). EASTERN NIGHT HAWK. — Two night hawks were flying over Big Cedar Lake on the evening of July 21, and two were circling in front of the cottage on Big Island on July 27.

Chaetura pelagica (Linnaeus). CHIMNEY SWIFT. — Chimney swifts were noted almost daily, particularly on the western side of the lake. Three to six birds could always be found here over cleared areas and adjoining logged-off land.

Archilochus colubris (Linnaeus). RUBY-THROATED HUMMINGBIRD. — This species was first noted on July 14 and became somewhat more abundant toward the latter part of the month when several a day were seen about patches of jewel weed (*Impatiens*).

Megaceryle alcyon alcyon. (Linnaeus). EASTERN BELTED KINGFISHER. — A pair of these birds was found on each of the larger lakes. Four birds were seen on July 24 on Blue Sea and Grant Lakes. This was the greatest number noted on one day.

Colaptes auratus luteus Bangs NORTHERN FLICKER. — Flickers were observed regularly in small numbers from July 6. On the 29th the birds became more conspicuous, if not more common, and remained more noticeable, particularly along country roads and farm buildings, than they had been previously.

Sphyrapicus varius varius (Linnaeus). YELLOW-BELLIED SAPSUCKER. — Sapsuckers were seen on July 8 and July 12 in a little creek bottom to the west of Blue Sea Lake. Two birds were noted on each day. Woodpeckers of all kinds were rather scarce in comparison with their number in other wooded countries that I have observed.

Dryobates villosus ((subsp. ?) HAIRY WOODPECKER. — A single bird noted in the jungle of aspen, dogwood, and maple on the west side of Blue Sea Lake was the only record. Others were heard but not seen.

Dryobates pubescens medianus (Swainson). NORTHERN DOWNY WOODPECKER. — The downy was only fairly common; one or two birds could usually be found in half a day in the woods. One pair bred on Big Island, and adults and young could usually be ob-

served at two different spots on the eastern shore of Blue Sea Lake.

Tyrannus tyrannus (Linnaeus). EASTERN KINGBIRD. — The kingbird was a conspicuous and fairly common bird about the small farms and along the country roads near Messines.

Myiarchus crinitus boreus Bangs. NORTHERN CRESTED FLYCATCHER. — Crested flycatchers were observed on July 8 and 12 on the shore of a small lake west of Blue Sea Lake, and a pair was seen on the latter lake on July 31. Others were heard calling at various times in about the same localities.

Sayornis phoebe (Latham). EASTERN PHOEBE. — Phoebes were fairly common about buildings and farms. One nest with four half-grown young was found on Sheep Island in Blue Sea Lake on July 18, and a nest at the boat landing of Blue Sea Lodge contained young until July 29.

Empidonax minimum (Baird and Baird). LEAST FLYCATCHER. — Small flycatchers were frequently heard and occasionally seen in the stream valleys. While I'm sure that both this species and the Alder Flycatcher were present, the two specimens collected (the first at Blue Sea Lake on July 8 and the second at Maniwaki on July 14) proved to be of this species.

Myiochanes virens (Linnaeus). EASTERN WOOD PEWEE. — The wood pewee was fairly common throughout the timbered country; one pair was noted regularly on Big Island and others on both the eastern and western shores of the lake and in various adjoining areas.

Nuttalornis mesoleucus (Litchtenstein). OLIVE-SIDED FLYCATCHER. — An olive-sided flycatcher observed on July 14 near Maniwaki was the only one noted in the territory.

Iridoprocne bicolor (Vieillot). TREE SWALLOW.— Numerous tree swallows appeared over the lake on the late afternoon of July 27, and from that date this species was conspicuous.

Riparia riparia riparia (Linnaeus). BANK SWALLOW. — Four bank swallows were identified in a great aggregation of swallows perched on the telephone wires north of Maniwaki on July 29.

Hirundo erythrogaster Boddaert. BARN SWALLOW. — This species was the only swallow that was common throughout the month. Birds could always be found darting about various farmsteads, about the lake, or over the adjacent waters. A considerable flight of these and other swallows appeared on July 29.

Petrochelidon albifrons albifrons (Rafinesque). NORTHERN CLIFF SWALLOW. — Cliff swallows were abundant along the roads north of Maniwaki up to Lake Baskatong on July 29 and were first found over Blue Sea Lake on July 30.

Cyanocitta cristata cristata (Linnaeus). NORTHERN BLUE JAY. — The blue jay was a fairly common but not abundant denizen of the woodland. Six seen on July 30 west of Blue Sea Lake was the greatest number noted in any single day. On July 8, when I saw the first jays, the young were well fledged, lacking only a little growth of the tail feathers to duplicate the appearance of their parents.

Corvus brachyrhynchos brachyrhynchos Brehm EASTERN CROW. — Crows were present in small numbers throughout the territory. One to four individuals was the normal count on a trip around Blue Sea Lake or on a half-day trip through the country. Fifteen were counted on July 29 on the longest trip of the month—that to Lake Baskatong.

Penthestes atricapillus atricapillus (Linnaeus). BLACK-CAPPED CHICKADEE. — One of the more common woodland birds; small flocks containing well grown young were present on my first excursion, July 4.

Sitta canadensis Linnaeus. RED-BREASTED NUTHATCH. — These small nuthatches were constantly seen and heard on Big Island and at one or two spots where considerable groves of hemlock, spruce, or cedar were standing.

Troglodytes aedon aedon Vieillot. EASTERN HOUSE WREN. — The house wren was somewhat more common than the winter wren. It was noted throughout the month with no apparent change in numbers.

Nannus hiemalis hiemalis (Vieillot). EASTERN WINTER WREN. — Winter wrens frequented the dense cedar swamps and the heaviest forests of other conifers and were more easily heard than seen. During early July the complete song was frequently heard, but singing decreased after the 14th, and the birds became increasingly difficult to locate.

Telmatodytes palustris dissaëptus (Bangs) PRAIRIE MARSH WREN. — A single bird seen and heard at Grant Lake on July 24 constituted the only record of this species; suitable habitat for marsh wrens was almost totally lacking.

Dumetella carolinensis (Linnaeus). CATBIRD — Catbirds were not common. Two birds were seen near the Blue Sea station on the southeast side of the lake on July 8, 12, and 30. A juvenile was found at Grant Lake on July 24.

Toxostoma rufum (Linnaeus). BROWN THRASHER. — Brown thrashers were among the rarer birds, only two individuals being noted. The first, on July 12, was south of Blue Sea and the second, on the 14th, in a little thicket by the side of the road north of Messines.

Turdus migratorius migratorius Linnaeus. EASTERN ROBIN. — Robins were common and widely distributed throughout the month but became much more abundant on July 20 After this date flocks of birds varying f om 4 or 5 to ten times that number were much in evidence along the country roads.

Hylocichla guttata faxoni Bangs and Penard. EASTERN HERMIT THRUSH. — A breeding pair of hermit thrush feeding young in a small coniferous thicket on the edge of Blue Sea Lake was discovered on July 9. The male was collected.

Hylocichla ustulata swainsoni (Tschudi). OLIVE-BACKED THRUSH. — The olive-backed thrush was one of the most common and widely distributed species. It was particularly in evidence on Big Island and in other spots that still had good stands of conifers. It was equally abundant, however, on the heavier hardwood ridges.

Hylocichla fuscescens fuscescens (Stephens). VEERY. — One individual was seen on July 30 near Blue Sea Lake.

Sialia sialis sialis (Linnaeus). EASTERN BLUEBIRD. — The bluebird was frequently noted in the more-open country beginning July 7 and was noticeably more abundant on the 29th, when great numbers were found along the roadsides.

Bombycilla cedrorum Vieillot. CEDAR WAXWING —Beginning on July 12, cedar waxwings were noted regularly in small numbers throughout the country visited. A flock of eight, which flew over our boat on the evening of July 30, was the largest group seen at one time, although flocks of 4 to 6 were observed on various occasions.

Sturnus vulgaris vulgaris Linnaeus. STARLING. — Starlings were common about Messines and all the small farms of the region. Small flocks of young were already roaming the countryside on July 6 and became increasingly abundant toward the end of the month.

Vireo solitarius solitarius (Wilson). BLUE-HEADED VIREO. — A single bird watched for some time in a patch of woodland north of Maniwaki on July 14 proved to be the only one of this species found in the territory. This species, like the catbird and brown thrashers, is here near the northern edge of its breeding range.

Vireo olivaceus (Linnaeus). RED-EYED VIREO. — This vireo was the most common species observed; a singing male could always be heard and generally two or more. The total vireo population of the 50-mile stretch of country examined during the summer must have approached astronomical proportions

Vireo philadelphicus (Cassin). PHILADELPHIA VIREO. — A single female collected in a little cedar thicket on the western side of Blue Sea Lake on July 12 provided the only record of this species.

Mniotilta varia (Linnaeus). BLACK AND WHITE WARBLER. — The black and white warblers were not the most abundant warblers, but they were very generally distributed over the territory. The daily record of birds actually seen varied from one to five, and others often were heard but not counted They were noticeably concentrated in hemlock and spruce areas but were also found somewhat more sparingly, in maple, oak, birch, and aspen growths. Young birds, barely fledged, were found on the shore of Blue Sea Lake on July 5, and well-feathered juveniles were taken on July 30. On this latter date there was a small migratory movement of birds that evidently included some of this species, as ten were noted—double the largest number seen on any other day. A pair with fledgling young was about the cottage from the first day, but these were not counted in daily totals unless work for the day was confined to the island.

Vermivora ruficapilla ruficapilla (Wilson). NASHVILLE WARBLER. — The Nashville Warbler was one of the rare birds of the area. A breeding female was taken in a tiny alder swamp southwest of Blue Sea on July 8, and a male was also noted at the same time. A second female in worn breeding plumage was taken July 29 from a similar thicket near Lake Baskatong. An attempt to collect a fledgling here resulted in the loss of the bird in the dense undergrowth.

Compsothlypis americana pusilla (Wilson). NORTHERN PARULA WARBLER. — Parula warblers had been heard frequently along the lake shore in a little cove on Big Island where a dense jungle of cedar and hemlock came to the water's edge, but it was not until July 28 that an adult male could be collected.

Dendroica aestiva aestiva (Gmelin). EASTERN YELLOW WARBLER. — A single male seen July 4 along a small stream emptying into Blue Sea Lake was the only yellow warbler actually observed, although several others were heard singing.

Dendroica magnolia (Wilson). MAGNOLIA WARBLER. — A brood of four fledged young was found on July 5 on the west shore of Blue Sea Lake. The fledglings, with tail feathers still tufted pin feathers, frequented several small clumps of hemlock growing under a dense forest of aspen and birch. Another family was discovered in a little cedar swamp on July 8 and others on the 12th. The last individual noted was on Big Cedar Lake July 22.

Dendroica caerulescens caerulescens (Gmelin). BLACK-THROATED BLUE WARBLER. — Black-throated blue warblers were common and widely distributed birds. They ranked third in abundance among the warblers, being exceeded only by the redstart and oven-bird, and possibly sixth among all of the species present during July.

The preferred habitat—wooded slopes of maple, red oak, aspen birch, and basswood —was similar to that of the redstart and oven-bird. During the early part of the month the curious song of this bird was one of the common woodland sounds and was still in evidence on the day of my departure. On July 28 I twice watched a male feed a fledging that was barely able to flutter along out of my reach. The brood from which this youngster came was raised by one of the three pairs that had been on the island throughout the month.

Dendroica coronata (Linnaeus). MYRTLE WARBLER. — A pair of myrtles were feeding newly fledged young about the cabin on the morning of July 8 and remained there continuously for 2 weeks. The birds were amazingly hard to see in the small tree, and it required close observation to locate one of the youngsters even when it was calling continuously for food. Another female with two barely fledged young appeared in the yard on July 30 and was still there when I left on August 3. Myrtle warblers were occasionally seen in other spots about the lake, but they were not among the most common species.

Dendroica virens virens (Gmelin). BLACK-THROATED GREEN WARBLER. — The black-throated green warbler was one of the less common warblers and stayed by preference in the growths of larger timber. At least two singing males were present on Big Island during most of the month. I watched one of these males coax a reluctant fledgling, barely able to fly, from a low hanging branch of the nest tree into a better hiding place on the afternoon of July 26, a rather late date for first flying lessons. The female spent the time in scolding me rather than in helping with the family duties.

Aside from the island where I could always find one or two of these birds, this species was most common in the drier woodlands of the hillsides on the western shore of Blue Sea Lake. Occasional individuals were noted elsewhere in similar country.

Dendroica fusca (Müller). BLACKBURNIAN WARBLER. — A newly fledged bird and an adult female were found in company with a bay-breasted warbler family on June 13 in a litttle spruce thicket. A single adult male was noted on July 18 on Big Island, and on the 26th Blackburnian warblers were conspicuous in a flock of migrating warblers congregated in a little sheltered depression on Big Island.

Dendroica pennsylvanica (Linnaeus). CHESTNUT-SIDED WARBLER. — The chestnut-sided warbler frequented the logged-off lands where sprouts and brush had reached a height of 10 to 12 feet. In these spots it was one of the more conspicuous birds. The males sang fairly regularly up to July 20, and newly fledged young were last noted on that date.

Dendroica castanea (Wilson). BAY-BREASTED WARBLER. — The bay-breasted warbler was seen only on July 13, when a pair was found feeding and caring for at least three newly fledged young. These birds were in company with Blackburnian warblers and redstarts in a thick clump of spruce and birch. Young of all three species were in this little patch of timber, but the bay-

breasts stayed closer to the spruce than did the others.

Seiurus aurocapillus (Linnaeus). OVEN-BIRD. — The oven-bird, next to the red-eyed vireo, was the most widely distributed woodland bird and probably was at least second in abundance as a breeding species. After July 20 songs largely ceased, the birds become less conspicuous, and careful search of areas where families had previously been present failed to reveal the birds. On July 30 two were seen in a small company of mixed warblers and vireos on a raspberry patch thickly grown with small aspen.

Oporornis philadelphia (Wilson). MOURNING WARBLER. — This was one of the rarer warblers about Blue Sea Lake. One pair frequented a little swampy bottom on the west shore where the birds were noted on July 5, 8, and 12 carrying insects into the dense undergrowth. A breeding female was collected near this area in similar type of bottom on July 8 and a second on July 20 in exactly similar country about two miles to the north. On the latter date a bird thought to be a young male was also noted.

Geothlypis trichas brachidactyla (Swainson). NORTHERN YELLOW-THROAT. — Very little suitable yellow-throat territory existed in the most thoroughly worked portion of the area. One or more yellow-throats could usually be found on a swampy bit of brush along a little stream entering the western side of Blue Sea. A bit of swamp near Messines, the south end of Grant Lake, and a small marshy area near Maniwaki each had a pair or more of these birds.

Wilsonia canadensis (Linnaeus). CANADA WARBLER. — A female was noticed feeding barely fledged young on July 6 on the west shore of Blue Sea Lake. Canada warblers were fairly common up to and including July 11 in about the little cedar swamps that dotted the area. After that date singing ceased, and because of the denseness of the cover and the super-abundance of mosquitoes, locating the birds became an impossibility. Perhaps they left the area entirely, since the only one seen later was a single individual in a flock of migrants on Big Island on July 27.

Setophaga ruticilla (Linnaeus). AMERICAN REDSTART. — Redstarts were by far the most abundant breeding warblers and were only exceeded in numbers by the red-eyed vireo and the olive-backed thrush. Whenever one entered the drier woodlands, redstarts would appear scolding anxiously, and during the first half of the month it was an exceptional period when one could not hear a male singing. During the last half of the month they were more difficult to find, although one might chance to locate a pair still caring for fledglings. On July 19 and 20 a very definite migration movement brought in larger numbers of these birds. I counted 20 on one little timbered point on the east shore of Blue Sea Lake on July 19, and 15 in a similar spot on the 20th. After that their numbers dropped back to the normal one to six observed daily during the latter half of the month.

Passer domesticus domesticus (Linnaeus). ENGLISH SPARROW. — The English sparrow was ever present in both Messines and Maniwaki and in smaller numbers about various farmsteads in the vicinity of Blue Sea Lake.

Dolichonyx oryzivorus (Linnaeus). BOBOLINK. — The bobolink was found only in two or three fields north of Messines. One or two birds were all that could be found on any one day except on July 20, when 40 were observed in one field. Five or six of these were still in the breeding plumage, but the rest were in fresh fall dress.

Sturnella magna magna (Linnaeus). EASTERN MEADOWLARK. — Meadowlarks were only moderately common in the early part of the month. On July 20 a mixed flock of bobolinks and 20 meadowlarks was found on a small grain field on the northeastern side of Blue Sea Lake.

Agelaius phoeniceus phoeniceus (Linnaeus). EASTERN RED-WING. — A flock of 10 red-winged blackbirds, including several adult males came to a little meadow near Messines on July 30, the first seen in the vicinity.

Icterus galbula (Linnaeus). BALTIMORE ORIOLE — An adult female and juvenile birds in a farmyard tree near Blue Sea Lake were watched for some time on July 30.

Quiscalus quiscula aeneus Ridway. BRONZED GRACKLE. — Flocks of well-grown young were noted in the vicinity of Messines beginning July 7, after which they continued to be much in evidence about the towns and farmsteads.

Piranga erythromelas Vieillot. SCARLET TANAGER. — Single males were noted at Blue Sea Lake on July 10, 12, and 20 and near Mount Laurier on July 14. Three males were seen near Lake Baskatong on the 29th.

Hedymeles ludovicianus (Linnaeus). ROSE-BREASTED GROSBEAK. — The rose-breasted grosbeak was a decidedly uncommon species. One or more birds were noted regularly on the small creek bottom to the west of Blue Sea Lake from July 4 to July 20, and an adult male was collected in the edge of a little glade on the shore of the same lake on July 9. Other birds were observed at the same place on July 10, and a single male was seen north of Maniwaki on July 14.

Passerina cyanae (Linnaeus). INDIGO BUNTING. — A bright male was seen sitting on a fence on the northwest side of Blue Sea Lake on July 30. Despite a rather careful watch for this species, this individual constitutes the only record.

Carpodacus purpureus purpureus (Gmelin). EASTERN PURPLE FINCH. — Purple finches were not common. A single bird in immature plumage was watched in a little cedar thicket on July 20. The bird was sitting on the topmost twig of a cedar tree and singing somewhat half-heartedly. An adult in bright plumage was seen on Sheep Island on July 28, and immature or female birds were found on July 29th and again on the 30th.

Spinus tristis tristis (Linnaeus). EASTERN GOLDFINCH. — This was a fairly common species frequenting recently logged lands. Here the abundance of raspberries, thistles, and other seed-bearing plants attracted numbers of birds, among which goldfinches were often conspicuous.

Passerculus sandwichensis savanna (Wilson). EASTERN SAVANNAH SPARROW. — The Savannah was one of the more common sparrows; it was observed throughout the month whenever fields were visited.

Pooecetes gramineus gramineus (Gmelin). EASTERN VESPER SPARROW. — Vesper sparrows were frequently seen about the farms from July 12, when a careful checks of field birds was made, through the rest of the month. On July 29 an enormous increase in the number of individuals occurred, and from then until my departure it was the most common bird in the farm areas.

Junco hyemalis hyemalis (Linnaeus). SLATE-COLOURED JUNCO. — A pair of breeding juncoes carrying food to young was found at Blue Sea Lake July 9. No others were noted until July 29 when two were flushed from a blueberry patch near Lake Baskatong. The scarcity of this bird, which I had expected to find somewhat common, was one of the surprises of the summer.

Spizella passerina passerina (Bechstein). EASTERN CHIPPING SPARROW. — Chipping sparrows were fairly common about the farm clearings in the vicinity of Blue Sea Lake. They were present daily in small numbers and apparently increased somewhat during the last week of the month.

Zonotrichia albicollis (Gmelin). WHITE-THROATED SPARROW. — This was one of the more common sparrows although not observed in numbers at any time. It became more conspicuous if not more abundant about July 14 at which time birds of the year began to move freely about.

Melospiza melodia melodia (Wilson). EASTERN SONG SPARROW. — The song sparrow was by no means an abundant species, although scattered pairs were readily located. One pair and their brood remained about a little cove on Big Island through most of the month. Other pairs were always to be found at the south end of Blue Sea Lake, at two or three willow grown coves on the west shore of the same lake, and in several little open meadows with brush-lined creeks betweens Messines and Maniwaki. Six individuals was the largest number noted on any day, and there was no noticeable change in abundance up to the date of my departure.

THE RELATION OF THE MARINE FAUNA TO THE PHYSIOGRAPHY OF THE WEST COAST OF THE QUEEN CHARLOTTE ISLANDS

By C. McLEAN FRASER

THE Queen Charlotte Islands lie off the west coast of British Columbia, between 51° 50′ and 54° 20′ N. and between 130° 50′ and 133° 15′ W., separated from the mainland of British Columbia and the adjacent islands by Hecate Strait, and from Alaska by Dixon Entrance. There are three main islands forming a crescent shaped chain. Graham is the northernmost and is much the largest, but Moresby, the intermediate, is also large, longer but much narrower than Graham; Kunghit, the southernmost, is relatively quite small.

The west coast, particularly of Moresby Island, is much indented with bays and fiords, but there are few islands of consequence. The east coast of Graham Island is very regular but that of Moresby and Kunghit is much dissected and there is an extensive archipelago of islands off the coast, some of them of quite large size. From the southern tip of Kunghit there is a chain of rocky islands, the first one Cape St. James, and the others known as the Kerouart Rocks.

Graham and Moresby Islands are separated by Skidegate Inlet and Channel, broad and deep in the eastern portion and in the western portion, but narrowed materially between these to form the east and west Narrows. These narrows go dry, or nearly so, at low spring tide, but gas boats with shallow draft can pass through at high tide.

Moresby and Kunghit Islands are separated by Houston Stewart Channel, which is nowhere very wide. Much of it is shallow, and although none of it goes entirely dry, the safe passage through for navigation is narrow and somewhat tortuous.

The west coast contour from Langara Point to the last of the Kerouart Rocks is approximately 170 sea miles. Due to the numerous indentations, the tide water line is probably at least twice that. The whole coast is very rugged and this ruggedness reaches the extreme in the northern part of Moresby Island. Although no part of this island is many miles from tide water, there is an extensive mountain system, with several peaks over 3000 feet and some few reaching almost or quite to the 4000 mark. The adjacent sea bottom has a surface as irregular as has the land. This accounts for the rocky, precipitous shore line along the open coast. In the northern half of Graham Island there are a few rather extensive beaches but from Port Chanal to Cape St. James there is not a single significant beach facing the open sea.

Where the shore is most precipitous, *e.g.*, in the Tasoo Harbour region, there is no continental shelf but towards the northern and southern extremities, the depth of the sea increases more gradually and comparatively shallow water may be met with some distance from shore. Here there is a real continental shelf although of somewhat limited extent. Mention should be made of a level bank (halibut bank) just north of the entrance into Inskip Channel, that extends out from shore for approximately five miles and is ten miles wide. It has a uniform depth of 112 fathoms.

Off Kunghit and Moresby there are no islands standing out distinctly from the main contour unless Anthony Island at the western entrance of Houston Stewart Channel can be considered as such. Off Graham Island there are three of these, none very large, dividing the coast of Graham into three large sections, Marble Island, Hippa Island and Frederick Island. As an extension of the general outline at its northern limit, there is Langara Island (commonly called North Island), separated from Graham Island by Parry Passage, and at the southern limit, Cape St. James Island and the Kerouart Rocks already mentioned.

Many of the coastal indentations are in the nature of large fiords, with narrow entrance and definite threshold, but the largest of the lot, Rennell Sound, Graham Island, is about 12 miles across at the entrance. It extends inland about 25 miles. The threshold may come within 20 fathoms of the surface but, in general, there is a rapid increase in depth just within, and nearly all of the fiord is quite deep, often more than 200 fathoms in places. Even near shore there is little shallow water and suitable anchorage may be entirely non-existent. This indicates that most of the shore here, as on the open coast, is precipitous and rocky, but beaches are somewhat more common, particularly, at or near the mouths of streams that flow down the

gorges between the mountains and hills. The beaches may be sandy or muddy, sometimes with numerous isolated boulders. There are practically no typical shingly beaches. These are confined to the shores of Houston Stewart and Skidegate Channels.

In considering the marine fauna of this west coast in relation to these physiographic conditions, the open sea situation may receive first attention. It is quite safe to say that the richest faunal areas are those at or near the coast in which there is the greatest mixing of the waters from different depths. These areas are to be found where there is an abrupt turn in the coast line to form headlands or capes, and where there are narrow channels between islands or between islands and the mainland. This holds definitely true in this region. The richest faunal areas are around Langara Island and Parry Passage to the north and around the Kerouart Rocks to the south. In both cases certain shoal areas some distance away may be included with these areas. Next in importance come the areas at the entrance to Houston Stewart and Skidegate Channels (The Kaison Bank, already referred to, may be included in the Skidegate area), and then the areas in or near the channels between Marble, Hippa and Frederick Islands and Graham Island.

Personal observations along this coast have been confined to the months of June and July. When definite distribution observations are given, it is to be understood that these apply to those summer months, for it is quite possible that the distribution of migratory species is different at different times of the year. The more general remarks may be based in part on information, that appears to be reliable, coming from other sources.

In considering the pelagic species that come near the coast, the mammals will receive the first attention. Of these, the whales take the fancy of the average individual. Whaling for the sperm whale and certain species of the baleen whales has been carried on in this region over a long period. In the early days of the fishery, sperm whales were seldom obtained but now they form principal support for the industry, although most of them that are brought in are of relatively small size. These mammals rove about over great distances but they must spend much of their time where food is readily obtainable. The baleen whales live mainly on small crustacea — "pink feed" — and they must get this where plankton is abundant. It is for good reason then that one whaling station is situated at Rose Harbour, on Houston Stewart Channel, not far from the Cape St. James area, and the other at Naden Harbour, near the Langara Island area, both areas with rich plankton fauna. At other parts of the coast the sea is very poor in small animal life and the whale does not loiter there.

The sperm whale feeds on larger organisms, squid and sharks, both pelagic, as well as on the "bastard halibut" (*See L.L. Robbins, F. K. Oldham and E. M. K. Geiling* The Stomach Contents of Sperm Whales Caught off the West Coast of British Columbia *Report of the British Columbia Museum, 1937, pp.* L19 *and* L20), which must be obtained from the bottom of the sea. These food species are dependent, directly or indirectly, on the rich plankton, and hence the sperm whales congregate in the same region as the whalebone whales.

The Killer (Orca) is probably confined to much the same area as the whales, but scarcely any of them were observed.

The Dolphin is to be seen in numbers along the whole coast. It is very active but it is impossible to tell how much of its activity is due to the pure joy of movement. Its distribution does not seem to bear much relation to the configuration of the coast. Its near relative, the porpoise, is commonly observed but does not seem to be so plentiful as the dolphin.

The Fur Seal passes northward near the coast in May and June but this is purely a migratory movement. On the other hand, its near relative, the Sea Lion (Steller's), provides a striking feature of the landscape or seascape, as it appears in the extensive rookery on the Kerouart Rocks. At least two thousand of them make their home here, and although they wander far (they go up the west coast at least as far as Rennell Sound) they return at the pupping season in June or early July. At all times there are enough of them feeding near by to use the rocks as a "hauling out place". They feed on fish and squid or other cephalopods that are pelagic but they also, at times go to the bottom for their food supply. Apparently Langara Island would be a suitable place for a rookery but for some reason it has not been chosen for such. The Hair Seal or Harbour Seal does not appear to be at all plentiful. None was observed out in the open sea at any great distance from the mouth of the inlets.

Sea birds move about so freely that one can scarcely expect to get much distributional correlation but there is some indication of it for all.

Even such ubiquitous species as the gulls, cormorants, and shearwaters are seldom observed in any great numbers in the more barren areas of the sea along this coast, except when two tides are meeting to segregate the supply of food, for ordinarily there is little in the water near the surface, and little or no flotsam to carry food about on the surface. At the meeting of the tides, the goony or black-footed albatross, often appears as well, but as it is not gregarious, seldom more than one or two may be seen at any one time. Most of the other common species stay more with the rich faunal areas. The Whalebird (Phalarope) appears in large numbers off Cape St. James, up the west coast of Kunghit and more particularly at the entrance of Houston Stewart Channel, near Anthony Island. The Tufted Puffin sticks even more closely to the Cape St. James area; few of them get even as far away as Anthony Island. This area seems to be specially favoured by the Bald Eagle. Like the puffins they probably nest near by.

On the abundance of fish there are few data. There is every indication that fish are plentiful in the Cape St. James area, as one should expect them to be. There is not much fishing done here but is is not because of lack of supply. For miles, many miles in certain directions, from the Ke ouart Rocks, the almost continuous tide-rips, overfalls and cross currents, make the sea dangerous for small boats and at times even for large ones. About the only time that there is much assurance of safety is a short period at slack water at neap tide. Furthermore, there is no securely protected anchorage within reasonable distance that could be used as a base, if such fishing were attempted. The fishing if indulged in must necessarily be sporadic, hence it does not pay to send collecting boats long distances to look after the supply.

It is quite a different story at the northern extremity. Here the sea may be very rough at times but not so bad as off Cape St. James, and there is reasonably good shelter close at hand. In consequence, the fishery is extensively exploited as one of the best trolling areas on the whole Pacific coast for spring and coho salmon. The pink salmon that run into Naden Harbour and Masset Sound in alternate years probably feed somewhere in or near this region. The fishing area extends some considerable distance east and south from Parry Passage, on the west coast going far enough to take in the Frederick Island area. At times, fishing is good around Hippa and Marble Islands and farther south, around Anthony Island. There are probably many other species besides the salmon abundant, the herring, for instance, but no satisfactory survey has been made of the fishery resources.

Of the invertebrates, the pelagic species in the open sea are largely those that appear in the plankton, and the areas rich in plankton have already been indicated. As might be expected, the nature and the amount of the plankton at any point in these troubled waters vary from hour to hour. The whole supply may be almost a pure culture of one or two species, — in a surface tow, taken one-half mile west of Cape St. James, on July 24, 1935, the plankton consisted almost entirely of a calanid copepod and siphonophore of the *Diphyes* type — or almost every phylum or class may be represented either as larva or adult, — near the entrance to Houston Stewart Channel, on July 20, 1935, fragments of hydroids, hydromedusae, siphonophora, ctenophora, polyzoa, copepods (larva and adult), zoea and megalop larvae of crabs and shrimps, gastropod larvae and eggs, larval pteropods and larval ascidians, were obtained.

It is a difficult matter to get an adequate idea of the bottom fauna near this coast. Beam or otter trawling would be out of the question anywhere except on the Kaison Bank. Dredging attempts have been made at various locations along the whole coast, but the bottom is so irregular and so rough that the success is very limited. Almost everywhere the dredge gets hung up almost as soon as it reaches the bottom, still the specimens obtained in these little bites indicate the presence of many species common to other parts of the coast as well as some that have not been reported elsewhere. To give some idea of the difficulties to be met with one example may suffice. Going southward over the Kaison Bank, where there is the uniform depth of about 112 fathoms, a sharp, deep gorge, opposite Inskip Channels, is reached. Within one and a third miles, the depth drops, with numerous ups and downs, to 345 fathoms, and rises again with the same sort of irregularity to much the same depth as there was over the bank. Some distance farther south, at about the same distance from shore (approx. 1½ miles), there is a depth of 455 fathoms.

Of the shore line of the open coast, that portion of it that is exposed to the full force of the ocean surf, is wholly barren, as no animals can stand the buffetting of the surf against the rocks in stormy weather. Where there is even a small amount of protection, so that the full force of the wave is broken, several attached or clinging

forms manage to thrive very well. To indicate the types of species that make their home in such localities, reference may be made to a collection obtained on June 5, 1935, about 5 miles north of the entrance to Flamingo Harbour. Sponges, two species, undetermined; hydroids, two species, *Sertularella* and *Calycella;* anemones, one species, *Cribrina;* alcyonaria, one species, *Alcyonium;* starfish, three species, *Pisaster ochracea,* very large, and two species of *Henricia;* sea urchins, one species, *Strongylocentrotus purpurea;* holothuroid, one species, *Cucumaria;* barnacles, one species, *Mitella;* isopod, one species, undetermined; chitons, two species, *Cryptochiton* and *Katharina;* pelecypods, one species, *Modiolus;* limpets, one species, *Acmaea;* keyhole limpets, one species, *Diadora;* nudibranchs, one species, *Archidoris.* These can be reached only by boat, of course, and only occasionally even in this way.

The northern open coast beaches have not been explored.

The fauna of the inlets and channels may well be considered under three headings: 1. The fauna on the shores of the two channels, Houston Stewart and Skidegate; 2. The fauna of the shores at or near the entrance to the large inlets, to include rocks or rocky islets in the main channels into these inlets; 3. The remainder of the inlets, not included in 2.

In both Houston Stewart and Skidegate Channels there are narrow portions where the water is shallow (in Skidegate the narrows may go dry), and in which there are reefs exposed at low tide. For much of the time, but more particularly after the change of the tide, the current through these narrows is very swift, so, except for the shallowness of the water, the conditions somewhat resemble those near the points projecting out to sea. The shallowness and the more gradually sloping beaches make an intimate acquaintance with them more readily possible. It is well worth while to make this acquaintance since these areas are so rich in animal life. The narrows are in part lined with shingly beaches and in almost every instance where those beaches were visited, from 70 to 100 species of animals large enough to be identified offhand, were observed. Many of them are species found all along the coast, while others such as the starfish, *Asterina miniata,* and the abalone, *Haliotis kamtschatkana* are restricted to localities reached by water of the high salinity of the open sea. The bottom of the narrows is probably equally rich. In the shallow water, among the eel grass and seaweed, such hydromedusae as *Aequorea, Gonionemus, Polyorchis, Phialidium, Halistaura, Sarsia;* siphonophora, as *Diphyes;* scyphomedusae as *Haliclystus;* stenophores as *Pleurobrachia, Beroe* and *Bolinopsis;* nudibranchs as *Melibe* and *Hermissenda;* were abundant.

Between the narrows and the open sea the channels are wider and deeper but still not very deep. In some places there is a shelly bottom in the middle of the channel, where material has been carried out from the narrows. These shelly areas are rich in invertebrates, mostly attached forms such as sponges, hydroids, polyzoa and ascidians. In one small area in the western central portion of Houston Stewart Channel, 47 species of hydroids were obtained in four short hauls of the dredge, each only for 400 or 500 feet.

The plankton in the channel waters varies much with the tide. When the tide is running out, numerous organisms are carried out from the narrows and the plankton is abundant and varied. When the tide is running in from the open ocean, there is much less plankton and much fewer species are represented.

In the case of some of the inlets the shores at and even within the entrance are as precipitous as those exposed to the open sea and when the entrance is narrow, with strong currents and tide rips through it, there may be no life possible. Tasoo Harbour is a good example of this type. The approach is funnel-shaped, leading to an entrance so narrow that it might easily be missed in passing along the coast. The shore is so precipitous that in places one hundred yards from the rocky shore line, the depth may be as much as one hundred fathoms, and a mile out it is four hundred fathoms. To the south of the entrance the mountain side goes up almost vertically and the peak of the conspicuous Mount Tasoo, over 3000 feet high, is probably not more than a mile in horizontal distance from the shore line. There are no reefs or rocky islets near the entrance in the main channel.

In other instances the entrance shores are quite low and may be continued as a chain of rocks or rocky islets into a long narrow point to make quite an efficient breakwater. Then there are likely to be isolated rocks or reefs, a short distance away from these points, even directly in the main channel. The entrance to Flamingo Harbour is a good case in point but Big Bay is even better. In each case the breakwater is to the north or northwest of the entrance. Although the inside face of the break-

wate. is pretty well protected at low tide and although the reefs are well within the channel of the inlet, the swell from the ocean surf makes collecting here an impossibility for much of the time. In two months spent on this coast in 1935, there was only one good spring tide series, when collecting here could be done with safety, but that one series of tides was well worth waiting for. These mid-channel rocks that were covered at half tide or less, when exposed, proved to be almost wholly covered with plant and animal life of great variety. The rocks on the inlet side of the breakwater were even more interesting, for besides the coating similar to that on the reefs, there were numerous natural tide pools formed by the irregularities of the rocks, in which the organisms could be viewed in full extension, perfect marine aquaria. The olivaceous seaweed, the magenta pink corallines, the almost black horse mussels, up to nine inches in length, the large barnacles, with brown stalks, white shells and red feet, all in masses, form the general setting. The large anemones, with dark green columns and lighter green tentacles and disks, are the most conspicuous objects in the tide pools; the sponges, hydroids, polyzoa and nudibranchs provide various shades of yellow and brown; the exquisite hydrocoralline in pinks and mauves, the large sea-urchin in purple, the splashes of colour provided by the crimson and purple starfishes, the multicoloured gastropods, with others less conspicuous, in the clear, undisturbed, limpid sea-water, make a striking picture or panorama, that must be seen to be duly appreciated.

The sea birds of the open coast tend to congregate here, and the black oyster catcher, not found to any extent elsewhere, is very much in evidence.

To leave the inner waters and the inner shores of the inlets to the last is to provide an anti-climax for the fauna here is poor and uninteresting. The threshold near the entrance of the fiords shuts off the interchange of water in the deeper parts of the fiord, to leave these large bodies of water more or less stagnant except near the surface, and such stagnant water is not suitable for an abundancce of life. The streams of fresh water coming in, in many places, decreases the salinity of the upper layers, so that at the head of the small bays only very tolerant species can exist.

In the upper layer certain pelagic species may be observed. Occasionally the harbour seal appears but never in great numbers. It was of somewhat special interest to see a large harp seal in Tasoo Harbour (I have seen no record of this seal in the northeast Pacific). Evidently the bump of curiosity is as well developed here as in the harbour seal, since this one remained in the vicinity to observe the whole process of sweeping to locate a pinnacle rock in the harbour.

In places near shore there are plenty of small fish and fish fry, spring and coho salmon, herring, viviparous perch, and sand launces being common.

In the surface layer near the entrance, scyphomedusae, *Cyanea* and *Aurelia,* and several species of hydromedusae, particularly *Aequorea, Phialidium* and *Halistaura,* may be quite abundant, and the plankton may be representative, but even in this layer the organisms gradually disappear, to be scarce or absent entirely at the head of the smaller bays.

Dredging near the shore in the outer part of the inlet, though difficult, may give fair results at times, but in the greater depths, the muddy bottom, often with a much reduced oxygen supply, supports very little life.

The shore is little or no better. In many places in the inlets, the shores are too precipitous to leave any foreshore, so there is little variety of conditions and hence little variety in the organisms, but the beaches farther in get poorer and poorer until at the head they are nearly barren. The small shore fishes, cottids, sculpins, blennies, clingfish and the like, and the pelagic fry in shallow water, provide food for birds. Ducks and geese may be quite numerous at times.

There are several species in several of the invertebrate class to be found but there is little variety from beach to beach and the collecting is a very tame procedure when compared with the harvesting possible on shores not so very far distant. To give one verification, not one respectable clam bed was discovered between Cape St. James and Rennell Sound.

SUMMARY

The west coast of the Queen Charlotte Islands provides a wide enough variety of physiographic conditions to make it suitable for examining the correlation between the marine fauna and these various conditions. This coast has not been explored extensively enough to work out the correlation in specific detail but, from the information that is available, certain generalizations can be made.

In the first place, it is quite safe to say that where there is the greatest mixing of waters, in swift currents, tide rips, etc., there are the best conditions for a richness of marine fauna. That

being the case, the richest areas for pelagic species are at the extremes, north, around Langara Island, and south, around Cape St. James and the Kerouart Rocks. Next in importance, come the areas around Frederick Island, Hippa Island, Marble Island and the entrance to Skidegate Channel, and Anthony Island and the entrance to Houston Stewart Channel. The areas at the entrance of some of the fiords are reasonably good, but the intervening areas along the open coast and the inner waters of the inlets are poor.

The sea bottom is so rocky and rough that it is difficult to get an adequate idea of the bottom fauna, but, in all probability, the richness here follows pretty well the richness of the waters. In the two channels, areas of shelly bottom make it possible to get a better idea of the richness there. Where dredging can be done near shore in the inlets, sometimes fair results are obtained but in the deeper portions, the muddy bottom is quite barren.

The littoral fauna is particularly rich in the narrows in Houston Stewart and Skidegate Channels, quite so at the entrance to these channels and at the entrance to several of the fiords. It is poor, in general, in the bays and inlets, especially those with a threshold, and gets poorer, the farther from the entrance; often rich, but restricted in the type of organisms, in the somewhat sheltered nooks and crannies along the open coast; and practically nil on the faces of the rocks on the open coast that are fully exposed to the force of the ocean surf.

NOTES AND OBSERVATIONS

OCCURRENCE OF THE LAPLAND LONGSPUR IN THE OTTAWA DISTRICT. — As recorded briefly in the 1937 Christmas Bird Census from Ottawa (*The Canadian Field-Naturalist*, 52:22,), three Lapland Longspurs (*Calcarius lapponicus*) were observed near Ottawa on December 26, 1937. As this appears to be the first record of this species in the Ottawa District since 1890, when a number of specimens were taken, a more detailed account seems desirable.

The three Lapland Longspurs seen on December 26th were observed by a census party consisting of C. R. Lewis, Barnard McL. Lewis, and the writer. They were in a snow-covered field beside the track of the Canadian Pacific Railway, about one and one-half miles west of Aylmer, Quebec, where their musical call-note, though uttered at infrequent intervals, attracted attention to them. In company with one Redpolled Linnet (*Acanthis linaria*) these birds, maintaining a fairly close group, were feeding busily upon seeds that they were obtaining from brown dead weed-stalks that projected above the snow so thickly that the birds were often largely concealed among them. So fearless were the Longspurs that I observed them at leisure, with X6 binoculars, at a distance of about ten feet and left them still feeding undisturbed when I went away Their dark crowns, the warm buffy sides of their heads, and the chestnut patches on their wing coverts and tertials were plainly seen. One individual, probably an adult male, showed very plainly a veiled black throat-patch and a reddish nape. In one of the other individuals a veiled black throat-patch could also be seen, but less plainly.

It seems probable that Lapland Longspurs occur near Ottawa more often than the infrequent records would indicate, but that they are often confused with Snow Buntings and Horned Larks and so pass unrecognized.—HARRISON F. LEWIS.

MUSICAL WARBLE OF THE SAVANNAH SPARROW. — On tracing to its origin a pleasing and musical warble that I heard on Pelee Island, Essex County, Ontario, on May 13, 1937, I found, to my great surprise, that it was being uttered by a Savannah Sparrow (*Passerculus sandwichensis*). This bird was one of two of this species that, with other Sparrows, were perched, about four feet from the ground, in a roadside row of small trees. Its rambling musical warble, which was uttered in an undertone, continued without cessation for several seconds and was, in general, in striking contrast to the usual brief, buzzing song of this species, with which I have been very familiar for many years. I noticed, however, that at one point the singer introduced into its warble the phrasing of its common song, rendered in an undertone and more musically than when sung in the usual way, and then continued without a pause with a variety of musical notes. I watched it with X6 binoculars at a distance of about 10 feet, in excellent light, and could see its mandibles move as it sang.

The late Dr. Charles W. Townsend recorded concerning this Sparrow, in his *Birds of Essex*

County, Massachusets (*Mem. Nutt. Orn. Club,* No. III, Cambridge, April, 1905, p. 264), that "on rare occasions a soft feeble warble takes the place of a song. I have heard this even in the spring given by an adult." This statement is referred to by Forbush (*Birds of Massachusetts and other New England States,* Pt. III, 1929, p. 54), but as most writers who describe the activities of the Savannah Sparrow do not mention such a song and as I had not previously noticed it, in the course of a field experience with this Sparrow extending over some twenty-eight years, it would seem to be uncommon enough to make publication of this record desirable.—HARRISON F. LEWIS.

GREATER YELLOW-LEGS AND PIGEON HAWK. — On May 25, 1926, at the shore of Anticosti Island, Quebec, near Port Menier, I saw a Pigeon Hawk (*Falco columbarius*) stoop at two Greater Yellow-legs (*Totanus melanoleucus*), though apparently not in deadly earnest. The two Yellow-legs, which were standing on a small gravel bar, uttered cries of alarm and half jumped, half fluttered for a distance of a few feet, into water so deep that they could not wade, where they swam placidly until the Hawk had flown some distance away, when they swam ashore.—HARRISON F. LEWIS.

REVIEW

LEGUMINOUS FORAGE PLANTS, *by D. H. Robinson,* 119 *pages,* 1937. *Edward Arnold & Co., London.* (*In Canada, Longmans Green & Co., Toronto; price* $1.80.)

This small volume presents descriptions of the forage legumes of the British Isles in relatively non-technical, concise language. It is intended primarily for students in Agricultural Colleges and for County Agents and Organizers. Unfortunately its usefulness in Canada is limited since the emphasis is placed upon the species and varieties of greatest importance in England and Scotland and the cultural requirements of these varieties.

The author, who is Head of the Biology Department of Harper Adams Agricultural College, Newport, Shropshire, has succeeded in writing brief but adequate and simple descriptions of the seeds, seedlings and mature plants of each species. These descriptions are supplemented by clear line drawings which should aid the student considerably in distinguishing the various species. The illustrations of the legume seedlings should be especially useful. Following the description of mature plant, seed and seedling, under each species there is a brief discussion of the chief cultivated varieties; their culture and uses in the British Isles; notes on seed production; and tables of chemical composition.

After a brief introductory chapter dealing with the morphology of the leguminous plant and its specialized process of nitrogen fixation through the agency of root nodule bacteria, two chapters are given over to a discussion of the *Trifoliums* (red, alsike, white, crimson, yellow suckling, subterranean, and strawberry clovers). The following chapter deals with the *Medicagos,* lucerne, or as it is more commonly known in America, alfalfa, and yellow trefoil. Species rarely grown in America are described in the succeeding chatpers: birdsfoot trefoils (Lotus). kidney vetches (*Anthyllis*), sainfoin (*Onobrychis*) and lupins (*Lupinus*). Sweet clover (*Melilotus*) is briefly discussed. A final chapter deals with pulse crops which are sometimes grown for fodder. Included are field beans, *Faba vulgaris* (better known as horse beans, *Vicia Faba*), vetches (*Vicia*) field peas (*Pisum*) and soy beans (*Glycine*). There is also a valuable table of seed statistics presenting data on weight per 1000, bushel weight. number per pound, standards of purity and germination, and percentage of hard seeds for the various species described. The volume concludes with a brief but useful glossary and index.—HAROLD A. SENN.

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The Canadian Field-Naturalist

Vol. LII OTTAWA, CANADA, OCTOBER, 1938 No. 7

SUMMER BIRDS OF THE FORILLON, GASPE COUNTY, QUEBEC

By STANLEY C. BALL

THE GASPE PENINSULA, lying south of the wide lower portion of the St. Lawrence River, terminates in a slender needle-like process, famous to geologists for its eastern-most mainland extension of the Appalachian Mountains and for the fossils embedded in its strata. In his book, *The Heart of Gaspé,* Dr. John M. Clarke has urged the use of its old name, *Forillon,* for this tiny peninsula.

It joins the higher land in the main part of Gaspé peninsula on a line between Cap des Rosiers on the St. Lawrence and Little Gaspé on the Bay of Gaspé. Mount St. Alban (1170 feet) and several neighbouring prominences of similar height occupy this region about a mile west of Grande Grève. For convenience I have called them the West Highlands.

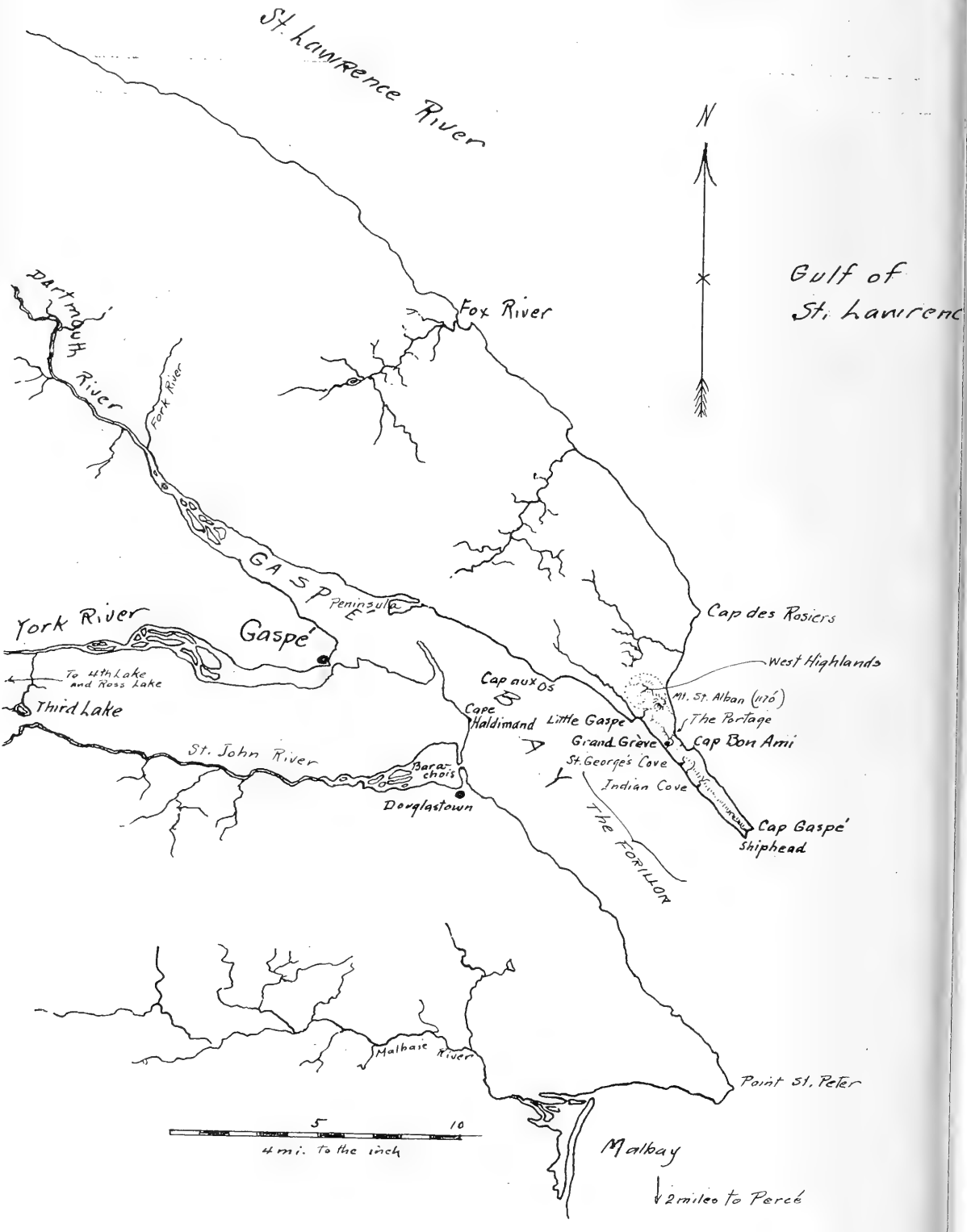
The Forillon is somewhat more than five miles in length, the width throughout being about half a mile. Two steep limestone ridges, continuations of higher ridges to the westward, run through its whole length separated by a coulée. The latter is broken by lower cross saddles into five drainage basins, four of which have outlets into the Bay of Gaspé, and one into the Gulf at the eastern end of the Forillon. The northern ridge reaches a height of 730 feet near the center of the peninsula, gradually diminishing to 300 feet at Cape Gaspé, its easterly end, and to about the same height in the westerly gap at The Portage across the base of the Forillon. The southern ridge is somewhat lower except at its eastern tip, Shiphead, which bears a lighthouse. From here the Bay of Gaspé extends twenty miles inland, with Gaspé Basin near its head between the estuaries of the York and Dartmouth Rivers. The mouth of the bay is only nine miles wide from Shiphead to Point St. Peter, whence it is another eight miles southward across the Malbay to Percé and Bonaventure Island.

Most of the southern ridge has been cleared by the farmer-fishermen whose homes are chiefly clustered about Grande Grève, St. George's Cove, Indian Cove and Shiphead settlements. Except for occasional clearings, the rest of the Forillon is covered by evergreen forest—spruce and balsam fir—and second growth mixed woodland in which white birch, mountain ash, and mountain maple compete with young evergreens. In small boggy swamps from one to four acres in area, scattered along the central valley, a few arbor vitae remain, but alders have followed the woodman's axe into most of them. Clumps of alder also flourish in many moist spots in the open farm lands, especially along six small brooks which drain the swamps just mentioned.

On the southern shore low cliffs, sixty feet or less in height, are interrupted by occasional short stretches of cobble beach where fishermen maintain their tiny stations, but no sand is to be found along the Forillon. Very different is the northern shore, famous for its rugged cliffs, from 300 to 700 feet high, carved out of ancient mountains by the storm-driven waves of the St. Lawrence Gulf. Only at The Portage and Cape Bon Ami can one descend to the rough shore of fallen rocks and ribbon of cobble beach at the foot of these cliffs. To the north and east lies the island of Anticosti, visible on clear days, its nearest point being fifty miles from the Forillon. Another thirty miles separate Anticosti from the northern shore of the St. Lawrence Gulf. From the northernmost curve of the Gaspé peninsula at Cape Magdalene, sixty miles northwest of the Forillon, at least seventy miles of the lower St. Lawrence waters must be traversed by birds migrating to or from the northern shore of the river.

Rainfall is ample and the summer temperature moderate to cool. The season is at least a month later than that of southern New England—apple trees in blossom on June 20, and lilacs July 4 Eggs of the spotted salamander hatched on July 3. The average minimum temperature from June 15 to June 30 was 50°F (the lowest, 44° on the 30th), and the average maximum 64°

MAP OF NORTHEASTERN PART OF GASPE PENINSULA



(highest, 74° on the 20th). The average for July and August 1936 was about 4° higher. The 1937 season was considerably warmer, the average maximum for June 17-30 being 67°; for July, 68.6°; and for August, 67°. The highest temperature, 76°, was attained on June 28, July 7 and 21, and August 10, 17, and 20.

Several kinds of introduced trees and shrubs in dooryards, added to the native evergreens, birches, maples, mountain ashes, dogwoods and viburnums scattered along the numerous spruce-pole fences, provide ample cover and feeding ground for birds which frequent open lands.

During the summer in Gaspé County, aside from brief opportunities on the automobile drive along the shore from Carleton to Grande Grève on June 13-14, 1936, and on June 17, 1937, little attempt was made to observe birds beyond the limits of the Forillon. A few days of fishing along the Dartmouth River, Griffon Cove, and at Grand Étang, weekly drives to Gaspé Basin and back, and a week's visit to Third Lake, Fourth Lake, Ross and Pauline Lakes, about 18 miles into the forest southwest of Gaspé Basin, August 3-8, 1936, and another short stay at Third Lake, September 1-3, 1937, enabled me to record 19 species not seen on the Forillon. On the latter all types of habitat were frequently visited from my dwelling at Grande Grève during the periods from June 14 to August 30, 1936, and from June 17 to September 13, 1937. Every valley and ridge was explored; most of the wooded areas, swamps, and pastures were systematically and frequently examined and the extensive sea-cliffs were watched from above and from boats below.

In all, 117 species were recorded, of which 98 were observed on the Forillon. Of the latter, 44 species nested, judging from nests found, juveniles observed, and adults seen carrying food; 11 other species also probably bred here. Two species resident on Bonaventure Island daily fish in the waters just off the Forillon's northern cliffs.

John B. Demille (*Auk* 43: 508-527 October, 1926) lists 12 other species which he and other observers have found during summer months in Gaspé County. Several of these might be expected to inhabit or visit the Forillon. I was surprised to find no evidence of nesting by the barred owl, hairy woodpecker, sapsucker, flicker, phoebe, blue jay, brown creeper, swamp sparrow, Canadian warbler, ovenbird, northern yellow-throat, and hermit thrush.

Flickers (*Colaptes auratus luteus*) were several times seen near the head of Gaspé Bay, and yellow-throats (*Geothlypis trichas brachydactyla*) along the Dartmouth River nineteen miles west of the Forillon and along the coast from Cap des Rosiers to Griffon Cove.

During the week, August 20-27, 1935, I saw dozens of marsh hawks (*Circus hudsonius*) working their way through the gap from Cap des Rosiers to Grande Grève and on down the Forillon. This lead to the expectation that other birds would follow the same route and that they would cross the Bay of Gaspé (4 to 9 miles) to follow the coast southward. But few eastward movements were detected in 1936 and 1937 Certainly, as far as observed, all passerines which nested on the Forillon, and other hundreds which reached it from the north or northeast— probably from Anticosti—passed northwestward up the little peninsula and on toward the head of the Bay. And this behaviour was not confined to feeding birds moving by day, but to such migrants as could be heard during the night. Presumably upon reaching the head of the Bay these birds again turned southward. Very few marsh hawks appeared during the last weeks of my 1936 sojourn. As in 1935, these first passed down the Forillon; although none was seen to cross the Bay, many were observed returning northwestward, especially in 1937 when they were again numerous in late August. With the exception of an immature cormorant, a long-eared owl, and a junco found dead no specimens were taken. Unless otherwise noted all observations in the annotated list below are sight records made with the aid of 8-power binoculars.

As noted by Dr. C. W. Townsend, who spent the period from August 6-25, 1919, and the last half of August, 1922, at Grande Grève, the avifauna of Gaspé is largely of the Canadian type with several Hudsonian and Transition forms. (Notes on the summer birds of the Gaspé Peninsula, Province of Quebec, by C. W. Townsend, M D. *The Canadian Field-Naturalist*, 34: 78-80, 87-95, 1920).

Thirty-three species marked with an asterisk on the list below were not recorded from the Forillon by Dr. Townsend during his briefer stay in 1919, nor in August, 1922. (Additional notes on the birds of the Gaspé Peninsula. *The Canadian Field-Naturalist*, 37: 6-11, 1923).

On the other hand, he saw there four species which I failed to note: rough-legged hawk, northern shrike, brown creeepr, and cowbird.

1. *Gavia immer immer.* COMMON LOON. — Several adults seen August 3-8, 1936, at Ross Lake and Fourth Lake, and at Third Lake, Sep-

tember 1-3, 1937. An adult flew across base of Forillon, August 21, 1937.

2. *Gavia stellata.* RED-THROATED LOON. — During the period June 25 to July 13, 1936, one or both of a pair, believed to have nested back of Little Gaspé, several times in the early hours of daylight flew down the Forillon toward St. George's Cove, and within a few minutes returned westward over Grande Grève. On July 18 four immature fished together in the inshore waters of the bay between Little Gaspé and Grande Grève.

3. *Oceanodroma leucorhoa leucorhoa**. LEACH'S PETREL. — On July 5, 1937, a small colony was discovered at the tip of the Forillon.

4. *Moris bassana.* GANNET. — Pass regularly northeastward across the mouth of Gaspé Bay from their Bonaventure rookery to fish in the waters off the northern cliffs of the Forillon. Curiously enough gannets were never observed in 1936 over the Bay west of Shiphead settlement, and only three times in 1937.

5. *Phalacrocorax auritus auritus.* DOUBLE-CRESTED CORMORANT. — About 200 pairs nested on the northern sea-cliffs of the Forillon, chiefly between The Portage and Cape Bon Ami. While the waters of the St. Lawrence Gulf below yield considerable food, birds from this colony continually cross the Forillon through the Grande Grève gap on their journeys to and from the fishing grounds at the head of Gaspé Bay and along the streams which empty into it. On August 21, 1936, four cormorants were seen close to the highroad diving and propelling themselves with foot and wing against the clear, strong current of the Dartmouth River.

6. *Botaurus lentiginosus.* BITTERN*. — For two days, August 16-17, 1937, one bird fished for small trout in Grande Grève Brook.

7. *Ardea herodias herodias.* GREAT BLUE HERON. — Common on tidal flats around upper part of Gaspé Bay, June to August 15, when the southward movement probably began; none was observed here afterwards. From the St. Lawrence valley on August 9 a single bird flew south through the Grande Grève gap and veered northwest along the shore towards the head of the bay; two others followed the same route on August 12. During August, 1937, one visited a small pond on the ridge above Shiphead settlement, feeding upon tadpoles of *Rana sylvatica.*

8. *Nycticorax nycticorax hoactli**. BLACK-CROWNED NIGHT HERON. — On August 28, 1936, a single individual crossed the Forillon through the Grande Grève gap. Several fed in the marshes behind the bar at Douglastown on the southern shore of Gaspé Bay, August 27. On the evenings of July 30 and August 3, 1937, a single bird flew southeast over Grande Grève and returned almost immediately.

9. *Anas rubripes rubripes.* RED-LEGGED BLACK DUCK. — During August many frequented the marshes at the mouths of rivers and streams entering the head of Gaspé Bay. One killed by a Duck Hawk at Grande Grève, August 29, 1937.

10. *Glaucionetta clangula americana.* AMERICAN GOLDEN-EYE. — August 3-8, 1936, a female with six well-grown young seen daily on Ross Lake, another family on Fourth Lake; 2 adults on Pauline Lake. Two at Third Lake, September 1-3, 1937.

11. *Somateria mollisima dresseri**. AMERICAN EIDER. — Breeds along the rocky northern shore of the Forillon. Seen feeding on young sea-urchins, procured by diving.

12. *Melanitta perspicillata.* SURF SCOTER. — August 15, 1937, seven just off shore at the tip of the Forillon.

13. *Mergus americanus.* AMERICAN MERGANSER. — Four swimming in surf near Grand Étang, August 13, 1937.

14. *Mergus serrator**. RED-BREASTED MERGANSER. — July 1, 1936, watched three pairs fishing off northern cliffs of the Forillon near Cape Bon Ami.

15. *Accipiter velox velox.* SHARP-SHINNED HAWK. — August 17, 1936, an adult passed southeastward down the coulée behind Grande Grève. Presumably it had just entered the Forillon from the northwest at the Portage gap. Three transients passed down the peninsula and back on August 19, 23, 28, 1937.

16. *Accipiter cooperi.* COOPER'S HAWK. — July 1, 1936, an adult crossed a small clearing in the West Highlands.

17. *Astur a. atricapillus**. GOSHAWK. — Two immature spent August 20 and 21, 1937, on St Alban and the Forillon, the first recorded from this region. I encountered them in the forest several times.

18. *Buteo borealis borealis.* RED-TAILED HAWK — August 5, 1936, one circled over sprout land in the "burn" between Ross and Fourth Lakes. An immature bird over Shiphead, August 19, 1937.

19. *Buteo lineatus lineatus.* RED-SHOULDERED HAWK. — August 17, 1936, two immature circled over highlands above Cape Bon Ami. Duck hawk chased one of them, apparently in play.

On the following day one of this pair, or another farther down the Forillon, perched for 10 minutes in the top of a 20 foot spruce while a sparrow hawk repeatedly feinted at it from above. Observed with 8-power binoculars in good light at distance of 30 yards. Not previously recorded from the Gaspé.

20. *Buteo platypterus platypterus.* BROAD-WINGED HAWK. — August 14, 1936, adult hunting in mixed woods on east slope of Mt. St. Alban, barely within limits of the Forillon. Several penetrated as far as Cape Bon Ami in 1937.

21. *Circus hudsonius.* MARSH HAWK. — Appearing first on August 15, 1936, immature birds were seen daily till the 28th, between Grande Grève and Shiphead, but never more than one at a time; no such migration down the Forillon occurred in 1936 as in late August 1935, when I saw as many as 9 of these birds in the air together hunting over the uplands back of Grande Grève. More numerous in 1937, the first arriving on August 9.

22. *Haliaeetus leucocephalus alascanus**. NORTHERN BALD EAGLE. — June 23, 1937, an immature bird was chased by twenty crows from Grande Grève to the north shore through the Portage Gap. Another (or the same) said to have been shot at Shiphead, August 20.

23. *Pandion haliaëtus carolinensis**. OSPREY. August 6, 1936, two visited Ross Lake, approaching from the northeast. Fishing in Bay at Grande Grève on August 27, 28 and September 9, 1937.

24. *Falco peregrinus anatum**. DUCK HAWK. From July 1 to August 25, 1936, one or both of a pair of immature birds was to be seen and heard daily along the northern cliffs of the Forillon. Both adults and immature present in 1937. One killed a black duck at Grande Grève, August 30, and on another occasion carried away an adult guillemot. This is the only species of hawk suspected of nesting on the little peninsula. The herring gulls which breed along the northern precipices do not appear concerned as the noisy peregrine dashes along before and above their rookeries, a fact which suggests that the young gulls are seldom molested. Probably the slow flying guillemots and murres are easy targets.

It is not surprising that other species of the larger birds of prey fail to nest on the Forillon, but an abundance of mice and small birds might be expected to attract a few pairs of sharp-shinned, sparrow, or pigeon hawks to the tracts which are infrequently visited by man.

25. *Falco columbarius columbarius.* PIGEON HAWK. — August 21, 1936, two immature migrants at western end of the Forillon, playfully chasing one another from tip to tip of young balsams.

26. *Falco sparverius sparverius**. SPARROW HAWK. — For two days, August 17 and 18, 1936, a single bird frequented a stump-lot northwest of St. George's Cove, resenting the temporary intrusion of a red-shouldered hawk (see above). Exactly a year later another of these little hawks appeared on the Forillon, followed by three other immature birds on August 20, 1937.

27. *Canachites canadensis canace.* SPRUCE GROUSE. — August 8, 1936, hen with two half-grown young ran for several yards in the wheel track just ahead of automobile on road west of Third Lake. September 9, 1937, male crossed road far up York River.

28. *Bonassa umbellus togata**. RUFFED GROUSE. — One in spruce woods a mile from Cape Gaspé, the only grouse recorded from the Forillon in 1936; but a brood of 5 young was raised on St Alban in 1937. They were as fearless as spruce grouse.

29. *Philohela minor**. WOODCOCK. — One flushed June 25, July 19, and August 20, 1937, from same half acre on southeast slope of Mt. St. Alban.

30. *Charadrius semipalmatus.* SEMIPALMATED PLOVER. — August 27, 1936, two feeding at Haldimand beach on southern shore of Gaspé Bay.

31. *Arenaria interpres morinella.* TURNSTONE. August 27, 1936, nine on Haldimand beach; fearless.

32. *Actitis macularia.* SPOTTED SANDPIPER. — Common along streams and shores of lakes and sea; only two seen on the Forillon in 1936; several in 1937.

33. *Totanus melanoleucus.* GREATER YELLOW-LEGS. — Common on tidal flats at head of Gaspé Bay, August 15 to 27, 1936 (all believed to have been of this species).

34. *Ereunetes pusillus.* SEMIPALMATED SANDPIPER. — August 15, 1936, several on tidal flats at head of Bay. Sandpipers, Yellow-legs and Plovers were observed here in 1937 also.

35. *Larus marinus.* GREAT BLACK-BACKED GULL. — August 1, 1936, one adult and one immature joined the herring gulls about the fishing station at Grande Grève, and remained for ten days. Eighteen around fishing boat near Cape Bon Ami, August 15, 1937.

36. *Larus argentatus smithsonianus.* HERRING GULL. — Several hundred nested on the north-

ern cliffs of the Forillon. On July 1 many nests contained only unhatched eggs; a few young, half-grown. This species, from before dawn till after dark, is the common bird about the fishing stations. Immature first noted on the water at Grande Grève, July 17, 1936. By August 9th flocks of 225, including both old and young frequently gathered there, and at St. George's Cove, Indian Cove, and Shiphead. August 15, 1937, a few young still in nests.

37. *Larus delawarensis**. RING-BILLED GULL. — August 22, 1936, an immature bird closely and repeatedly circled fishing boat near Cape Gaspé, in company with Kittiwakes and Herring Gulls. It was probably an early wanderer from the colonies along the north shore of the Gulf which has been described by Dr. H. F. Lewis. (*Canad. Field-Nat.*, 48: 115-119, 1934.)

38. *Rissa tridactyla tridactyla*. ATLANTIC KITTIWAKE. — Birds from the Bonaventure Island colony frequently visit fishing boats off the northeastern cliffs of the Forillon.

39. *Sterna hirundo hirundo*. COMMON TERN. — August 15, 1937, a pair approached our fishing boat off Cape Bon Ami.

40. *Alca torda*. RAZOR-BILLED AUK. — Nests commonly in the northern sea-cliffs, especially between the Portage and Cape Bon Ami.

41. *Uria aalge aalge*. ATLANTIC MURRE. — Often seen flying out from northern cliffs; probably nests there.

42. *Cepphus grylle grylle*. BLACK GUILLEMOT. — Nests commonly in cliffs along both shores of Forillon. Immature first noticed on the water August 22. This species is less timid than the other sea birds of the region, and is the only one which nests in the cliffs on the Bay shore.

43. *Zenaidura macroura carolinensis**. — EASTERN MOURNING DOVE. — Mr. P. S. Hotton of Grande Grève had a good opportunity to observe a small flock of this species which spent part of a day near his home in September, 1936. He had at hand a copy of *The Birds of America* by which to confirm his field identification. Although this is the first Gaspé record, Dr. Lewis reported one bird at Pointe aux Basques on the southern shore of the Labrador peninsula, June 4, 1935, and cites fall records on Anticosti. (*Canadian Field-Naturalist*, 38:89, 1924; *and* 51:119, 1937.)

44. *Antrostomus vociferus**. WHIP-POOR-WILL — Reported calling at Lighthouse on Shiphead a few years ago by the Light Keeper, Mr. Arthur Minchinton.

45. *Chordeiles minor minor**. NIGHTHAWK. — One hunting in the twilight of July 3, 1936, at Grande Grève. Another August 8 at dawn over Ross Lake. Seen twice at Grande Grève, August 16, 20, 1937.

46. *Chaetura pelagica*. CHIMNEY SWIFT. — July 3, 1936, one circling above evergreen forest in highlands just west of Forillon, and on evening of July 11 a pair hunted above Grande Grève. Not uncommon in villages and settlements from Gaspé to Fox River. August 8 three flying over Ross Lake, many miles from habitations except camps. In 1937 two pairs frequently circled over Grande Grève and the forest at base of the Forillon, where they probably nested.

47. *Archilochus colubris*. RUBY-THROATED HUMMINGBIRD. — A few pairs frequented flower gardens on the Forillon and at Gaspé Basin.

48. *Megaceryle alcyon alcyon*. BELTED KINGFISHER. — August 25, 1936, one on fence at mouth of Dartmouth River. Seen there again in late August 1937, and at Grande Grève, August 23.

49. *Asio wilsonianus**. LONG-EARED OWL. — One found dying at Grande Grève, August 29. 1937. I preserved the skin of this, the first recorded Gaspé specimen.

50. *Colaptes auratus luteus*. NORTHERN FLICKER. — Not observed east of Peninsula Village on northern shore of Gaspé Bay in 1936, but occasionally westward, especially along Dartmouth River. On July 25, 1937, an adult male descended slope of St. Alban and remained back of Grande Grève till August 7, when it passed eastward to ridge north of Indian Cove. A week later this bird or another flew westward over Grande Grève.

51. *Ceophloeus pileatus abieticola**. PILEATED WOODPECKER — One at Grande Grève, September 5, 1937.

52. *Dryobates villosus septentrionalis*. NORTHERN HAIRY WOODPECKER. — July 11, 1936, female seen back of Grande Grève. June 28, 1937, male on north ridge half way down the Forillon; apparently not nesting, for I could find no sign of it later.

53. *Dryobates pubescens medianus*. NORTHERN DOWNY WOODPECKER. — July 20, 1936, female in slash above Cape Bon Ami. August 26, one calling back of Grande Grève. More numerous in 1937.

54. *Picoides arcticus*. ARCTIC THREE-TOED WOODPECKER. — June 25, 1936, male working on trunks of spruces at edge of swamp back of Grande Grève. July 21 to August 23, 1937, a

female with one immature seen several times back of Grande Grève and in West Highlands.

55. *Empidonax flaviventris.* YELLOW-BELLIED FLYCATCHER. — Common in evergreen forests of the Forillon, especially near swamps, where I heard its call regularly from June 15 to August 25. Several at Ross and Fourth Lakes in early August.

56. *Empidonax traili traili.* ALDER FLYCATCHER. — June 14 to August 11, fairly common in alders and deciduous saplings in cleared lands along southern slopes of Forillon. Several seen in alders back of Percé, June 14, 1936.

57. *Nuttalornis mesoleucus**. OLIVE-SIDED FLYCATCHER. — One visited the valley behind Grande Grève, July 4-7, 1937.

58. *Iridoprocne bicolor.* TREE SWALLOW. — August 5, 1936, about 20 flying over Fourth Lake, about which many dead spruce stubs remained in a large burned area.

59. *Hirundo erythrogaster.* BARN SWALLOW.— None observed, but a "fork-tailed swallow" is said to have flown against the lighthouse at Shiphead two or three years ago. Probably the fields of the Forillon are not sufficiently extensive to attract these birds even though suitable buildings are numerous. Townsend found them breeding commonly in barns along the southern St. Lawrence shore, where meadows are wider and less tilted, with open water on only one side.

60. *Petrochelidon albifrons albifrons.* CLIFF SWALLOW. — June 16 to 19, 1936, many began nest-building under eaves of buildings along the Forillon. Egg-laying began about the 25th, but the males continued adding mud till July 5th. First young left nests August 1st. By the 11th all had departed.

61. *Perisoreus canadensis canadensis.* CANADA JAY. — Unrecorded from the Forillon, but not uncommon inland. Seen at Third Lake, August 8, 1936, and September 3, 1937. ,

62. *Cyanocitta cristata cristata**. BLUEJAY. — Two appeared in Portage gap behind Grande Grève, September 12, 1937.

63. *Corvus corax principalis.* NORTHERN RAVEN. — June 14, 1936, three young flying about cliffs back of Percé, still being fed by parents. From July 20 to August 28, 1936, one or two seen at various times along the northern cliffs of the Forillon. August 25, two immature visited a dooryard near Indian Cove to feed—not an unusual occurrence, I was told. One flew over Fourth Lake August 6th. Present also in 1937; probably breeds on the St. Alban cliffs.

64. *Corvus brachyrhynchos brachyrhynchos.* CROW. — Very common and fearless on the Forillon. Numbers increased as season progressed. June 18, 1936, fourteen in one tree at Grande Grève, attracted by fish thrown on land as fertilizer; by August 15th a flock of 58 had accumulated, now feeding in fields, and even in dooryards, on insects exposed by haying operations. In 1937, crows discovered the nesting places of starlings in the cliffs, and devoured most of the young.

65. *Penthestes atricapillus atricapillus.* BLACK-CAPPED CHICKADEE. — Breeds commonly throughout the region. Young flying by July 24th. Dr. Townsend recorded only "two or three" in 1919.

66. *Penthestes hudsonicus littoralis.* ACADIAN CHICKADEE. — Common on Forillon. Young left nest at St. George's Cove, July 15, 1936.

67. *Sitta carolinensis carolinensis.* WHITE-BREASTED NUTHATCH. — Not seen, but believe I heard one back of Grande Grève in 1936.

68. *Sitta canadensis.* RED-BREASTED NUTHATCH. — A few pairs bred in the highlands west of Grande Grève. Not found on Forillon in 1936 until August 14th, when many appeared, working northwestward. Throughout the rest of the month this extraordinary movement continued, the greatest activity occurring on the 15th, 22nd, and 29th, when hundreds passed an observation post back of Grande Grève between 6 to 7 a.m. These were the only mornings when the temperature dropped below 10° C. [50°F.]. I believe these nuthatches had crossed to the Forillon from Anticosti, and were feeding along the peninsula north of Gaspé Bay instead of making the easy flight of 5 miles across it to the southern shore. Robins, sparrows, juncos, and warblers accompanied the nuthatches. Similar flights occurred in 1937, but began on July 12th, a month earlier, and were not correlated with temperature. Three pairs nested on the Forillon. Such opportunities as I had afield at the head of the bay and to the south of it were inadequate to determine whether these migrants followed the coastline southeastward or whether they passed southward through the mountains. Demille's observations would lead one to expect a coastwise movement.

69. *Certhia familiaris americana.* BROWN CREEPER. — August 3, 1936, one on trail to Ross Lake in large arbor vitae.

70. *Nannus hiemalis hiemalis.* WINTER WREN. — Common breeder, especially around recently cut wood-lots. Raises two broods.

71. *Turdus migratorius migratorius.* ROBIN. — Fairly common, nesting both in cleared lands and forests. A nest with 4 eggs in spruce 10 feet from the edge of 600 foot sea-cliff at northern side of the Forillon. Young of second brood left nest at Gaspé Basin, August 21st. A northwestward movement, begun at Grande Grève, August 17, 1936, was still in progress on the 30th. In 1937 movement began August 14th, and continued till my departure September 13th.

72. *Hylocichla guttata faxoni.* HERMIT THRUSH. — August 5, 1936, one heard at Fourth Lake. A pair bred near Gaspé Basin in 1937.

73. *Hylocichla ustulata swainsoni.* OLIVE-BACKED THRUSH. — Breeds commonly in lower wooded portions of coulée throughout the Forillon.

74. *Hylocichla minima aliciae*.* GRAY-CHEEKED THRUSH. — June 24, 1936, in the West Highlands a male which had been singing in dense spruce emerged into strong light at short range, affording me, for ten seconds or more, an excellent opportunity to discern the lack of brown on the upper parts, with scarcely a trace of buffiness below. This may, of course, have been an unusually gray Bicknell's thrush, but especially striking was the vibratory character of the alarm note uttered as the bird dived back into the spruce depths upon discovering my presence. Dr. Townsend saw one at Percé, July 13, 1919, and reports one taken there by Mr. Taverner, July 16, 1914. Mr. Bond records it as not uncommon in northern Gaspé in June and July, 1925. (Ornithology of Northern New Brunswick, by James Bond, *The Canadian Field-Naturalist*, 40: 85-87, 1926).

75. *Hylocichla minima minima.* BICKNELL'S THRUSH. — On several occasions during June and July, 1936, I heard thrushes singing in the same highlands west of Grande Grève, but was unable to obtain a clear view. Their songs certainly were not those of olive-backs. Being unacquainted with the song of the gray-cheeked and Bicknell's thrushes, I tentatively record these birds as the latter subspecies, chiefly on the strength of observations by a man who knows their songs well. Mr. L. B. Gillet spent several weeks at Grande Grève in 1932 studying thrushes. He assures me that these birds in the west Highlands were Bicknell's. Certainly a pair nested on top of Mt. St. Alban in 1937, male seen clearly on one occasion.

76. *Regulus satrapa satrapa*.* GOLDEN-CROWNED KINGLET. — Nested in highlands just mentioned in 1936. Common along trail to Ross Lake. August 3-8. Three nests on Forillon in 1937.

77. *Corthylio calendula calendula.* RUBY-CROWNED KINGLET. — Nesting pairs scattered through evergreen forests of the Forillon and westward.

78. *Anthus spinoletta rubescens.* AMERICAN PIPIT. — During a lull in a terrific rain storm on September 13, 1937, more than 100 settled in a field beside the shore road near Mont Louis

79. *Bombycilla cedrorum*.* CEDAR WAXWING. — Common at times; flocks of 25 to 70 at Grande Grève in June, 1936. Generally distributed later. Only 2 in 1937.

80. *Sturnus vulgaris vulgaris.* STARLING. — According to Mr. Fred Richmond of Gaspé it was first seen there in 1932. It is now common and survives the winters. Mr. P. S. Hotton noted the first starlings at Grande Grève in the autumn of 1935; 3 or 4 spent the winter. During 1936 several pairs nested along the Forillon, occupying crevices in the sea-cliffs near guillemots. At the end of August the starling population here had increased to 33. Mr. Franklin Gavey reports that this flock finally left the vicinity October 25th. He saw no more until February when two visited his door-yard. Seven pairs nested on the Forillon in 1937, but crows devoured many of the young. All the survivors had departed by August 3rd. On August 24th, fifteen immature and one adult visited Grande Grève, then passed westward.

81. *Vireo solitarius solitarius.* BLUE-HEADED VIREO. — Uncommon breeder on the Forillon and westward. In 1937 I located 5 breeding pairs about the boggy swamps of Grande Grève, Indian Cove and Shiphead. Townsend recorded but one in 1919; Demille none in 1925.

82. *Vireo olivaceous*.* RED-EYED VIREO. — Uncommon about head of Gaspé Bay and westward. Only one seen in 1936 on the Forillon, and that at the very tip, August 28, probably a migrant from Anticosti. One pair nested in the West Highlands among well grown birches and maples. In 1937, 3 pairs nested in the West Highlands, one of them choosing the same territory occupied in 1937.

83. *Vireo philadelphicus*.* PHILADELPHIA VIREO. —During 1936, I was able to identify by sight only two of this species, one in shrubs on the bank of Fork River, a tributary of the Dartmouth, in cleared land, and the other in small birches on the northern talus slope of Mt. St. Alban. In 1937 this latter territory was again occupied, and four other breeding pairs were located on the Forillon. Two chose bushy clearings behind Grande Grève, another a patch of pin cherry

and birch surrounded by fields near Indian Cove, and the fourth a mountain ash at the margin of a swamp in the coulée near Shiphead.

The distribution of the vireos in this region shows the red-eyed preferring the older forest trees on the higher ground, while the blue-headed and Philadelphia vireos resort to the lower and more open lands. The relative numbers in 1937 support the belief of both Townsend and Bond that the Philadelphia vireo is the most numerous.

84. *Mniotilta varia**. BLACK AND WHITE WARBLER. — August 28, 1936, one near Shiphead Lighthouse working westward with *Dendroica aestiva* and *D. virens,* all probably migrants just landed. None seen in 1937.

85. *Vermivora peregrina**. TENNESSEE WARBLER. — A few at base of Forillon and westward, June and July, 1936, in deciduous trees. More numerous in 1937, when 10 pairs nested on the Forillon, and 5 in West Highlands.

86. *Vermivora ruficapilla ruficapilla.* NASHVILLE WARBLER. — Breeds commonly throughout the Forillon.

87. *Dendroica aestiva aestiva.* YELLOW WARBLER. — A few migrants passed from Shiphead to Grande Grève and westward on August 28 and 29, 1936. None on Forillon in 1937, but several heard June 17th near the road along south shore of Gaspé peninsula, and through the mountains back of Percé. This species has been reported widely through the Gaspé peninsula, Dr. Lewis in 1922 having found it at Bonaventure Island, Gaspé, and Fox River, as well as fairly common on Anticosti. Townsend saw a pair feeding young at St. Annes des Monts, while Demille also found it common on the north shore of the peninsula at Grande Vallée and along the Mont Louis River. Its absence from the Forillon, therefore, is somewhat surprising. See remarks under Northern Yellow-throat.

88. *Dendroica magnolia.* MAGNOLIA WARBLER. — Very common throughout the region. Many working westward out of the Forillon August 29, 1936, and September 1-5, 1937.

89. *Dendroica tigrina**. CAPE MAY WARBLER. — June 24, 1936, male seen and heard several times in highlands west of Grande Grève, but not afterwards.

90. *Dendroica caerulescens caerulescens.* BLACK-THROATED BLUE WARBLER. — June 23 and 24, 1936, male in West Highlands feeding and singing on same clump of birches; possibly a transient, but on July 19, 1937, two males (or the same bird twice) were observed on St. Alban 1/4 mile apart, and may have bred, though not again heard. Dr. Townsend saw one at Grande Grève August 16, 1919, and Dr. Harrison F. Lewis recorded another there May 24, 1922.

91. *Dendroica coronata.* MYRTLE WARBLER. — Common breeder throughout the Forillon; began westward movement August 17, 1936.

92. *Dendroica virens virens.* BLACK-THROATED GREEN WARBLER. — Abundant breeder. Many moving westward with other species August 25, 1936. During the next few days few were seen passing southeastward into and along the Forillon, the only passerines to do so. Worn female still feeding young near the lighthouse, August 28th.

93. *Dendroica fusca.* BLACKBURNIAN WARBLER — July 22, 1936, male in heavy spruce, West Highlands; on branch with pine grosbeak. Again July 6, 1937, on northwest slope of St. Alban, in full song.

94. *Dendroica castanea.* BAY-BREASTED WARBLER. — Fairly common breeder in evergreen forest on West Highlands; rare on the Forillon in 1936, but bred throughout its length in 1937, the territories of 6 males being located.

95. *Dendroica striata.* BLACK-POLL WARBLER. — Common; nests chiefly in young firs and spruces. A male at Grande Grève sang every morning from July 26 until August 29, 1936, the last time I visited his territory.

96. *Dendroica palmarum hypochrysea**. YELLOW PALM WARBLER. — August 25th. One immature, probably this species, at the base of the Forillon. Worked for five minutes about low pasture spruces while I sketched it. Yellower below and less striped above than young black-polls also present.

(To be concluded)

NOTES ON THE FLORA OF CAPE BRETON ISLAND

By A. E. ROLAND

Nova Scotia Agricultural College, Truro, N.S.

IN LATE August, 1937, immediately after the meetings of the American Society of Botany at Wolfville, Mr. John Adams and I, accompanied by Mr. Chalmers Smith, graduate student of Acadia University, and Mr. Harry Grant of Dalhousie University spent four days on Cape Breton Island. The following are some of the typical areas which we examined.

The first night was spent in Mabou, and early the next morning we went to Glen Dyer at Hillsborough. This was a deep, shady glen in a limestone area, bordered with hardwood trees and with a small stream at the bottom. Giant ostrich ferns grew along the edge of the stream; and the sides of the glen were covered with the long, delicate fronds of the bulblet fern, *Cystopteris bulbifera. Thelypteris Filix-mas* was found in one corner. *Polystichum Braunii* was not seen; but we were told that it grew everywhere in the near-by woods, and we later encountered it in different places further north along the coast.

Of the flowering plants *Geranium Robertianum* was the most abundant here, as we had earlier seen it on the sides of Cape Blomidon in Kings County, the dominant plant upon the talus slopes and on the rocky cliffs. *Impatiens biflora* bordered the stream and mixed with it was the rarer *Impatiens pallida;* while along the bank grew such typical plants of a hardwood forest area as *Ranunculus abortivus* and *Agrimonia striata.* In all a profusion of forms that would be met with only on the richest and most alkaline soils.

As we returned up the side of the glen we encountered one of the rarities of the trip, *Triosteum aurantiacum,* one of the rarest of Nova Scotian plants, but here growing on the open banks and over four feet in height.

We spent the rest of the day in making a circuit of Lake Ainslie. At the very head of the lake a tiny brook flows in through a meadow. Here on the sandy shore grew *Ranunculus reptans, Galium Claytoni, Phalaris arundinacea, Potentilla palustris;* and along the banks *Mimulus moschatus,* and other plants typical of the colder parts of Nova Scotia. Further round the lake and in fact everywhere upon the most sterile soils was found *Gnaphalium sylvaticum.*

At the outlet of the South-west Margaree River was found a number of the water plants: *Scirpus, Acorus, Sparganium,* etc, each species covered with a good growth of its own particular rust. While two of us were laying in a good supply of the rusts Smith came over with a dripping handful of a peculiar water plant he had found in the slowly-flowing water further down. This proved to be *Megalodonta Beckii,* reported by Fernald in 1922 from Digby County for the first time east of the Penobscot River, Maine.

All along the shore we had been running into typical seashore plants — at Inverness, at Margaree Harbour, and again at Cheticamp, so that a single enumeration of the species will suffice: *Ammophila breviligulata* and *Elymus mollis* upon the dunes; *Xanthium* and *Salsola* upon the sandy shores; and behind the sand bars *Scirpus validus* or *Leersia oryzoides.* Along the headlands *Potentilla tridentata* grew everywhere. In Nova Scotia this seems to be the most typical plant, either of the exposed headlands, or wet barrens, or of the sandiest plains such as are found in the Annapolis Valley.

Above Cheticamp and just before the sharp ascent that leads over the mountain, a stop was made for a few minutes by the rocky shore. *Ligusticum scoticum* and *Campanula rotundifolia* grew in profusion along the cliffs; while everywhere along the shore and up over the hills was the common catnip, *Nepeta Cataria.* On the sandy shore we found *Potentilla pectinata,* a plant unknown from Nova Scotia, and rare even in Newfoundland; while further back *Potentilla fruticosa,* much dwarfed by the wind, was now in full bloom. Growing with it were numerous bushes of *Shepherdia canadensis;* and at the very edge of the cliffs trailing vines of *Juniperus horizontalis* were common. This is a characteristic enough group of plants for northern Cape Breton, but it is one both novel and thrilling for a collector used to the plants of the more acid and inland soils of the mainland.

Next morning in Pleasant Bay we awoke to the fact that one of the commonest weeds of the settlement, competing with the *Anaphalis margaritacea* which grew white upon the recently cleared pastures and hillsides, was the introduced *Achillea Ptarmica.* Flowers and cultivated plants were few or none; and in front of one of the houses was a single specimen of the

green foxtail, *Setaria viridis,* carefully transplanted and cared for.

At the upper end of the settlement is one of the finest growths of virgin hardwood to be found in the province, unspoiled and with a variety of ferns and typical plants of the forest floor. We passed through this and over the mountain until we descended again, this time into the big interval at Cape North with the Bay of St. Lawrence and St. Paul's Island off in the distance. Here at the very tip of Cape Breton is one of the few agricultural districts — a place of broad fields, and barns, and even of plum orchards.

At this place the white cliffs of gypsum again attracted us. In the meadows were the common northern plants; the ever-present *Sanguisorba canadensis, Heracleum lanatum, Cornus americana, Triglochin maritima* in the damper spots; and upon the white cliffs, making a perfect covering, was a growth of *Erigeron hyssopifolius,* a relic species known in Nova Scotia only in the northern part of Cape Breton and on the gypsum cliffs of Hants County.

The following are some of the more interesting collections and observations made in the short time available: Specimens are in the herbarium of the Nova Scotia Agricultural College, Truro, — or at Acadia University, Wolfville, N.S.

Thelypteris Filix-mas (L) Nieuwl. Inverness County, shady glen, Hillsborough.

Juniperus horizontalis Moench. Inverness County, base of cliffs, north of Cheticamp. Victoria County, common, roadsides, Ingonish.

Sagittaria graminea Michx. Inverness County, shallow water, sandy shore at the head of Lake Ainslie.

Leersia oryzoides (L) Sw. Inverness County, behind the sea-beach, Margaree Harbour. The typical form with the panicle exserted.

Phalaris arundinacea L. Inverness County, abundant in the wet meadow at the head of Lake Ainslie. Reported from Whycocomagh by Macoun and probably common.

Suaeda americana (Pers.) Fern. Sandy sea-beach, North Sydney.

Spergularia leiosperma (Kindb.) F. Schmidt. Reported by Nichols as characteristic of brackish pools. Inverness County, sandy sea-beach, Cheticamp.

Potentilla fruticosa L. Common and much stunted along the sea-coast north of Cheticamp.

Potentilla pectinata Raf. Known in eastern Quebec and from Newfoundland, but here reported for the first time from Nova Scotia. Inverness County, sandy seashore, base of cliffs north of Cheticamp.

Acer rubrum L. var. *tridens* Wood. Inverness County, mixed woods behind the railway station, Mabou.

Impatiens pallida Nutt. Inverness County, shady glen, Hillsborough.

Shepherdia canadensis (L) Nutt. Inverness County, common on hillside along the coast, north of Cheticamp.

Nepeta Cataria L. Inverness County, one of the commonest weeds above Cheticamp and at Pleasant Bay.

Limosella subulata Ives. Inverness County, sandy and muddy flat back of the beach, Margaree Harbour. Formerly reported from Sydney Mines and southwestern Nova Scotia.

Triosteum aurantiacum L. Inverness County, side of ravine, Hillsborough. Reported by Nichols from northern Cape Breton, but otherwise unknown in Nova Scotia.

Erigeron hyssopifolius Michx. Victoria County, covering a gypsum cliff, Cape North. Long known from northern Cape Breton and Hants County.

Gnaphalium sylvaticum L. Widely distributed in the eastern part of the province on dry sterile soil, or in open woods. Inverness County, sterile ground around Lake Ainslie. Victoria County, in open pasture woods, Beinn Breagh; dry ground, Cape North. Also on the mainland in Guysborough County, open woods, Pirate's Cove.

Xanthium echinatum Murr. Common on the sandy seashore at least from Cumberland County to Inverness County and also known from the Bras d'Or Lakes. Inverness County, sandy seashore, Margaree Harbour; sandy shore, Iona. Also on the mainland in Antigonish County sandy seashore, Bayfield Road.

Megalodonta Beckii (Torr.) Greene. Inverness County, below the bridge, outlet from Lake Ainslie on the South-west Margaree River. New to Cape Breton and the second station for Nova Scotia.

Achillea Ptarmica L. Inverness County, introduced and common about Pleasant Bay.

Artemisia Stelleriana Besser. Reported by Fernald in 1921 for the first time from Nova Scotia. It is, however, widely distributed around the coast; and especially common in northern Cape Breton. Shelburne County, crest of stony

sand beach, Villagedale. Digby County, sandy shore, Sandy Cove. Halifax County, along the North West Arm, Halifax. Cape Breton County, common on the beach at North Sydney. Inverness County, scattered on a sandy bar at Cheticamp.

The following species do not appear to have been recorded previously as occurring on Cape Breton Island.

Equisetum limosum L. Lake Ainslie.
Sparganium acaule (Beeby) Rydb. Vicinity of Margaree.
Potamogeton perfoliatus L. Lake Ainslie.
Alopecurus aristulatus Michx. Margaree Harbour.
Hordeum jubatum L. Sydney.
Panicum capillare L. Sydney.
Heleocharis acicularis (L.) R. & S. Lake Ainslie.
Cypripedium acaule Ait. Pleasant Bay.
Comptonia asplenifolia Gaertn. Ingonish.
Rhus hirta Sudw. Whycocomagh.
Ribes oxyacanthoides L. Ravine beyond Cheticamp.
Hypericum boreale (Britt.) Bicknell Kilmuir Place.
Rubus hispidus L. Margaree.
Oenothera pumila L. Mabou.
Aralia hispida Vent. Pleasant Bay.
Coelopleurum actaeifolium (Michx.) Coult. & Rose. Margaree Harbour.
Hydrocotyle americana L. Kilmuir Place.
Ambrosia artemisiaefolia L. Englishtown Ferry and other localities.
Lactuca spicata (Lam.) Hitchc. Ravine beyond Cheticamp.
Erigeron annuus (L.) Pers. Hillsborough.
Erigeron philadelphicus L. Hillsborough.
Solidago juncea Ait. Railway bank beside gypsum cliffs, Iona.

FURTHER ADDITIONS TO THE OTTAWA LIST OF MOLLUSCA

By A. LA ROCQUE

SINCE the publication of the writer's first paper[1] bringing the Ottawa list as nearly up to date as possible, a few papers have been published and much new material collected and studied; together, these add a few species and varieties to our list and correct some old records.

It is the intention of the writer to publish a catalogue of the species of the region with localities and synonymy as soon as it is felt that the data accumulated are sufficiently complete to set up a more or less permanent list. In the meantime, a guide for the beginner, without synonymy but with notes on the identification of the species has been prepared and will appear shortly in *The Canadian Field-Naturalist*.

In the changes listed herewith, it is understood that the 1890 list of Taylor and Latchford[2] is used as a basis. Mere changes in names or generic references are not discussed here but will be incorporated in the catalogue.

ADDITIONS AND CORRECTIONS

Lampsilis radiata borealis (Gray) — Chief Justice Latchford has often expressed the opinion that this form is not entitled to specific rank but is merely a variety of *radiata*. Comparison of specimens of *borealis* from the type locality (Duck Island, Ottawa River) and specimens of typical *radiata* will show that his opinion is well founded and that the form should indeed have only varietal rank. Mr. Oughton and the writer have so treated it in a recent paper on Ontario Naiades[3] and it should appear on our list as a variety of *radiata*. The typical form of *radiata* is found at Britannia Bay and other localities in the Ottawa River above the Chaudière Falls and therefore should be retained on our list.

Valvata lewisi Currier. — Specimens are in the National Museum of Canada from the Ottawa River, where it is fairly abundant in Britannia and Graham Bays, and in the Fairbairn collection from the Rideau River at Billings' Bridge, rare.

Somatogyrus subglobosus Say. — Over ten specimens of a *Somatogyrus* were collected at Duck Island early in October, 1936. Specimens were submitted to Mr. Elmer Berry of the Museum of Zoology, University of Michigan, who identifies them as this species. *S. subglobosus* has been recorded for Lake Erie and Baker gives it the following distribution: "Ohio Valley; Ohio and Iowa, Michigan and Wisconsin, south to Kentucky". How this species came to the Ottawa river it is impossible at present to say.

Helisoma campanulatum wisconsinense (Winslow). — This variety is found in many lakes of the Gatineau Valley. It was recorded by Winslow[4] from Blue Sea

Lake which is outside the limits of our area, but the following records which have been checked by Prof. F. C. Baker show that it is a common shell in many of our lakes: Meach, Bernard, Gauvreau and Taylor Lakes, Que. Constance Bay (Ottawa River) and Rideau River, Ont.

Typical *H. campanulatum* (Say) is found in McKay Lake (*fide* F. C. Baker) so that both the typical form and the variety *wisconsinense* should appear on our list.

Helisoma trivolvis pilsbryi F. C. Baker. — The species was recorded for Meach Lake in a recent paper by the writer[5], specimens identified by F. C. Baker.

Gyraulus circumstriatus walkeri (Vanatta). — The measurements of two specimens of this variety from the Baker collection are given in Baker's Wisconsin Monograph[6]. The localities are as follows: "Hull, Quebec (Baker coll. 1731)" and "Ottawa River (Baker coll. 1732)". This is the only mention known to the writer of this variety for the Ottawa region. The form was originally described as a variety of "*Planorbis' parvus* by Vanatta (*Nautilus* 16:58, 1902)

Fruticicola striolata (Pfeiffer). — This species appears on our earlier lists as *Helix rufescens* Pennant. Mr. Fairbairn has recorded[7] another occurrence of the species which seems to be an entirely unintentional introduction. Interesting data on the species at Toronto, Ont., have been published recently by Mr. J. Oughton[8].

Polygyra fraterna (Say). — In describing *Polygyra monodon cava,* Pilsbry and Vanatta[9] mention Ottawa as one of the localities from which they had specimens. However, Mr. Allan F. Archer of the Museum of Zoology, University of Michigan, informs me that our specimens are *fraterna* (Say). Therefore, *Polygyra monodon* should be dropped from our list and replaced by *Polygyra fraterna* (Say).

Polygyra multilineata (Say). — Mr. Fairbairn recently re-discovered the species in the district[10]. So far as known it is confined to a small area in Tétreauville, a suburb of Hull, Que. The specimens were found on the east side of the ridge running from the Ottawa River to Fairy Lake, a favourite collecting locality of Latchford's which has produced many fine specimens.

Pupilla muscorum (Linné). — A large series of this species was collected at Eastview by Mr. Fairbairn whose work has already added many species to the Ottawa list. Part of his set has been deposited in the National Museum of Canada (Cat. no. Mollusca 3350). Most of the specimens are of the typical form, with one denticle on the parietal wall of the aperture.

Arion circumscriptus (Johnston). — This slug was recorded for the Ottawa region in December 1936.[11] Further records were published in 1937[12] which show that it is one of our commonest slugs but, so far as we know, has not reached beyond Meach Lake to the North. In the last two summers it has been seen by the writer in many gardens in the Ottawa region; wherever seen it was common but so far few complaints have been heard about it. Most gardeners do not seem to note any damage done by this slug, or if they do, ascribe it to "worms" generally.

Limax maximus Linné. — This species, the Great Slug of Europe, has often been found in greenhouses in the city[13] but until this year had not been caught outside of them; it was thought that the climate was too severe for the species to establish itself here. On July 6th, 1938, a specimen was brought to me from a garden in Rockcliffe where it had been causing damage to young Petunias. On further search in the same garden two more specimens were found. Four days later two more were brought in, also from a garden in Rockcliffe, but a quarter of a mile away from the first occurrence. Two of these specimens were more than three inches long (4 and 3½ inches respectively) which would indicate that they had wintered outside without any protection from the cold.

The species is firmly established in many places in the United States; in California it has become a serious garden pest. Whether the Ottawa specimens represent a mere casual outbreak which will disappear in a cold winter or the permanent establishment of another European species remains to be seen In the meantime the writer would appreciate further information on this slug, which can be recognized by its size and colour (gray ground with black-brown stripes).

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1. "Mollusca of the Ottawa Region—Additions and Corrections" *Can. Field-Nat.* 49:33-34, February, 1935.

2. "Report of the Conchological Branch" *Ottawa Naturalist* 4:51-58, 1890.

3. "A preliminary Account of the Unionidae of Ontario" *Can. Journal Research* D, 15:147-155, 1937.

4. Winslow, Mina L.: "The varieties of *Planorbis campanulatus* Say" — *Occ. Papers Mus. Zool. Univ. Mich.* No. 180, pp. 1-9, pls. 1-2, December, 1926.

5. "Molluscan Fauna of Meach Lake, Quebec" *Can. Jour. Res.* 13:46-59, Sept. 1935.

6. Baker, Frank C. "Fresh Water Mollusca of Wisconsin" Part I, p. 379, 1928.

7. Fairbairn, G. E., *Can. Field-Nat.* 52:14, January, 1938.

8. Oughton, J., *Nautilus* 51:137-140, April, 1938.
9. *Nautilus* 25:12, May, 1911.
10. Fairbairn, G. E., *Can. Field-Nat.* 51:40-41, March, 1937.
11. A Slug new to the Quebec and Ottawa Lists" *Can. Field-Nat.* 50:148, December, 1936.
12. "The Slug *Arion circumscriptus* in Canada" —*Can. Field-Nat.* 51:58, April, 1937.
13. Latchford, *Ottawa Naturalist* 18:92, 1904.

MAMMALS FROM TOUCHWOOD HILLS, SASKATCHEWAN

By E. RAYMOND HALL

IN THE period July 7, 1901, to April 23, 1902, at Touchwood Hills, Saskatchewan, Mr. Edwin Hollis collected 106 mammals of 24 species which he presented to the British Museum of Natural History. Two of these are alcoholics, one is a skull-only and the remainder are well prepared skins-with-skulls accompanied by measurements taken in the flesh. All are labeled as taken at Touchwood Hills and bear catalogue numbers as follows: 1.10.2.1. to 39.; 2.4.2.1. to 49; 2.8.2.1. to 18. Mr. Hollis's *Collecting Small Mammals in N. W. T. Canada* (*The Zoologist*, ser. 4, vol. 6, pp. 294-299. 1902) records information of value about the habitats occupied by several of the species.

Because of the relative paucity of information about the occurrence of mammals in the region concerned, it seemed worth while to make written record of the specimens in this collection under names of application as exact as possible. Receiving permission so to do from Mr. T. C. S. Morrison-Scott, Assistant Keeper of Mammals, the following notes were prepared as possibly of aid to students of the distribution of Canadian mammals.

Sorex arcticus arcticus Merriam, SADDLED-BACKED SHREW. — One.

Nycteris borealis borealis (Müller), RED BAT. — One, September 16, 1901, "caught by hand in a willow bush".

Nycteris cinerea (Beauvois), HOARY BAT. — One, September 11, 1901.

Mustela cicognanii cigononii Bonaparte, ERMINE. — One subadult male in summer coat October 3, 1901, and one subadult female in white winter coat, March 27, 1902.

Mustela frenata longicauda Bonaparte, LONG-TAILED WEASEL. — Of four taken in the autumn of 1901, three young obtained on August 19, 25 and September 5, are in summer dress and a subadult female dated November 9, is in white winter dress.

Mustela vison lacustris (Schreber), AMERICAN MINK. — One.

Mephitis mephitis hudsonica Richardson, STRIPED SKUNK. — One.

Taxidea taxus taxus (Schreber), AMERICAN BADGER. — Three.

Vulpes fulvus regalis Merriam, RED FOX. — Three in the red phase.

Canis latrans (*latrans*? Say), COYOTE. — Three, of which one adult male was wrongly listed by Pocock (*Proc. Zool. Soc. London*, 1935, *p.* 677) as "an immature" individual of *Canis lupus nubilus* Say.

Citellus richardsonii (Sabine), RICHARDSON GROUND SQUIRREL. — Six, of which an adult male, taken on April 1, 1902, when the temperature was at zero, was the first one seen that spring by Mr. Hollis.

Citellus franklinii (Sabine), FRANKLIN GROUND SQUIRREL. — Three.

Citellus tridecemlineatus tridecemlineatus (Mitchill), 13-LINED GROUND SQUIRREL. — Six.

Eutamias minimus borealis (Allen), LEAST CHIPMUNK. — Six.

Thomomys talpoides talpoides (Richardson), NORTHERN POCKET GOPHER. — Eight.

Onychomys leucogaster missouriensis (Audubon and Bachman), SHORT-TAILED GRASSHOPPER MOUSE. — Nine.

Peromyscus maniculatus arcticus (Mearns), DEER MOUSE.—Six specimens, mostly young, are of a dark coloration, more suggestive of the subspecies *arcticus* than of *osgoodi*. Adult specimens, from this place, where inte gradation might be expected between the two mentioned races, may be enough lighter in colour to change the provisional identification to subspecies *osgoodi*. Evidently these specimens are those recorded by Hollis (*op. cit., p.* 297) under the name *Mus musculus*.

Clethrionomys gapperi loringi (Bailey), RED-BACKED VOLE. — Two.

Microtus pennsylvanicus drummondii (Audubon and Bachman), PENNSYLVANIA MEADOW MOUSE. — Sixteen including one alcoholic.

Microtus minor (Merriam), MINOR MEADOW MOUSE. — Eight including one alcoholic.

Ondatra zibethica alba (Sabine), MUSKRAT. — Five (sixth registered but not seen) specimens, all features considered, seem nearer *alba* than to any of the three adjacent races.

spatulata, osoyoosensis or *cinnamomina,* to which last, however, Mr. Hollis's specimens show some approach in larger size.

Zapus hudsonius (campestris Preble?), HUDSONIAN JUMPING MOUSE. — Four, but the skull of no. 1.10.2.23. not seen.

Lepus americanus americanus Erxleben, SNOWSHOE RABBIT. — Four: One young male dated September 26, 1901, is in the brown coat. Two males collected on October 24, 1901, are in transitional pelage, and an adult female taken January 4, 1902, is in white winter pelage.

Bison bison subsp.?, BISON. — One slightly weathered skull; recorded by Lydekker (*Catalogue of the Ungulate Mammals in the British Museum of Natural History, vol.* 1, *p.* 39, 1913) as *Bison bison bison,* and from Southwood Hills, which place name may be correct.

Museum of Vertebrate Zoology,
University of California, Berkeley.

Transmitted December 13, 1937.

NOTES AND OBSERVATIONS

FIRST RECORDED NEST OF BALTIMORE ORIOLE FOR NOVA SCOTIA. — On June 18th, 1938, at Berwick, Kings County, Nova Scotia, I had the delightful experience of watching at close range a pair of Baltimore Orioles (*Icterus galbula*) feeding their young in a nest which was typically suspended from the end of a long, drooping branch of an elm tree. According to my notes, compiled during the past 40 years, I find but 5 records of occurrence of this species in this province, including the foregoing which, so far as I can learn, constitutes the only breeding record. — R. W. TUFTS, WOLFVILLE, N. S.

YELLOW-CROWNED NIGHT HERONS IN NOVA SCOTIA. — Four recent occurrences of the Yellow-crowned Night Heron (*Nyctanassa violacea violacea*), observed by the writer in the vicinity of Wolfville, N.S., are so unusual as to seem noteworthy.

On September 13, 1932, a first-year specimen, rather unwary, was easily collected as it stood beside a small creek of brackish water on the Grand Pré meadows, some four miles north-east of Wolfville. The presence here of this individual is perhaps attributable to the unusually violent gales of September 10, 1932. This bird is now in the Provincial Museum, at Halifax.

In the evening dusk of July 28, 1937, a male, in juvenal plumage, was taken as it flushed from a rather extensive, brackish marsh located a mile east of Wolfville, where it had been feeding. This bird was in excellent physical condition, and the stomach contained a small eel and some broken-up Coleoptera. Originally made up in skin form, it has since been relaxed and mounted for the Provincial Museum.

The marsh, from which the July 28 bird was taken, gives way abruptly on one side to a long terminal moraine, the steep side of which is wooded by a mixed growth of spruce and birch. Here, at noon of August 12, 1937, a Night Heron was discovered perching drowsily in a large birch. This specimen was taken, and the gun report disturbed another, which had escaped notice in the thick foliage. It, too, was secured. Both are *violacea,* in juvenal dress. One of these was mounted for the collection of the Provincial Museum and the other, a skin, is in the National Museum of Canada.

I am aware of no unusual weather conditions immediately prior to the taking of the 1937 specimens, and probably their occurrence in Nova Scotia can best be ascribed to the tendency of some of the Ardeidae to post-breeding-season wandering.

Aside from the Yellow-crowned Night Heron reported by Kennard (*Auk,* 1902, 396) as having been taken at Cape Sable Island about April 1, 1902, I know of but one other record for Nova Scotia. The details regarding it were kindly supplied by Mr. R. W. Tufts from his copious notes on Nova Scotia birds and are as follows:

September 14, 1925. A specimen at Cole Harbour, Halifax Co., taken by William Shaw. This bird was mounted and is in the Provincial Museum at Halifax. — W. EARL GODFREY.

REVIEWS

OUR SHADE TREES — *A practical handbook containing reliable information for every owner of shade trees: By E. Porter Felt, New York, Orange Judd Publishing Co. Inc.;* 1938. $2.00.

This volume of 187 pages prepared by Dr. Felt, the Director and Chief Entomologist of the Bartlett Tree Research Laboratories, will undoubtedly be appreciated by lovers of shade trees in

Canada as well as in the United States. The author has had many years of experience in studying problems relating to the care of shade trees and their protection from insect and other enemies. During the period 1898 to 1928 he was State Entomologist of New York, and from 1908 to 1935, Editor of the Journal of Economic Entomology. He therefore speaks with authority.

The book is divided into eight chapters, each of which contains various sections. The titles of the chapters are:

I.-Shade trees and men. II.—General Shade Tree Care. III.—The Language of Shade Trees. IV.—The Troubles of Shade Trees. V.—The Selection and Planting of Shade Trees. VI.—Research and Education. VII.—Control of Insects and Diseases. VIII.—A List of Some of the More Useful Books on Trees and Shrubs.

Thirty-one plates of illustrations and one text line cut add to the value of the volume.—ARTHUR GIBSON.

Special Publication of the American Committee for International Wild Life Protection, No. 9. The Organisation of Nature Protection in the Various Countries by G. A. Brouwer, 1938.

This is a translation of Dr. Brouwer's original, in Dutch, which appeared in 1931, and which has now been translated into English. It is issued with a foreword by Dr. John C. Phillips, Chairman of the American Committee, who says — "It is fairly complete up to about 1928, but any work of this sort is of necessity out of date before it leaves the hands of the printer—" This work contains a wealth of information on the status of wild life conservation throughout the world. For a summary of wild life protection in any country of the world, adequately supported by references, this book is the best work the writer has seen. — H. L.

THE CHAT. *A tri-monthly journal of the Toronto Ornithological Field Group. Vol. 2, No. 1. January, March*, 1938, *pp.* 7, *Mimeographed.*

This is another of those admirable manifestations of activity among junior nature observers from whose ranks future naturalists must be recruited. This is very nicely got up with a particularly attractive cover. This number is devoted largely to a sketch of the ornithological life and work of George Pearce, one of Toronto's most picturesque characters of a past generation, whose memory was likely to be forgotten through his being a field man rather than a writer. There is an interesting article on the nesting of the Canada Jay and a list of spring birds observed to date.

A very good reason for the existence of these juvenile efforts is given in a recent number of *Field Notes* similarly produced by the Junior Field Naturalists' Association of British Columbia. In reply to the question,—

"Why should I pay my dues and what do I get out of it? — The privilege of writing for the paper four times a year; — I don't like writing anyway" it is said, — "The members will find that in biological research it is necessary to be able to write clearly and concisely, and I do not think the members will find any better way to learn to write than by doing it. Surely the *Field Notes* is the natural place for members to practice their theoretical knowledge of writing by recording their natural history observations. Perhaps when writing becomes better they can get papers accepted for publication in more widely distributed journals".

It might be added that they are thereby enabled to increase their powers of observation, to think more clearly, to separate the essential from the non-essential and to obtain knowledge and background in useful scientific procedure.

The mimeograph process of publication is a godsend for minor publications and its use in this manner should be highly recommended and encouraged.—P.A.T.

NEW OTTAWA MAP SHEET

The Department of National Defence has recently published the Ottawa sheet of the National Topographic series on a scale of four miles to one inch. It includes the eastern counties of Ontario and the adjoining portions of the province of Quebec. The principal cities and towns shown are Ottawa, Cornwall, Alexandria, Kemptville, Hawkesbury, Hull, Valleyfield, Huntingdon, Lachute, Buckingham, St. Jerome, and Arundel. The roads are all classified by distinguishing colours, thus making it a very good road map.

The Ottawa river is shown from Lake Deschenes and the St. Lawrence from Cornwall to their point of confluence. Other information shown includes townships, post offices, railways, power lines, wooded areas, lakes, rivers, and streams. Elevations at 200 feet intervals are represented by coloured tints and contour lines.

Copies of this map may be obtained from the Surveyor General, Department of Mines and Resources, at 25 cents per copy.

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We would ask the Officers, and more particularly the Secretaries, of all the Affiliated Societies to assist us in our task of building up the circulation of this magazine. By securing every member as a subscriber we can truly make this magazine into one of the leading Natural History publications of America.

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CONTENTS

The Canadian Field-Naturalist

VOL. LII OTTAWA, CANADA, NOVEMBER, 1938 No. 8

MOLLUSCA OF THE OTTAWA REGION

(*CLAMS, SNAILS AND SLUGS*)

By A. LA ROCQUE

THIS GUIDE has been written with two objects in mind: first to give a complete list of the mollusca of the Ottawa region and second to prepare a guide which would enable the beginner to distinguish genera and those species which are easily learned. For those who wish to pursue the subject further a selected bibliography is appended. The writer intends to treat the subject more fully in a later paper.

The study of mollusca is no longer a mere pastime without economic importance. Suffice it to say that many parasites of fur-bearing and domestic animals pass a stage of their existence in the body of certain snails. Therefore, the study and eradication of these parasites depends on a knowledge of their intermediate hosts, the mollusca.

Of the five classes of Mollusca only two, the *Pelecypoda* (clams)[1] and the *Gastropoda* (snails and slugs) are represented in our region; the other three, *Scaphopoda, Amphineura* and *Cephalopoda* are exclusively marine.

a) *PELECYPODA* (CLAMS)

Family *Sphaeriidae* (Finger-nail Clams)

The species of this family are difficult to separate. They are all small, usually less than three-quarters of an inch long[2], horn colour, without ornamentation other than concentric striae.

Genus *Sphaerium* Scopoli

In this genus the beaks are placed almost in the centre of the shell but are not elevated. *S. simile* (Say) the largest species, is common in our lakes and rivers; *S. occidentale* is common in temporary ponds. Those interested in studying the species in more detail will find much information in Latchford's *Canadian Sphaeriidae* (see bibliography).

S. simile Say[3]
S. sulcatum Lam.
S. striatinum Lam.
S. stamineum Conrad
S. rhomboideum Say
S. occidentale Prime
S. crassum Sterki
S. aureum Prime
S. emarginatum Prime
S. flavum Prime
S. torsum Sterki
S. acuminatum Prime
S. modestum Prime
S. cf. vermontanum Prime

Genus *Musculium* Link

These are distinguished from *Sphaerium* by their elevated beaks which stand out prominently on each shell.

The species are somewhat smaller than *Sphaerium* and equally hard to differentiate.

M. declive Sterki
M. jayense Prime
M. partumeium Say
M. parvum Sterki
M. rosaceum Prime
M. rosaceum fuliginosum Sterki
M. ryckholti Normand
M. securis Prime
M. transversum Say
M. truncatum Linsley
M. winkleyi Sterki

Genus *Pisidium* Pfeiffer

Latchford's *Canadian Sphaeriidae* contains a great deal of useful information, but most workers refer their material to a specialist for iden-

1. All technical terms used are explained in the glossary, Dec. '38.

2. Where measurements are given, it must be understood that they are averages and that smaller or larger individuals may be found.

3. The species listed after the account of each genus are those which have been recorded for the district.

tification. As the name indicates, the species are about the size of a garden pea or smaller. They are more inequilateral than either *Sphaerium* or *Musculium*, *i.e.* the beaks are nearer the front end of the shell.

P. abditum Haldeman
P. aequilaterale Prime
P. affine Sterki
P. compressum Prime
P. compressum pellucidum Sterki
P. elevatum Sterki
P. glabellum Sterki
P. latchfordi Sterki
P. milium Held
P. minus Adams
P. noveboracense Prime
P. ohioense Sterki
P. pauperculum Sterki
P. politum Sterki
P. rotundatum Prime
P. sargenti Sterki
P. splendidulum Sterki
P. streatori Sterki
P. strengi Sterki
P. subrotundum Sterki
P. subrotundum canadense Sterki
P. succineum Sterki
P. variabile Prime
P. ventricosum Prime
P. vexum Sterki
P. virginicum Gmelin
P. walkeri Sterki

Family *UNIONIDAE* (Pearly fresh-water mussels).

These are the river clams or mussels. When full-grown they are always more than one inch long. Young Unionidae may be distinguished from Sphaeriidae by their beak-sculpture which is always coarser than the ornamentation of the latter. In the United States the thick-shelled species are used in the manufacture of pearl buttons. There are three subfamilies, which need not be enumerated here; eleven genera are known for the district.

Genus *Elliptio*

A solid shell, with nacre usually coloured. There are two pseudocardinals and two laterals in the left valve, one pseudocardinal and one lateral in the right valve. Our two species may be distinguished as follows:

a. Hinge teeth large, heavy; laterals short, wide .. .. *E. dilatatus*
b. Hinge teeth small; laterals long, narrow.. .. .. *E. complanatus*

E. complanatus Dillwyn
E. dilatatus Rafinesque

Genus *Lasmigona*

One pseudocardinal in the right valve and two in the left; laterals imperfect. Our two species may be distinguished as follows:

Posterior slope fluted ..... L. costata
Posterior slope not fluted.... L. compressa.

L. compressa Lea
L. costata Rafinesque

Genus *Anodonta*

The generic characters of this genus are easily recognizable. The shell is very thin, the hinge entirely toothless. For the beginner, and sometimes even for the specialist, the species are very hard to differentiate. It is quite possible that many of the "species" described are mere forms of one or two species; at any rate no reliable key to them can be given. The common form of rivers is *A. grandis;* in some lakes of the Gatineau area *A. marginata* is common.

A. cataracta Say
A. grandis Say
A. grandis benedictensis Lea
A. grandis footiana Lea
A. implicata Say
A. marginata Say

Genus *Anodontoides*

There are no teeth on the hinge, but the latter is usually thickened. The best distinguishing feature is the beak sculpture. In *Anodonta* the bars are numerous and double-looped; in *Anodontoides* they are few, concentric and continued on the posterior slope into fine radiating ridges.

A. ferussacianus Lea

Genus *Alasmidonta*

Shell thin or thickened only in front; two pseudo-cardinals in left, one in right valve, laterals wanting, sometimes faintly marked. The three species of the district may be known by the following characters: *A. marginata* has flutings on the posterior margin and adults are two inches or more long; *A. undulata* is usually much thickened in front, thin behind, without flutings, about as large as *marginata*. *A. calceolus* is smaller than the other two, not much more than one inch long.

A. calceolus Lea
A. marginata Say
A. undulata Say

Genus *Strophitus*

There is one rudimentary tooth in each valve, sometimes a secondary one. The teeth are somewhat as in *Anodontoides* and from descriptions alone the two might be confused. However, *Strophitus* is always more compressed and its

shell is usually thicker.

S. rugosus Swainson

Genus *Obovaria*

A small, round, thick shell with solid teeth, both pseudo-cardinals and laterals. Ottawa River only, rare.

O. olivaria Raf.

Genus *Leptodea*

Shell strongly "winged" behind. Pseudocardinals two in left, one in right valve. Two laterals in each valve. Ottawa River only, rare.

L. fragilis Raf.

Genus *Ligumia*

Shell thick, solid, much longer than wide. Pseudo-cardinals two in left, one in right valve; laterals strong, crenulated, two in left, one in right valve. Easily recognized by the elongate shape and black epidermis.

L. recta latissima Rafinesque

Genus *Lampsilis*

Large naiades (2 to 6 inches or more) with one or two pseudocardinals and one lateral in the right valve, and two pseudocardinals and two laterals in the left. Female shells strongly inflated posteriorly. Most of the specimens found in the Ottawa district may be separated by means of the following key. However, there are many puzzling individuals which will not fit into the key; experience and comparison with large series of specimens are the only way of identifying these.

1. a. Epidermis with a satiny sheen caused by many almost microscopic concentric wrinkles 2
   b. Epidermis shiny, no concentric wrinkles..3
2. a. Shell compressed ... ... L. radiata
   b. Shell inflated ... ... L. radiata borealis
3. a Shell round-ovate 4
   b. Shell usually longer than wide .. ..L. siliquoidea
4. a. Shell rayed over its entire surface .. .. L. ventricosa
   b. Shell yellow, shining, rayed only on the posterior slope ... ... L. cariosa.

L. cariosa Say
L. radiata Gmelin
L. radiata borealis A.F. Gray
L. siliquoidea Barnes
L. ventricosa Barnes

Genus *Proptera*

Shell large, winged. Pseudocardinals imperfect or wanting Laterals present. Nacre (in our species) purple.

Proptera alata megaptera (Rafinesque)

b) *FRESH-WATER SNAILS*

Genus *Valvata*

Small (6 mm. or less wide), the operculum spiral, umbilicus wide and deep. *Tricarinata* has three spiral ridges (*carinae*) one on the shoulder of the whorl, one in the middle and the other at the base. The other two species are smooth; *lewisi* has a wide umbilicus and a low spire, *sincera* a narrow umbilicus and high spire.

V. lewisi Currier
V. sincera Say
V. tricarinata Say

Genus *Campeloma* (Green Appple Snails)

Large (30 - 35 mm. long), operculum wholly concentric. The adults cannot be mistaken for anything else; they are our largest operculate snails.

C. decisum Say

Genus *Bulimus*

Represented in our area by one species, lately introduced from Europe. Medium in size (10 to 12 mm.. Operculum spiral when young, concentric when adult. A good character is the thick, calcareous operculum which dissolves with effervescence in dilute hydrochloric acid in contrast with our native operculates which have a horny operculum.

B. tentaculatus Linnaeus

Genus *Amnicola*

A group of small operculates common on water-weeds and sometimes also on alga-covered rocks. (3 to 5 mm. long).

A. granum Say
A. limosa Say
A. limosa porata Say
A. pallida Hald.

Genus *Cincinnatia*

Difficult to separate from Amnicola. The spire appears truncated, the first two whorls being coiled in the same plane. (3 to 5 mm. long).

C. cincinnatiensis Anthony

Genus *Somatogyrus*

Shell small (5 to 9 mm. long), spire short, columella thick, operculum subspiral. One species only, rare.

S. subglobosus Say

Genus *Goniobasis*

Operculates of medium size (10 to 15 mm. long) with a high spire and tightly wound whorls, giving the shell a spindle-like appearance. Generally found in swift water, clinging to submerged rocks. A good locality for them is the Rideau, in the rapids above Billings Bridge or

at Strathcona Park where the river runs over ledges of rocks.

G. livescens Menke

All the genera of snails mentioned so far have an operculum, that is a horny or calcareous plate which exactly fits the mouth of the shell when the animal withdraws into it. The following genera have no operculum.

Genus *Lymnaea*

One of our largest fresh-water snails, the other being *Bulimnea megasoma* from which it may be distinguished by the colour of the shell which is purplish brown in *Bulimnea* and various shades of horn in *Lymnaea*. We have only one species, (*stagnalis*) with two varieties, *jugularis* which is the common form of rivers and *lillianae* which is found in some, but not all the lakes of the district. Shells of *jugularis* more than 60 mm. long have been taken in the Rideau river but the average is considerably smaller.

L. stagnalis jugularis Say
L. stagnalis lillianae F. C. Baker

Genus *Bulimnea*

B. megasoma, the only species, is easily recognized by its large (25 to 50 mm. long) thick shell, dark purple-brown in colour. It is found in a few of our lakes, notably those of the Meach Creek drainage, in marshy bays and creeks. Occasional specimens wander out into the rocky parts of lakes.

B. megasoma Say.

Genus *Stagnicola*

Many species of this genus have been recorded for the district but they are hard to separate. Specimens found in ponds and sluggish streams are almost sure to be *palustris* while specimens from swift water are usually *emarginata*. *S. emarginata canadensis* from Chilcott Lake was described as a new species, *Lymnaea laurentiana* by Latchford. The species vary in length from 20 to 40 mm.

S. caperata Say
S. catascopium Say
S. desidiosa Say
S. emarginata Say
S. emarginata canadensis Sowerby
S. oronensis F. C. Baker
S. palustris Müller

Genus *Pseudosuccinea*

This handsome little shell, 12 to 20 mm. long, bears a great resemblance to the land snail *Succinea,* hence the generic name. The shell of *Pseudosuccinea* has both spiral and vertical striae, visible with a good lens, while *Succinea* has only vertical ones. When the animal is available there are many other points which separate the two. For instance *Pseudosuccinea* has only one pair of tentacles with the eyes at their base, while *Succinea* has two, the eyes being on the tips of the longer pair.

P. columella Say

Genus *Fossaria*

These small amphibious snails are exceedingly difficult to identify. They are found in many different stations but a favourite habitat is a wet clay flat near a stream. They are sometimes abundant also in quite small ponds and around springs. It is probable that more than one species is to be found around Ottawa but the following is the only one recorded with certainty:

F. umbilicata C.B. Adams.

Genus *Helisoma*

These are the ramshorn snails. They are easily separable into three groups:

1. Spire very depressed, both it and the umbilicus forming conical depressions .. .. *H. anceps.*
2. Umbilicus deep but spire flat, sometimes even elevated above the body whorl, aperture bell-shaped ..... *H. campanulatum*
3. Umbilicus deep, spire flat, usually depressed below the body whorl, which is not markedly bell-shaped; larger than the other two. ... ... *H. trivolvis* group.

According to a leading authority, there are three species in the third group. *H. trivolvis* is found in the Ottawa River; its variety *macrostomum* in some of the lakes of the Gatineau district. *H. pilsbryi* is known as yet only from Meach Lake and the fine, large form found in the Rideau River has been named *H. infracarinatum.*

H. anceps Menke
H. anceps latchfordi Pilsbry
H. anceps unicarinatum Haldeman
H. anceps sayi F.C. Baker
H. campanulatum Say
H. campanulatum wisconsinense Winslow
H. infracarinatum F.C. Baker
H. trivolvis Say
H. trivolvis macrostomum Whiteaves
H. pilsbryi F.C. Baker

Genus *Planorbula*

Distinguished from our other ramshorns by the teeth which obstruct the body-whorl, sometimes quite far in.

P. armigera Say

Genus *Menetus*

One of our smallest ramshorns. It is very flat, with a carina on the outside edge of the whorl and a small umbilicus. The latter character distinguishes it from some members of the next genus in which the umbilicus is wide. Found in temporary ponds.

M. exacuous Say

Genus *Gyraulus*

Small ramshorns, quite flat and button-like; in some species the last whorl is directed downward.

G. circumstriatus walkeri Vanatta
G. crista Linnaeus
G. deflectus Say
G. hirsutus Gould
G. parvus Say

Genus *Ferrissia*

These are the fresh-water limpets. They are shaped like tiny elongated saucers and cannot be mistaken for anything else.

F. parallela Haldeman
F. rivularis Say

Genus *Physa*

The shell in this genus and in Aplexa has the aperture on the left when the shell is held with its spire upwards; in the *Lymnaeidae* it is on the right when the shell is held in the same position. The identification of the species is best left to a specialist. *Physa sayii* and *P. integra* are found in the Rideau River, *P. latchfordi* in Meach Lake, the type locality for this species.

P. ancillaria Say
P. integra Haldeman
P. gyrina Say
P. gyrina elliptica Lea
P. (parkeri var.?) latchfordi F.C. Baker
P. sayii Tappan
P. sayii warreniana Lea

Genus *Aplexa*

Shell as in Physa, but the spire longer and with a highly-polished surface which has a metallic sheen. It is found in temporary ponds.

A. hypnorum Linnaeus

c) LAND SNAILS

The land shells in this account are not arranged systematically but are presented in the order in which the collector finds them: the larger, commoner ones first, the smaller ones later. The slugs are grouped together, also for convenience.

Genus *Anguispira*

Our commonest land snail, sometimes called the Tiger Snail because of the reddish-brown markings which cover the shell. Average size (width) 21 mm.

A. alternata Say

Genus *Polygyra*

A group of land shells of large or medium size. Most of the species have a strongly reflected lip and bear a tooth in the aperture, some of our species as many as three. *P. albolabris,* our largest species, is usually toothless but sometimes has a small tooth on the parietal wall (variety *dentata*). *P. dentifera* is smaller, has a flatter spire and a strong tooth on the parietal wall. *P. multilineata* is reddish brown, with five revolving lines of darker brown; the aperture is toothless. *P. sayana* is somewhat smaller than *albolabris*, with one tooth on the parietal wall and one on the peristome. *P. fraterna* is smaller than all the others, has a hairy epidermis and, on the parietal wall, a large tooth which extends almost entirely across the aperture.

P. albolabris Say
P. albolabris dentata Tryon
P. dentifera Binney
P. fraterna Say
P. multilineata Say
P. sayana Pilsbry
P. thyroidus Say

Genus *Succinea*

These are high-spired as northern land shells go, resembling the fresh water group *Lymnaeidae,* but the aperture is even larger than in the latter. Most of the species are a rich amber colour, hence the name. Our three species are easily separated. *S. ovalis* is the largest; it is rounded in outline and lives in woods and fields. *S. retusa* is more elongate in outline and slightly smaller. It is found in wet situations at the margins of lakes and streams. This is the shell which so nearly resembles *Pseudosuccinea.* (see above). *S. avara* is smaller than the other two and is usually encrusted with particles of earth, hence it is fairly hard to find. It prefers drier situations than does *retusa* and has a smaller aperture than the other two.

S. avara Say
S. ovalis Say
S. retusa Lea

To be Concluded.

THE CRANBERRY IN CANADA*

By A. E. PORSILD
National Museum of Canada

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TWO KINDS of cranberries are well known in Eastern Canada. The large-fruited one, *Oxycoccus macrocarpus*, most of us, perhaps, are accustomed to associate with a turkey dinner; it is the plant of the New England "cranberry bog" familiar to anyone who has travelled through the New England states, where its berries are harvested commercially. Its range in Canada is limited to the Maritimes and southern Quebec and Ontario, in addition it is known from Newfoundland.

The small-fruited cranberry so ubiquitous in our northern peat and sphagnum bogs is, perhaps, not so well known. By the casual berry picker it is sometimes confused with the better flavoured rock or mountain cranberry, also known as cowberry, *Vaccinium Vitis-Idaea*. By American botanists it has generally been treated as but one species under the name of *Vaccinium Oxycoccus* L. or as *Oxycoccus palustris* Pers. whereas European botanists for some time have recognized two species of small-fruited cranberries, namely *Oxycoccus quadripetalus* Gilib and *O. microcarpus* Turcz The latter recently made its debut in North American floras in Rydberg's posthumous manual[1] where, in addition, *O. macrocarpus* and *O. palustris* are listed; the same writer, in 1917[2] had raised Gray's *Vaccinium Oxycoccus* var. *intermedium* to specific rank[3]. Fernald,[4] in 1902, stated that this plant, originally described as an endemic of the Pacific coast and Eastern Asia also occurs in Eastern North America.

M. P. Porsild[5] has recently shown that the small-leaved *Oxycoccus* of West Greenland, now also known from Eastern Canada, which was formerly treated as *O. palustris* Pers. f. *microphylla* Lange, is not, as has been suggested by various writers, referable to *O. microcarpus* Turcz., but that it, because of its constantly pubescent pedicels is best treated as a small-leaved variety of *O. quadripetalus*. For the Greenland plant Porsild l.c. proposes the new combination *O. quadripetalus* Gilib. var. *microphyllus* (Lange) Porsild.

Superficially the characters upon which *O. quadripetalus* and *O. microcarpus* are separated seem, perhaps, rather small and insignificant but European botanists, who in recent years have studied the two species intensively, agree that they are good and distinct species and have even shown that each is bound to an ecological association of its own[6]. According to Lindman[7] *O. microcarpus* is in all parts smaller than *O. quadripetalus* and has glabrous pedicels, and filaments that are hairy on the outside whereas the latter has pubescent pedicels, and filaments that are hairy on the sides only. In the American plant at least, the hairiness of the filaments seems to be of no taxonomic value and a segregation based upon this character merely leads to confusion. The pubescence of the pedicel, on the other hand, seems to be a very constant character in this genus[8].

A revision of the 70-odd sheets of the small-fruited cranberry in the National Herbarium of Canada, all named *Vaccinium Oxycoccus*, in addition to the 20-odd numbers collected by the writer in Northwestern Canada, at first seemed rather hopeless. By disregarding the hairiness of the filaments and by depending instead chiefly on the hairiness of the peduncles, the shape and size of the leaf, the texture of the bark, etc.,

1. Rydberg, P. A.: *Flora of Prairies and Plains in Central North America*. New York, 1932.

2. *idem: Flora of the Rocky Mountains and Adjacent Plains*. New York, 1917.

3. Robinson and Fernald, *Rhodora* 11:54 (1909) have pointed out, however, that Gray's var. *intermedium* is antedated by *V. Oxycoccus* var. *ovalifolium* Michx. The correct combination for the western plant thus becomes:

Oxycoccus ovalifolius (Michx.) n. comb.

Vaccinium Oxyoccus L. var. *ovalifolium* Michx. Fl. Bor. Am. 1:228 (1803); *V. Oxycoccus* L. var. *intermedium* Gray. Syn. Fl. (ed. 2) 2, 1:396 (1886); *Oxycoccus intermedius* (Gray) Rydb., Fl. Rocky Mts. 646 (1917).

4. *Rhodora*, 4:237 (1902).

5 Medd. om Grœnland, 77:38-42 (1930).

6. Melin, E.: Studier over de Norrlandska Myrmarkernas Vegetation, Norrlandskt Handbibliotek, 7:124 (1917).

7. Lindman, C. A. M.: Svensk Fanerogam Flora, 439 (1926).

8. The genus *Oxycoccus* Tourn. is separated from *Vaccinium* L. by its deeply 4-parted corolla and by its exserted anthers that are produced into long tubes. In *Vaccinium* and in most other genera of the *Ericaceae* as well, the petals are united into a gamopetalous, campanulate or urceolate corolla and the anthers are short, tubeless and included.

the writer, at length found that the material could be segregated quite nicely into natural geographical units:

*Pedicels pubescent, leaves elliptic, broadest near the middle

1. OXYCOCCUS MACROCARPUS (Ait.) Pers; *Vaccinium macrocarpon* Ait. Hort. Kew. 2:13, tab. 7 (1789). *Stems stout,* trailing often several meters long; leaves evenly and symmetrically arranged on the branches, 6 *to* 17 *mm long* and 2 *to* 8 *mm broad,* elliptic-oblong, rounded at the apex, flat or very slightly revolute; pedicels 1 to 10, lateral on the elongated, leafy branches, in maturity evenly curved, bearing one or two leaf-like, *green* bracts above the middle fruit 10 *to* 20 *mm in diameter.*

   Open bogs and swamps. Newfoundland, Anticosti and Magdalen Islands, the Maritimes, southern Quebec and Ontario, west to Lake Huron and north to Georgian Bay. An endemic of Eastern North America which has recently been introduced into Europe.

2. O. QUADRIPETALUS Gilib. Fl. Lithuan. 1:5 (1872); *Vaccinium Oxycoccus* Am auth. in part; *Oxycoccus Oxycoccus* MacMill. in part.

   Stems slender, creeping, bark of the stem and branches brown or black; leaves 6 *to* 10 *mm long* and 2 *to* 5 *mm broad,* flat or slightly revolute, elliptic, pointed at the apex; pedicels 1 to 4, terminal, abruptly curved towards the tip, bearing a pair of *scaly bracts;* fruit 8 to 12 mm in diameter, often spotted and mottled when young.

   Wet, marshy places. In Canada from Nova Scotia to British Columbia, but, perhaps, everywhere limited to the Canadian zone, reaching north to James Bay (Charlton Island, *A. E. Porsild,* No. 4464)

3. O. QUADRIPETALUS Gilib. var. MICROPHYLLUS (Lange) M. P. Porsild, Medd. om Grönl. 77:42 (1930); *O. palustris* Pers f. *microphylla* Lange, Consp. Fl. Groenl. 2:267 (1887); *Vaccinium Oxycoccus* Am. auth. in in part.

   Like the preceding but smaller in all parts. Leaves 2 *to* 5 *mm long* and 1.5 *to* 3 *mm broad,* strongly revolute, arranged somewhat unilaterally on the filiform stems, pedicels 1 or 2, *strictly terminal,* strongly pubescent; *style shorter* than in the other members of the genus, barely exceeding the anthers; fruit less than 10 mm in diameter, pink, not spotted. In wet, mossy bogs. West Greenland between 60° and 62° N. and again at 68° 41'N., not known from East Greenland, nor from Iceland; on the Labrador coast from Strait of Belle Isle north to 56° 16' N. (Turnavik, *A. E. Porsild*) also in Newfoundland and the Gulf of St. Lawrence region. South of Newfoundland and the Labrador coast gradually merging into the preceding. In Greenland and Labrador the var. *microphyllus* by its minute leaves and very pubescent pedicels seems well enough distinct from *O. quadripetalus,* but since intermediate forms abound in the Gulf of St. Lawrence region it seems best to retain the varietal rank. Its case may parellel that of *O. microcarpus* and the little studied *O. ovalifolius* in the west.

**Pedicels glabrous or essentially so, leaves distinctly broader near the base.

1. O. MICROCARPUS Turcz. ex Rupr. in Beitr. z. Pflanzenk. des Russ. Reich. 4:56 (1845); *Vaccinium Oxycoccus* Am. auth in part; *O. Oxycoccus* Mac Mill. in part.

   Stems slender and filiform with *red or reddish brown,* but never black bark; leaves small 2 *to* 6 *mm long* and 1.5 *to* 2 *mm broad,* strongly revolute, pointed at the apex; *pedicels red;* glabrous, bearing a pair of *red,* scaly bracts below the middle; fruit 5 to 7 mm in diameter, pale pink, insipid.

   Sub-artic sphagnum bogs only. From Alaska to the east shore of Hudson Bay, penetrating but a short distance north of the limit of trees. From the Yukon Territory south through the mountains of British Columbia and Alberta; also in Europe and Asia. Throughout northern Alaska and the Northwest Territories *O. microcarpus* is the only representative of the genus. It is remarkbly free of variations although some specimens from British Columbia and Alberta approach the following species.

2. O. OVALIFOLIUS (Michx.) n. comb. see footnote on page 116) *Stems stouter* than in the preceding with *black* or dark brown bark; leaves 6 *to* 8 *mm long* and 2 *to* 3 *mm broad,* flat or but slightly revolute; *pedicels* 1 *to* 8, often lateral; fruit 10 to 12 mm in diameter with a *bloom.*

   Wet bogs. According to Rydberg known from Alaska to Washington, south and east to Indiana and Idaho and also from Eastern Asia. The following specimens in the National Herbarium of Canada, all from British Columbia, may be considered typical: Skagit River, *J. M. Macoun,* No. 72.508; Gillies Bay, Texada Island, *J. M. Macoun,* No. 94.149, Cumberland, V. I., *J. M. Macoun,* No. 94.148; Ucluelet, V. I., *John Macoun,* No. 86.330 and Nanaimo, V. I., *John Macoun,* No. 86.329.

CHURCHILL, MANITOBA, AND ITS BIRD-LIFE

By FRANK L. FARLEY

THE COMPLETION of the Hudson Bay Railway in 1930, connecting The Pas, Manitoba, with the Port of Churchill on Hudson Bay, has been responsible for a greatly increased interest in the natural history of that hitherto little known section of Canada. This is particularly true as it relates to the ornithology of the region. Churchill and its immediate vicinity have received more attention from bird students during the past eight years, than in all the period since the celebrated harbour was first discovered more than four hundred years ago. The ease with which this naturalist's Mecca can be reached is, of course, the reason for the recent activity. By way of contrast one has only to think of the hardships endured and the time expended by the Preble expedition on its journey to and from Hudson Bay in 1900.

In no other part of the North American continent served by a railway has the traveller the opportunity of seeing all three of the Boreal Life zones in the short space of a day's travel by train Here these important faunal divisions, the Canadian, the Hudsonian and the Arctic, are linked together by the railway's 510 miles of steel. A passenger for Churchill can leave The Pas on a Saturday afternoon in early June, when such birds as the House Wren, Song Sparrow, Kingbird, the Red-eyed and Warbling Vireo, and other species peculiar to the Transition and Canadian Life zones are nesting. If observant, he notes the many neat gardens in the pretty town with their rows of early vegetables already given their first cultivation. Flowers appear to be as far advanced, and the lawns just as green as those seen a day or two previously in Saskatoon or Prince Albert. Crab-apple trees of fair size and well located with fragrant blossoms beautify severals of the lawns and have every appearance of having made satisfactory growth in this northern latitude.

The birds, flowers, vegetables and fully-leaved trees indicate that The Pas has for some weeks enjoyed the summer's sunshine. After experiencing several hours of such pleasant surroundings, one is loath to believe that a land of Arctic conditions may greet him on the morrow at his journey's end.

As the train pulls out of the station in mid afternoon with its motley crowd of human freight, including Indians, half-breeds, trappers, traders, prospectors and adventurers, one hardly realizes he is about to enter a land where the fight for existence is ever present. For more than 20 hours the train rolls over one of the finest roadbeds in Canada, through an undulating, rocky country interspersed here and there with many beautiful lakes. The ridges are fairly well covered with spruce, jackpine and poplar, while the lowlands surrounding extensive marshes support heavy growths of willow and birch. At noon the following day (Sunday) there are indications of a change in both climate and vegetation. The chill in the air and the backward growth are reminders of the approach towards the great ice masses of the Bay. The leaves of the poplars and birches are not yet fully out and the only signs of life on the willows are the enlarged "pussy willows". Shortly after the rocky gorge of the Nelson river is crossed, the trees become more stunted and occasional tracts of tundra are noted. Willow Ptarmigan, still in their winter plumage, may be seen quietly sunning themselves in sheltered spots. Horned Larks, Longspurs and Pipits in small flocks or pairs are leisurely making their way northward. When a stop is made for water or to deliver mail or supplies at section-houses, the soft, plaintive notes of Harris Sparrows can be heard from scrub-patches along the tracks.

Arriving at Churchill on Sunday evening the traveller is aware that he is in an entirely different climate from that which he left the day previously. The great river is still ice-bound from shore to shore. Indians with their dogs and sleds are seen crossing the two-mile expanse of ice in apparent safety. The small lakes scattered over the tundra are likewise covered with ice. The spruce woods, often termed the "last fringe of timber" are piled high with snow, blown in from the open wastes. A walk over the townsite reveals an interesting variety of birds, chiefly waders. The mating season is now on in earnest and their nuptial flight songs can be heard in all directions. Horned Larks already have their nests built and some are sitting on full sets of egs Lapland Longspurs, the most abundant of tundra birds, are in full song The townsite slough in its sheltered location is free of ice and is a favoured feeding place for many kinds of waders, ducks, gulls, and Arctic Terns. Here may be seen Stilt Sandpipers, Red-backed Sandpipers, Least and Semi-palmated Sandpipers,

Northern Phalaropes, Yellowlegs, Semi-palmated Plovers, Hudsonian Curlews and the occasional Hudsonian Godwit. On all sides there is a wonderful panorama of bird-life. My first visit to Churchill in June, 1931, so impressed me that I decided then and there to return to this interesting country whenever opportunity offered.

Accompanied by Mr. Albert Wilk, an undergraduate of the University of Alberta and a keen bird-student, I made my sixth visit to Churchill in June, 1937. As a result of investigations carried on at this time, two species of birds — the Red-winged Blackbird and the Pine Siskin — were added to the list of Churchill birds published in 1934 by Taverner and Sutton. In addition, other observations which I believe are worthy of recording at this time were made relating to the status and habits of several other species.

RED-WINGED BLACKBIRD. On June 21, 1937, Mr. Wilk reported seeing a male Red-winged Blackbird near a marshy lake about a quarter of a mile from our camp and four miles south of Churchill. The following day, it, or another male, was observed near the same place. On July 6th, he saw two males close to where the others had been seen. Although a careful search was made on several occasions for their mates or nests, no females were discovered. It is more than likely that the two males were unattached, and had probably been the advance guard separated from a migrating flock of the species a considerable distance southward.

PINE SISKIN. On June 16, 1937, when walking through an open piece of spruce woods on the east side of Lake Isabelle, our attention was drawn to a Golden-crowned Kinglet that was singing in the top of a spruce. When enjoying the song and comparing it in our minds with that of the Ruby-crown, I noticed two small dark birds feeding, cross-bill fashion, in the top of a small spruce tree close by. I immediately identified them as Siskins. We approached to within 25 feet to the birds and distinctly noted the forked tails, the striped backs and breast, and the yellow markings on the wings. During the time we watched the birds they uttered no note of any kind. They were quite likely a breeding pair and had a nest in the vicinity.

BRONZED GRACKLE. On June 8, 1937, Mr. Wilk reported he had seen a Grackle about a mile from our camp. As there were Rusty Blackbirds nesting in that vicinity I questioned him as to the identity. He assured me he was satisfied that the bird was a Grackle. On June 20th and again on the 21st, when passing the same place he saw what he believed to be the same bird. On the 22nd he found a nest containing four young Grackles about three days old. The bulky nest was placed in a dead scrub spruce standing in water at the edge of a marsh. It was built under a thick brushy branch about three feet above the water. He visited the nest again on July 5th and found one bird only, the others apparently having left the nest or been destroyed. He made a skin of the collected juvenile and took the nest; these were sent to Mr. Taverner for inspection, who advised me that the bird was a Bronzed Grackle. On July 8th three Grackles were seen in the vicinity of where the nest was found, and on the 10th but a single bird was observed. This is the only recent record of the Bronzed Grackle occurring in the Churchill territory. Taverner and Sutton list the species on the authority of Clark (1890), who mentions an adult male collected at Churchill sometime previous to the year 1845.

DOWITCHER. On June 12, 1935, about five miles south-east of Churchill, I found a Dowitcher's nest with four eggs. The nest was in a marsh, about 30 feet from the edge of a small lake. The bird when flushed off the nest rose into the air about ten feet and dropped into the shallow water at the edge of the lake. The nest, made of coarse grasses, was built into the top of a small hummock, partially surrounded by water. (On June 20, 1936, another nest was found in a similar location about a mile distant from the site of the first nest; it contained four slightly incubated eggs). At the time the nest was found this year no one in the party had a gun and the bird could not be collected. Later in the day the nesting locality was gain visited and a bird was secured. The bird and eggs were examined by Mr. Taverner who was at Churchill a few days later, and he gave it as his opinion that the specimen answered the description of the new subspecies (*hendersoni*). This is, I believe, the first time the nest and eggs of the Dowitcher have been found anywhere in the extensive territory lying between the central portion of Alberta and Hudson Bay.

LINCOLN SPARROW. On June 17, 1935, when walking over a dry marsh south and east of the watertank situated about four miles south of Churchill, I flushed a Lincoln Sparrow from her nest of five fresh eggs. As far as I am aware this is the first time the nest and eggs of this species have been found in the Churchill territory.

SUMMER BIRDS OF THE FORILLON, GASPE COUNTY, QUEBEC

By STANLEY C. BALL

(*Concluded from page* 103)

97. *Seiurus aurocapillus**. OVEN-BIRD. — One singing back of Gaspé Basin, July 9, 1937. Two wandering males worked up valley behind Grande Grève, July 13th, singing occasionally.

98. *Seiurus noveboracencis noveboracencis*. NORTHERN WATER-THRUSH. — August 25, 1936, one migrating westward with other warblers back of Grande Grève. August 28th, two others seen near the eastern tip of the Forillon—one of them high up at the northern cliff brink—suggest recent arrival from Anticosti. Had this strongly vocal species nested on the Forillon it could not have escaped detection. It seems strange that at least two of the streams and some of the swamps have not attracted it, as have those of southern Gaspesia according to Bond. Furthermore, Lewis saw several on Anticosti in June, 1922. On August 23, 1937, fifteen worked eastward along top of north ridge back of St. George's Cove. On the following day sixteen returned northwestward up the coulée. Dr. Townsend saw one on August 17 and 19, 1919.

99. *Oporornis philadelphia*. MOURNING WARBLER. — June 14, 1936, male sang repeatedly while feeding in *Acer spicatum* [Mountain maple] back of Percé in the gorge northwest of the Pic d'Aurore.

100. *Geothlypis trichas brachydactyla*. NORTHERN YELLOW-THROAT. — July 21, 1936, male along Fork River, tributary of the Dartmouth, northwest of Gaspé Basin. Two males July 12, 1937, at Cap des Rosiers, and another at Griffon Cove. Its absence from the Forillon seems noteworthy. Although Townsend emphasizes the lack of bogs in Gaspé, as a matter of fact the Forillon alone has more than 10 acres of such habitat, besides a mile or more of brush-bordered brooks flowing through cleared lands. At Cap des Rosiers only two miles away both Dr. Lewis and I have observed yellow-throats along the sluggish brook, and Lewis and others have found them common on Anticosti. Probably the general ruggedness of this slender little peninsula repels the yellow-throat and the yellow-warbler, both of which might find suitable niches upon it.

101. *Wilsonia pusilla pusilla*. WILSON'S WARBLER. — One in company with *Seiurus noveboracensis* working eastward above Cap Bon Ami, August 23, 1937.

102. *Setophaga ruticilla*. REDSTART. — Uncommon in northern Gaspé in 1936 as compared with abundance in New Brunswick in June. A few on the Forillon, probably breeding. More common in 1937, 8 pairs nesting on the Forillon and 2 in West Highlands.

103. *Passer domesticus*. ENGLISH SPARROW. — Common in Gaspé village, but none on the Forillon.

104. *Agelaius phoeniceus phoeniceus*. EASTERN REDWING. — One pair nested in a small marsh at the head of Gaspé Bay in 1937, the first recorded east of Mont Louis where Demille found a pair nesting in 1924. Two adults and three immature still present September 8th.

105. *Euphagus carolinus*. RUSTY BLACKBIRD. — A few seen about Ross Lake, August 4-8, 1936. Adult and 2 immature at Third Lake, September 2, 1937.

106. *Quiscalus quiscula aeneus*. BRONZED GRACKLE. — A few pairs bred at Grande Grève and St. George's Cove during 1936 and 1937; said to be decreasing in numbers, but I saw a flock of more than a hundred near the Dartmouth River marshes, August 19, 1936, a few miles from the York River where Townsend observed 50 or 60 in 1919. It may be this colony which is reported to descend the Forillon in some years, foraging on the farmers' grain.

107. *Carpodacus purpureus purpureus*. PURPLE FINCH. — Fairly common on the Forillon in 1936. June 25th, male in dark-striped first nuptial plumage singing vociferously. August 3-8, moulting male seen daily in cedars at Ross Lake. Rare on Forillon in 1937.

108. *Pinicola enucleator leucura*. PINE GROSBEAK. — July 22nd, two males and a female in spruces on West Highlands. August 8, 1936, two feeding on cherries of *Prunus pennsylvanica* [bird cherry] at Third Lake. During 1937 a single male was seen near Grande Grève on August 6 to 19.

109. *Spinus pinus pinus*. PINE SISKIN. — Several at Grande Grève, June 20-July 4, 1936; disappeared suddenly, not seen again. Abundant at times from June 19 to July 28, 1937; a flock of 80 at Shiphead, July 2nd. Townsend found them abundant during July and August in 1919.

110. *Spinus tristis tristis.* GOLDFINCH. — Common throughout the region.

111. *Loxia leucoptera.* WHITE-WINGED CROSSBILL. — At least thirty spent the summer of 1936 on the Forillon, sometimes appearing in one flock, but usually in smaller groups. On August 28th, eleven fed in spruces within 100 feet of Cape Gaspé's easternmost precipice. In 1937 a flock comprising at times as many as 60 birds ranged up and down the little peninsula, sometimes leaving it altogether for a few days.

112. *Passerculus sandwichensis savanna.* SAVANNAH SPARROW. — Common in open land along the coast. About 50 pairs nested on the Forillon; at least some of them raised two broods.

113. *Junco hiemalis hiemalis.* JUNCO. — Common throughout the region; two broods generally.

114. *Spizella passerina passerina.* CHIPPING SPARROW. — Uncommon on the Forillon, but nests throughout its length, both in dooryards and forests. One nest in spruce near edge of northern cliffs.

115. *Zonotrichia albicollis.* WHITE-THROATED SPARROW. — Breeds commonly throughout the region.

116. *Melospiza lincolni lincolni**. LINCOLN'S SPARROW. — Although neither yellow warblers nor yellow-throats seem to have been attracted to the boggy swamps of the Forillon, the Lincoln's sparrow has discovered them. Two pairs bred back of St. George's Cove and another at Shiphead in 1937. More remarkable is the pair which, both in 1936 and 1937, has nested above Grande Grève in a bushy pasture. The male appears incongruous perched upon the tip of one of the scattered white spruces which dot the hillside. Attracted by his contralto song I have many times stalked him carefully but only on a few occasions succeeded in observing him closely before he withdrew to a distant tree-top.

117. *Melospiza melodia melodia.* SONG SPARROW. — Fairly common in open lands, especially along south shore. First brood left nest at Grande Grève July 12th. On a walk to end of Forillon August 28, 1936, heard four different males still singing.

In vain have I sought on the Forillon three other fringillids, the vesper, fox, and swamp sparrows. To be sure, the vesper is partial to upland fields and pastures, none of which on this little peninsula are more than 700 feet above sea-level. But for the fox sparrow there are still many acres of conifers little disturbed by man. Possibly roving cattle may be the disturbing factor for this species, as well as for the swamp sparrow which might well thrive in several of the shrubby swamps.

Townsend found several vespers in full song in July, 1922, at St. Annes-des-Monts. The fox sparrow has been reported by Townsend and Bond at Bonaventure Island, by Demille along the Mont Louis coast, and by Dr. Lewis on Anticosti where he found it common at Ellis Bay in 1922. Lewis observed swamp sparrows at Cap des Rosiers, May 24, 25, and at Gaspé May 30, 1922. Farther westward, between Mont Louis and the Shickshock Mountains, Demille found them nesting commonly in 1924. So it may be expected that the bogs of the Forillon will occasionally attract a pair.

In *The Canadian Field-Naturalist,* 37:9, 1923, Dr. C. W. Townsend emphasizes the difficulty of observing land birds, especially warblers, after the waning of the song season in July. At Grande Grève in 1922 he saw only four warblers between August 13th and 26th, and believed that nearly all the resident warblers had left, without their places having been filled by migrants from the north. It is true that, after the young have hatched, songs become less frequent, and almost cease during the summer moult.

A list of the numbers of birds found singing during the 1937 season at stations along a certain 2-mile route of varied habitats shows 18 males belonging to 12 species on June 19th, and a steady increase until July 5th, when 24 species were represented by 81 males. Then followed a gradual decrease until July 25th, when the number of species still vocal was 15, and the number of males, 23. For the next four-day period the same species continued in song, although fewer individuals were heard. Through the succeeding three weeks the steady decline may be appreciated from the following dates and statistics: August 1st, 11 species, 16 males; 4th, 9, 12; 9th, 7, 11; 12th, 4, 4; 18th, 3, 3; 20th, 1, 1.

Through much of the season the magnolia warbler exceeded all other species in numbers of singing males — on June 19th, 3, July 5th, 16; July 25th, 3, and July 29th, 4. Two of these continued into August, one being last heard on the 4th, the other on the 12th. Very nearly as abundant was the black-throated green warbler, last heard in song on August 20th. Some pairs of both these species are believed to have raised two broods. But in the case of the black-poll warbler, a species which was still singing when I left the Forillon on September 13th, the single broods were making their great

est demands for food between July 26th and August 9th, a songless interval for the males.

Other species which brought out two broods were the savannah sparrow (July 10th and August 10th), chipping sparrow (July 3rd and August 12th), white-throated sparrow (July 11th and August 16th), song sparrow (July 10th and August 8th), junco (July 13th and August 10th), winter wren (July 14th and August 18th), robin (earliest, June 22nd, and latest, August 17th). Males of all these species except the robin could be heard at some place on the Forillon almost daily throughout the season; no robin songs were heard between August 4th and 21st, when three males sang briefly.

But during the songless periods, even after feeding of the young no longer demanded conspicuous activity on the part of the parents, the adults of all the common species could be discovered in the seclusion of forests and thickets. For example, *Dendroica castanea* was last heard singing on July 21st, but was repeatedly seen feeding in thick evergreen forests until August 17th. *Corthylio* stopped singing even earlier—July 13th, but family groups were several times seen during the summer under conditions which marked them as still sedentary. Again, *Dendroica magnolia* sang throughout the Forillon until August 4th, and occasionally until the 21st, but was seen daily and its call notes were frequently heard till the end of the month. Although the young had left the nests by August 12th, and were last seen being fed by the adults on the 16th, no definite westward movement of *D. magnolia* out of the Forillon was detected until August 29th. Strangely enough the first warbler to show such movement was *D. coronata*, of which several passed through Grande Grève on August 17th, but no more until the 28th and 29th. Although *D. virens* seldom sang after August 1st, it was seen and its call notes heard daily until the 20th. The first westward movement out of the Forillon was observed August 25th. Northern representations of this species entered the Portage gap from the direction of Cap des Rosiers on the 27th, and either these birds or residents of the Forillon worked westward again on the 29th.

As far as my observations indicate, the only species which seem to fit Townsend's conclusions are the cliff swallow and robin. *Petrochelidon* leaves the region on the very day that the young forsake the nest; most of the Grande Grève colony departed August 5, 1936. A small group of robins, apparently of the first brood, were seen leaving the Forillon on August 8th, 1937. The first movement in 1936 was on August 17th. However, I can agree with Dr. Townsend that true migratory waves begin late in August — on the 25th in 1936, and the 24th in 1937. During the early morning hours mixed flocks of warblers, thrushes, and sparrows passed up the ridge and the coulée behind Grande Grève. That some of these birds had come from farther north is proven by the inclusion of four species which did not breed on the Forillon—*Dendroica aestiva*, *D. caerulescens*, *Seiurus noveboracensis*, and *Wilsonia pusilla*. Of birds from the north many, as I have seen, enter from the northwest. Others in all probability cross the 50 miles of Gulf waters from Anticosti; many species breed abundantly there, and may be expected to strike out for the only land in sight to the southward, the Forillon and the highlands west of it.

The astonishing flights of red-breasted nuthatches, outlined in the annotated list above, almost certainly came directly from Anticosti, for none was seen entering the little peninsula from the west. Further comment on this species is reserved for a special paper.

Migrants of certain species were seen daily until my departure on September 13, 1937. Meanwhile others, like the yellow-bellied and alder flycatchers, had quietly disappeared.

NOTES AND OBSERVATIONS

SUMMER TANAGER IN NOVA SCOTIA. — Early in April, 1937, a report reached me from the west end of Wolfville to the effect that a "strange reddish bird" was seen about the home of my informant. Believing it to be nothing more unusual than a male Purple Finch, I dismissed the incident from my mind. On April 17th, however, a similar report was received by phone from the same vicinity and upon investigation I had the pleasure of seeing, for the first time a beautiful male Summer Tanager (*Piranga r. rubra*), in life. I followed it about for half an

hour or longer, as it flew leisurely from tree to tree, apparently in search of food. Its bright plumage stood out most vividly among the leafless branches and was attracting the attention of a number of passers-by. On one occasion I saw it drop suddenly to the ground, where it pounced upon a large dark-coloured beetle which it quickly carried to a limb upon the broad surface of which it was seen to peck viciously at its helpless victim. The bird stayed about that immediate locality for the remainder of the month, surviving as it did a number of freezing nights and at least one snowfall of sufficient violence to leave the ground white for several days. This record is the third definite one for this species in Nova Scotia which my files contain. The others are April 20, 1913, a male picked up dead in Yarmouth County and October 10, 1929, a male picked up at Annapolis Royal in an emaciated condition. According to Mr. P. A. Taverner there are several old records for Nova Scotia scattered over many years, two of which were at Seal Island, Yarmouth County, prior to 1888.—R. W. TUFTS, *Wolfville, Nova Scotia.*

CORMORANTS ON LAPRAIRIE BAY, QUEBEC.—On May 2, 1938, while travelling in a motor-boat on Laprairie Bay, an enlargement of the St. Lawrence River south of Montreal, I saw at least thirty Cormorants on that bay. Twenty-five of them were counted in one group, perched on a small isolated rock.

As no white plumage could be seen anywhere on these birds, it is believed that they were all Eastern Double-crested Cormorants (*Phalacrocorax auritus auritus*)

There appears to be no previous record of Cormorants in this vicinity in such large numbers.—HARRISON F. LEWIS.

ROUGH-WINGED SWALLOWS AT OTTAWA. — At about 5.25 a.m. (E.S.T.) on May 10, 1938, I observed two American Rough-winged Swallows (*Stelgidopteryx ruficollis serripennis*) that were perched quietly, about ten feet from the ground, in full view and in full sunlight, in a small dead tree, in the Arboretum, close to the Rideau Canal, near Ottawa, Ontario. The birds were facing me as I observed them in detail through x6 binoculars at a distance of about twenty feet. Their characteristically coloured underparts were observed to excellent advantage. These swallows appeared to be warming themselves in the early morning sunlight, while they waited for insects to begin to fly about.

At about the same hour on the following day, May 11th, a pair of Rough-winged Swallows, probably the same pair, was seen under circumstances even more favourable, as they perched on the low wire fence beside a line of the Canadian Pacific Railway, a few rods from the place where the above-mentioned swallows were seen on May 10th. They were very tame and both their upper and lower surfaces could be clearly seen, for they were perched at a level much lower than that of the eyes of an adult human being. On this second occasion they were observed by a group of eleven people, of whom I was one.

There does not appear to be any published record of the occurrence of the Rough-winged Swallow in the Ottawa district since 1918.—HARRISON F. LEWIS.

AN INCIDENT IN AN OSPREY'S FISHING — On May 26, 1938, I was engaged in photographing Southern Eiders (*Somateria mollissima dresseri*) from a small blind placed between two limestone masses on the northwest shore of Wood Island, in Betchouane Bird Sanctuary, about eighteen miles east of Havre St. Pierre, Saguenay County, Quebec. Soon after one o'clock in the afternoon I heard several notes of an Osprey (*Pandion haliaëtus carolinensis*) that was evidently flying above me, outside the field of vision that I commanded from the blind. At that time the tide was low and the water immediately in front of me was shallow for perhaps seventy-five feet from shore. The surface of the water was smooth, as there was practically no wind.

I did not see the plunge of the Osprey, but, a minute or two after I had noticed its calls, I heard a loud splash in front of me and slightly to my left. Looking in that direction, I saw the Osprey in the water about forty feet from shore, where apparently the water was only about one foot deep. The bird, when first seen, was facing shoreward and was very quiet, almost motionless. Its head was lowered and its outstretched wings were resting on the water, while its body was almost entirely submerged. I wondered if it had misjudged its plunge and had stunned itself or done itself some injury, or if it was quietly

improving it grip on a fish, or if it was merely considering what to do next.

After several seconds of quiet, the Osprey began to flap its wings vigorously, in an endeavour to rise from the water and carry away with it the fish that it had seized. In this attempt it failed. Its wings were raised from the water and were flapped very rapidly, lifting its body into the air, but apparently the fish in its talons was a heavy one, for neither it nor the toes that grasped it appeared above the surface of the water. After several seconds of strenuous flapping, the great Hawk ceased its efforts and relaxed into the same semi-submerged resting position in which I had first seen it.

A second or two later a new mode of procedure was attempted. Abandoning its endeavour to lift its prey, the Osprey undertook to drag it along the sea-bottom, which at this place was formed chiefly of smooth, level limestone, to the beach, forty feet away. Rising somewhat from its relaxed position, but with its feet, belly, and tail still submerged, it advanced towards shore by a steady series of deliberate lunges, each of which carried it perhaps a foot forward. Each lunge or forward surge was accompanied by a slow, forceful beat of the wings, which struck backward against the water and were therefore used like oars.

A strange sight indeed was this large bird as, with the feathers of its head wet and matted into groups and ridges, it rowed itself in deliberate and determined fashion toward the shore, dragging its unseen prey through the water! It appeared to be entirely unconscious of my presence and I therefore entertained high hopes that it would choose to land on the beach just in front of my blind. Unfortunately, it did not do this, but pressed towards a point on the beach about forty feet to my left, which was the part of the shore nearest to the place where it had made its capture. Because of the sheltering mass of limestone on my left side, the Osprey passed out of my range of vision before it reached the land and even before it reached water sufficiently shallow to bring its prey into sight above the surface. That it arrived at the shore with its burden I do not doubt, for it was making good progress as it passed from my sight and a few seconds later I heard its notes in a direction that indicated that it was on the beach.

About forty-five minutes later, when I was once more busily occupied with observing and photographing the Eiders, an Osprey suddenly flew low from left to right in front of my blind, carrying an object of moderate size in its talons. Probably this was the bird that I had seen previously in the water, though I do not know in what way it had become able to carry its captured fish. Possibly it had eaten part of it or perhaps it had merely secured a better hold on it and a better position from which to take off in flight. After I came out of my blind I examined that part of the beach where I supposed that the Osprey had brought the fish ashore, but I failed to find there any blood or other indications that the bird and its prey had been there

I had no opportunity to recognize the fish that was captured on this occasion, but I surmise that very likely it was a blue lumpfish (*Cyclopterus lumpus L.*) as such fish come into shallow water on the north shore of the Gulf of St. Lawrence about the beginning of summer, presumably to spawn, and a large individual would make a heavy and awkward load for an Osprey. —HARRISON F. LEWIS.

NOTES ON OBSERVATIONS OF CERTAIN BIRDS ON THE ISLAND OF ANTICOSTI, QUEBEC. — During a brief visit to Port Menier and vicinity, on Anticosti, from July 15 to July 17, 1938, I had time and opportunity to make only casual observations of birds. Those observations described below appear to be worth recording in published form. They may be considered as supplementary to previous publications about the bids of this island.*

Gavia stellata. RED-THROATED LOON. — Mr. Harold S. Peters and I saw two adult Red-throated Loons with one downy young bird in a pond on the border of a sphagnum plain near Port Menier on July 15th. On July 16th we saw one adult of this species with one downy young bird in another pond on the tongue of land that forms the west side of Ellis Bay. There appears to be no definite published observation of the breeding of the Red-throated Loon on Anticosti since that made by Professor A. E. Verrill, in 1861.

Hirundo erythrogaster. BARN SWALLOW. — On July 16th Mr. Peters and I saw two Barn Swallows flying near an old building at L'Anse aux Fraises, north-west of Port Menier.

Euphagus carolinus. RUSTY BLACKBIRD. — At least twelve were seen about the swampy shores

*Can. Field-Nat., 38:43ff. 1924, and 40:179ff. 1926.

of Lake Plantin, near Port Menier, on July 16th.

Melospiza lincolni. LINCOLN'S SPARROW. — Two individuals were heard singing near Port Menier on July 16th. — HARRISON F. LEWIS.

OCCURRENCE OF THE AMERICAN COOT AND THE WHIP-POOR-WILL IN EASTERN SAGUENAY COUNTY, QUEBEC. — An American Coot (*Fulica americana*) was caught in a trap, near the village of Old Fort, Saguenay County, Quebec, in the autumn of 1934, by Frank McDonald, of that village. I examined and identified the preserved skin of this bird on July 3, 1936, at which time it was at St. Augustin, Saguenay County, in the possession of William Fequet. Old Fort is on the north shore of the eastern part of the Gulf of St. Lawrence, twenty-nine miles west of the eastern boundary of the Province of Quebec. While the American Coot has been recorded from the eastern coast of the Labrador Peninsula, this is apparently the first certain record of it from the north shore of the Gulf of St. Lawrence.

A female Whip-poor-will (*Antrostomus vociferus*) was found dead on Cove Island, Saguenay County, Quebec, on June 11, 1936, by William T. Bobbitt, of Harrington Harbour. When found, it had apparently been dead for two or three days. Its skin is now preserved in the bird collection of the National Museum of Canada. Cove Island is situated about three miles from the mainland, on the north shore of the Gulf of St. Lawrence, about ninety-eight miles southwest of the eastern boundary of the Province of Quebec, and ten miles southwest of Harrington Harbour. This is the first record of the Whip-poor-will in the region of the Labrador Peninsula.

These two records should have been included in my paper entitled "Notes on Birds of the Labrador Peninsula in 1936 and 1937" (*Can. Field-Nat.*, 52:47, 1938, but were omitted through oversight. — HARRISON F. LEWIS.

REVIEWS

The Geologic History of Magnolia State Park. By William Clifford Morse, Ph. D., State Geologist. Bulletin 37. Mississippi State Geological Survey. University, Mississipi, 1938. pp. 1-19, 12 figs., 1 map.

This nineteen page report recently published by the State Geologist of Mississippi is embellished by a dozen artistic photographs, each of which is dated. All of these were taken within a few days of Christmas, and together supply a good composite picture of the Gulf Coast as it appears in winter. One of them displays the beauty of a live oak whose branches have a lateral reach of 180 feet. Another shows a historic church and bears the cryptic title, "A Light House of the Soul".

This admirable little booklet fills the role of a lighthouse for those who are not geologists, in guiding them for this particular part of the Gulf coast, a little way back in geological time. The author lets the reader see in a brief and simple statement, omitting geological jargon, what has been going on in that fascinating border-land of marsh and bayou between the Gulf and the continent during recent geological time. He tells the Gulf coast people with fervour that they have in Magnolia State Park and its bayou something "beautiful beyond description" and urges that "it must be kept in its natural state without the change of a bank, a channel, or the grass — even under the guise of landscape architecture. It is a God-given trust to the people of this generation and of the generations yet to come". Similar exhortations are needed in many other parts of the continent where misguided zeal in attempts to improve on the beauty of Nature leads to unhappy results. If this sound advice is followed, naturalists and geologists will have good reason to thank Dr. Morse for giving it.

Here a State Geologist is addressing the people of his state from much the same angle that Charles Kingsley a generation ago approached the readers of his Town Geology. Too many geological reports are prepared for professional readers only and too few for Mr. Average Citizen. This booklet will be appreciated by the general public whose existence the geologist often forgets about in writing his reports.—EDWARD M. KINDLE.

"ANIMAL TREASURE".—Doubtless many readers of *The Canadian Field-Naturalist* read, or heard of, a book called *Animal Treasure*, by Ivan T Sanderson (Viking Press). To most naturalists

the book is a remarkable and amusing account of a collecting expedition to the Cameroons. The book has had many favourable reviews, and was the "Book of the Month" selection for September, 1937. The author gained a tripos at Cambridge. In such circumstances one should be able to sit down and enjoy the book with confidence in the accuracy of the subject matter.

Because of its wide acceptance attention should be drawn to the reception which this book has received at the hands of those familiar with the country and the animals with which it deals. In particular, reviews by Arthur Loveridge, formerly Curator of the Natural History Museum. Nairobi, (Kenya), and now of the Museum of Comparative Zoology, Cambridge, Mass., should be mentioned. They are to be found in *Copeia*, November, 1937, and the *Atlantic Monthly Bookshelf*. October, 1937, and particularly, under the title *If the Blind Lead the Blind* in *Scientific Monthly* for January, 1938.

In the latter publication Loveridge concludes "Sanderson has caused incalculable injury to natural history by disseminating false information, which is, and will be, quoted far and wide". For further details the reviews mentioned should be consulted.—C.H.D.C.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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The Canadian Field-Naturalist

VOL. LII OTTAWA, CANADA DECEMBER, 1938 No. 9

THE CANADIAN DISTRIBUTION OF LITHOSPERMUM CROCEUM FERN.*

By HAROLD A. SENN

*Contribution No. 560 Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada. (Continuing the Series of the former Division of Botany).

IN 1935 Fernald (*Rhod.* 37: 329-331, pl. 376) segregated the northern inland element from *Lithospermum caroliniense* (Walt.) MacMill, as a new species *L. croceum* Fern. This northern species is chiefly distinguished from the southern coastal plain species by the harsh, papillose-based pubescence of the stem and leaves, by the keeled and stiffly ciliated calyx lobes and by the smaller corolla (limb 1.5 - 2.0 cm. broad rather than 2.0 - 2.5 cm. in *L. caroliniense*). The northern species had previously passed in Ontario as *L. hirtum* (Muhl.) Lehm. or *L. Gmelini* (Michx.) Hitchc.

Fernald stated the distribution of *Lithospermum croceum* as "Sands, gravel, and sandy woods, thickets and bluffs near the Great Lakes from western New York and Ontario westward, thence to Montana, South Dakota, Nebraska and Kansas". In June, 1921, Macnamara collected this species at Constance Bay, Ontario. As the citations below indicate it has frequently been collected there since that time and examination during the present summer showed it to be abundant over a considerable area. Constance Bay is an expansion of the Ottawa River about twenty-six miles north-west of Ottawa, Ontario. Constance Bay and adjacent Buckham Bay are the mouths of a former channel of the Ottawa River. The area between these two bays is filled with glacial and late marine deposits, the exposed portions being alluvial sand. This sandy region of open second growth woods forms a habitat for *L. croceum* quite similar to the sandy stretches along Lake Erie and Lake Huron.

In addition to Fernald's account, the occurrence of this species in western Ontario has been reported as follows: Faull (*Ont. Nat. Sci. Bull.* 4: 102, 1908) reported *L. hirtum* from the upper beach at Rondeau Park, (Kent County). Dodge (*Ott. Nat.* 24: 45-52, 1910) described *L. Gmelini* as plentiful in spots in Lambton County and later (*Can. Geol. Surv. Mem.* 54:84, 1914) cited this species as frequent at Point Pelee (Essex County) in open sandy ground and the sandy upper beach about Windsor (Essex County). Zenkert in the "Flora of the Niagara Frontier Region" (*Bull. Buffalo Soc. Nat. Sci.* 16, 1934) describes *L. Gmelini* (Michx.) Hitchc. as occurring along Lake Erie at Fort Erie, Windmill Point and "abundant at intervals from Point Abino into Humberstone and Wainfleet townships" (Welland County). Among the stations listed by Macoun (*Cat. Can. Plants* 2: 352, 1884) for *L. hirtum* Lehm. are the following from which no specimens have been seen: Bosanquet, shore of Lake Huron, Ont. (*McGill Coll. Herb.*); Vicinity of Toronto (*Fowler*).

In western Quebec, Carrier in his catalogue of the flora of Montreal Island (*Bull. de l'Acad. Intern. Geographic Botanique* 13: 268-281, 1904) cites *L. hirtum* Lehm. as occurring in dry places. Marie-Victorin's "Flore Laurentienne", 1935, does not include this species and no specimen has been seen to substantiate Carrier's record. Fletcher in Flora Ottawenis (*Ott. Nat.* 3 Suppl. 56, 1889) recorded *L. hirtum* Lehm. as follows:

"Riverside in sand. On the banks of the Ottawa above Aylmer. Rare (Mrs. Chamberlain)." While no specimen has been found to support this record the region cited is almost directly across the Ottawa River from Constance Bay, Ontario, so the report may be valid.

The Canadian distribution of this species is set forth in the collections cited below. It will be seen that the Constance Bay station represents the extreme north-eastern limit of the range being 125 to 325 miles east of the nearest authentic stations. In the following citations specimens not otherwise designated are in the herbarium of the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Canada. Other herbaria are design-

ated as follows:

CAN—National Herbarium of Canada
T—University of Toronto Herbarium

I am grateful to the curators of these herbaria for the loan of specimens and to Mr. James Soper of McMaster University for the opportunity of examining his Turkey Point collections.

Bruce County: Bruce Peninsula, Sauble Beach, *Taylor* 8175, 8209 sandy dunes (T); Saugeen, *Burgess s.n.* dry shifting sand, July 24, 1884.

Georgian Bay: Grant's Tomb, *"A.G.W."* *s.n.* Aug. 17, 1904, (CAN);

Lambton County: River St. Clair, Point Edward, *J. M. Macoun* (17180) sandy soil, Sept. 13, 1884, (CAN):

Essex County: Lake Erie, Pelee Point, *John Macoun* (23963), dry woods, July 23, 1892, (CAN);
Lake Erie, Pelee Point, *John Macoun* (17181), sand banks on dunes along lake, June 30, 1882, (CAN);
Lake Erie, Pelee Point, *John Macoun* (54342), May 27, 1901, (CAN);
Point Pelee, *Burgess s.n.* sand shore, July 30, 1882, (T);
Pelee Island, *Botham s.n.* June 6, 1938.

Norfolk County: Lake Erie, east end of Long Point, *John Macoun* (17179), on blown sand, July 21, 1892 (CAN);
Long Point, *Boughner s.n.*, June 14, 1892, (T);
Lake Erie, Long Point, *Senn* & *Soper* 521, dry sandy ridges;
Turkey Point, pine woods, *Soper* 223;
Turkey Point, open grassland, sandy soil, *Soper* 47;

Welland County: Shore of Lake Erie, Pt. Abino, *McCalla* 407, (CAN);

Prince Edward County: Wellington Beach, *John Macoun* (17176), dry soil, July 1868, (CAN);

Carleton County: Constance Bay, *Macnamara s.n.* June 1921;
Constance Bay, *Groh s.n.*, Aug. 10, 1927;
Constance Bay, *Groh s.n.*, sand ridges, June 17, 1930;
Constance Bay, *Minshall s.n.*, June 28, 1934;
Constance Bay, *Adams s.n.* June 12, 1938;
Ottawa River, Constance Bay, *Senn* 401, sandy soil in second growth woods; Ottawa River, Buckham Bay, *Groh s.n.*, in fruit, Aug. 6, 1938.

MOLLUSCA OF THE OTTAWA REGION

(*CLAMS, SNAILS AND SLUGS*)

By A. LA ROCQUE

(*Concluded from Page 115*)

Genus *Oxychilus*

A group of introduced snails reminding one of the ramshorns. One species (*O. alliarium*) has never been found outside of greenhouses and therefore is not included in the main list. The other (*O. cellarium*) is well-established. It resembles *Mesomphix inornatus* (see below) but may be distinguished from it by its wider umbilicus. It might also be confused with the next species which it resembles slightly but *Haplotrema concavum* has a much wider umbilicus and a more thickened lip.

O. cellarium Müller

Genus *Haplotrema*

A shell of medium size (15 to 21 mm. wide) flatly coiled, widely umbilicated, greenish-horn when alive. These snails are carnivorous and should not be left in the same box with *Succinea* or *Vitrina*. Our specimens are sometimes referred to the variety *minus* Ancey.

H. concavum Say

Genus *Mesomphix*

Another flatly coiled shell, but with a much narrower umbilicus than the preceding two. Rather scarce in this region.

M. inornatus Say

Genus *Vitrina*

The shell has only a few whorls, the last one enlarging rapidly; it is greenish-white, almost transparent. The animal, when present, seems too big for its shell. (Greatest diameter 6 mm. or less).

V. limpida Gould

Genus *Zonitoides*

Shells of small and medium size, with a moderately elevated spire. We have only two species. In live *Z. nitidus* the shell appears black due to the colour of the animal, but when the latter is removed it is very pale horn colour. The umbilicus is moderately wide. In live *Z. arboreus* the animal is gray-white; this difference in the colour of the animal is helpful in separating the two species.

Z. arboreus Say
Z. nitidus Müller

Genus *Discus*

One of the commonest of our smaller land-snails. It may be distinguished by its rich brown colour, flat spire, wide umbilicus and the coarse concentric striae closely set on the whorls. Some specimens have angular whorls which make the shell appear almost carinate while in others the body whorl is evenly rounded.

D. cronkhitei anthonyi Pilsbry

Genus *Gastrocopta*

The spire is high, the whorls tightly coiled. The aperture is strongly reflected and usually lined with many strong teeth which almost obstruct it. The strong reflection of the aperture distinguishes the genus from *Vertigo*.

G. armifera Say
G. corticaria Say
G. contracta Say
G. holzingeri Sterki

Genus *Vallonia*

Small snails (3 mm. high) often very numerous in grass. The shell is usually grayish white, the lip reflected except on the parietal wall.

V. albula Sterki
V. costata Müller
V. excentrica Sterki
V. pulchella Müller

Genus *Cochlicopa*

High spired (6 mm. high), dark brown, shining. Aperture toothless, its edges thickened.

C. lubrica Müller

Genus *Helicodiscus*

A small shell, 3½ mm. in diameter, flatly coiled, with both spiral and vertical striae. Fresh shells are greenish in colour.

H. parallelus Say

Genus *Pupilla*

Brown, high spired, 4 mm. high. The aperture may be toothless or may have one or two teeth.

P. muscorum Linnaeus

Genus *Vertigo*

Very small, high spired shells. Our species are either brown or grayish white with many teeth in the aperture.

V. bollesiana Morse
V. curvidens Gould
V. gouldii Binney
V. milium Gould
V. ovata Say
V. pentodon Say
V. ventricosa Morse

Genus *Retinella*

Flat spired shells, shining, translucent, with faint striae.

R. binneyana Morse
R. electrina Gould
R. indentata Say

Genus *Striatura*

Very small shells, living in moss; the sculpture on the whorls resembles bead-work and identifies them easily. (2½ mm or less). The species found around Ottawa may be identified by the following key:

1. a. "Beading" and transverse striae present, the latter cutting the former obliquely .. ..*S. exigua*
   b. "Beading" present, no transverse striae ..2
2. a. Umbilicus wide, beading coarse *S. milium*
   b. Umbilicus narrow, beading faint *S. ferrea*

S. exigua Stimpson
S. ferrea Morse
S. milium Morse

Genus *Punctum*

A very small shell which looks like a tiny *Vallonia* without a reflected lip and brown in colour. Found in moss and in dead leaves, under trees. We have only one species:

P. pygmaeum Draparnaud

Genus *Hawaiia*

A minute (2½ mm.) whitish shell, with microscopic wrinkles. Aperture almost circular, umbilicus wide. Rare.

H. minuscula Binney

Genus *Strobilops*

Small snails, 1½ to 2 mm. high. They resemble the next genus, *Euconulus*, but the latter is

smooth while *Strobilops* is marked with strong growth striae; *Euconulus* has no teeth in the aperture while *Strobilops* shows at least one.

S. labyrinthica Say

Genus *Euconulus*

Differentiated from *Strobilops* by the characters given under that genus (see above).

E. fulvus Müller

Genus *Columella*

A very small, high-spired snail (1.6 mm. high) without teeth in the aperture.

C. edentula Draparnaud

Genus *Carychium*

Small, chalky-white land shells less than 2 mm. high, preferring marshy ground. The small size and white colour will distinguish them from all others.

C. exiguum Say
C. exile H.C. Lea
C. exile canadense Clapp

Genus *Planogyra*

The only species, *P. asteriscus* may be confused at first with *Striatura exigua* (see above) but the latter is greenish while *P. asteriscus* is brown. Moreover, in *Striatura* the vertical striae cross the smaller growth lines, while in *Planogyra* they are parallel to them.

P. asteriscus Morse

Genus *Paravitrea*

The only species known for the district, *P. multidentata* is a small, flat-spired shell with three rows of teeth disposed in groups across the whorl. Rare. *P. lamellidens* may have to be added to our list on the strength of one specimen said by Walker to have been found in a lot of *multidentata* received from Heron. Since the species has never since been found in the district, it is possible that Walker's record was erroneous.

P. multidentata Binney

The following species are slugs. The shell is internal, sometimes reduced to a few granules under the skin of the mantle. The slug corresponds to the animal of the shelled species.

Genus *Philomycus*

A large slug, sometimes as much as four inches long. The mantle covers almost all of the body, so that it was first described as having no mantle at all. The back is dark gray-brown with fine, irregular markings of buff, the sole light gray. It lives in woods, never invading gardens or cleared fields and lives on fungi.

P. carolinianus Bosc

Genus *Pallifera*

Small slugs, the mantle covering almost all of the body, as in *Philomycus*. We have only one species which may be distinguished from *Philomycus* by its size (about half that of the latter) and its colour, bluish white with an interrupted black line down the middle of the back.

P. dorsalis Binney

Genus *Deroceras*

In this genus the mantle covers the front third of the body and the breathing-pore is placed on the right side, at the hind end of the mantle. The latter character separates *Deroceras* from the next genus. We have two species, both of which have probably been introduced from Europe. *D. laeve gracile* Rafinesque lives in woods. It is a small slug, dark gray and very watery in appearance. *D. agreste* is larger, variously mottled or plainly coloured, usually easy to distinguish by the white ring which surrounds the breathing pore.

D. laeve gracile Rafinesque
D. agreste Linnaeus

Genus *Arion*

Although now common throughout the district, this slug was not noticed until 1934. It was probably introduced from Europe. It is about the same size as *Deroceras agreste* but the position of the breathing pore will separate the two. In *Deroceras* it is at the hind end of the mantle, in *Arion* at the front.

A. circumscriptus Johnston

CASUAL INTRODUCTIONS

Besides those species which are native to the region and those others which have been introduced and have established themselves, there are others which are taken from time to time in the area but are not likely to become established. The following are those most commonly reported:

Oxychilus alliarium Miller is a small snail, sometimes found in greenhouses. It may be recognized by the strong smell of garlic which it gives off when crushed.

Limax maximus Linnaeus: Until a few years ago this slug was hardly entitled to a place on our list. A few specimens from greenhouses had been recorded by Latchford, but it was thought that the climate was too severe for it to establish itself. In July, 1938, however, two lots of specimens were brought to the writer from two different gardens in Rockcliffe Park which indicated that the species might join other invaders from Europe which have established

themselves here. *Limax maximus* is a large slug, 4 to 6 inches long when full grown. The mantle is short, as in *Deroceras,* but mottled with black and the back bears four more or less broken black stripes.

Oxystyla undata jamaicensis Pilsbry: The "Banana Snail", only one of a group, but the one most commonly brought in with bananas here, is sometimes found alive, in fruit stores, on bananas. It is extremely unlikely that it will ever become established in the district.

In addition to the above, a number of species were introduced into our region many years ago. It seemed at first that they had failed to establish themselves but two of them have been re-discovered lately. Of these *Polygyra multilineata* is included in the account above. "*Helix rufescens* Pennant" is discussed below. The other species thus introduced are: *Zoögenetes harpa* Say, *Theba cantiana* Montagu, *Fruticicola striolata* Pfeiffer (*Helix rufescens* Pennant of old lists), *Discus perspectivus* Say, *Anguispira kochi* Pfeiffer (*Pyramidula solitaria* Say of old lists), *Polygyra hirsuta* Say, *Polygyra palliata* Say, *Zonitoides ligerus* Say.

Fruticicola striolata Pfeiffer (=*Helix rufescens* Pennant): A small colony of this species was found recently in Rockcliffe Park by Mr. Fairbairn. This locality is far removed from the Exhibition Grounds where Latchford first introduced the species and the writer believes this to be an independent introduction. Until we know whether or not this colony will survive better than the first introduction, it cannot be classed with our "permanent" molluscan fauna.

BIBLIOGRAPHY

NOTE.—Over forty papers dealing exclusively with the Mollusca of the Ottawa region have already been published, and some twenty more containing occasional references to them. Obviously, all of these cannot be included in an elementary text. On the other hand, since the species are neither figured nor described at length in this paper, references containing figures and descriptions have been given. All of these references contain bibliographies which will be helpful to the student who wishes to pursue the subject further.

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GLOSSARY

Amphineura: A class of the Phylum Mollusca comprising the Chitons or "coat-of-mail" shells. The name is derived from two Greek words meaning "all-round" and "nerves" alluding to a peculiarity of their nervous system. Exclusively marine.

Aperture: In snail shells, the opening or mouth. It may be simple or thickened with layers of shell-material which may or may not bear teeth.

Beak: In Pelecypods, the shell grows by the addition of layers of material which project *out,* one under the other, but this growth is greater on the side away from the hinge. In time the earlier parts of the shell stand out at or near the middle of each valve. These projections are called the beaks.

Beak-sculpture: In the Unionidae the markings on the beaks do not correspond to those on the mature shell. They consist of strong, well-marked bars and loops which are helpful in separating genera and species. Unfortunately, they are sometimes worn away with age, this being especially true in the Ottawa region. They are best shown in young shells.

Cardinals: are the very small, irregularly pyramidal teeth lying just under the beaks in Sphaeriidae. (see also *Pseudocardinals*)

Carina: A spiral thickening resembling a thread tightly wound round the shell. It may be strongly marked or reduced to a mere angulation.

Cephalopoda. A class of the Phylum Mollusca comprising the squids, cuttle-fish and so-called "devil-fish". They are the most highly-developed of the Mollusca and the ones which attain greatest size. They are exclusively marine.

Compressed: Pelecypod shells in which the length and height greatly exceed the diameter, giving them a flattened appearance.

Dextral: When a snail shell is held in the hand with the aperture facing one and the spire pointing upwards, it will be seen that in the majority of snails the aperture is to the student's right in relation to the spire; such shells are said to be dextral. When these conditions are reversed (as in *Physa* and *Aplexa*) the shell is said to be sinistral. Reversed specimens of normally dextral or sinistral species are usually rare.

Epidermis: A thin, horny layer on the outside of the shells of most mollusca. The thicker, inner layers are calcareous.

Gastropoda: A class of the Phylum Mollusca comprising those which have a spiral or conical shell, Ex.: Whelks, winkles, snails, limpets, but including also the slugs. The name is derived from two Greek words meaning *stomach* and *foot*.

Genus: (plural *genera*) — A group of species possessing a number of characters in common. The scientific name consists essentially of the generic name and the specific name, followed by the name of the author who described the species.

Hinge: In the pelecypods this is the side of the valves where they are joined together. It consists of the teeth which hold the valves in position and the ligament which binds them on the outside.

Inflated: Pelecypod shells in which the diameter is almost as great or greater than the height, giving them a swollen appearance.

Laterals: These are the longer, lamellar teeth found in both *Unionidae* and *Sphaeriidae*. In the former there is only one set (behind the beaks) in the latter two sets, one at each side of the valve.

Measurements:

Gastropoda: The length of a snail is measured from the tip of the spire to the lower edge of the aperture. The width is the greatest width at right angles to the height. Other measurements are sometimes used but are not detailed here since they are not used in the text.

Pelecypoda: There are three main measurements: The length is measured parallel to the hinge line but from one end of the shell to the other. The height is taken at right angles to the length. The thickness is the greatest thickness of the two valves, when closed, as in life.

Mollusca: A Phylum of the Invertebrates (animals without backbone) comprising the clams, oysters, snails, slugs, cuttle-fish, squids, sea-slugs and tooth-shells.

Operculum: A horny (rarely calcareous) plate which blocks the aperture of certain snails when the animal withdraws into its shell. It may be concentric, when it grows evenly on all sides, subspiral, when it grows slightly more on one side than on the other, or spiral when growth is almost entirely on one side

Parietal Wall: In snail shells, the inner wall, *i.e.* the one nearer the inside of the shell.

Pelecypoda: A class of the Phylum Mollusca comprising all those which have a shell composed of two valves. Ex.: Oysters, Scallops, Clams. The name is derived from two Greek words meaning *hatchet* and *foot*.

Phylum: A major division of the animal kingdom. Ex.: Chordata (including the Vertebrates), Arthropoda (Insects, Spiders, Crustaceans), Mollusca.

Posterior slope: In our *Unionidae*, the beaks being anterior, the posterior slope is that part of the shell directly behind and below the hinge in the wider half of the shell.

Pseudocardinals: These are the teeth which lie nearest the beak in the *Unionidae*. They are usually triangular and stumpy while the laterals are thin and lamellar.

Rays: Colour lines running from the beaks to the margin in various *Unionidae*.

Scaphopoda: A class of the Phylum Mollusca comprising the tooth-shells. The name is derived from two Greek words meaning boat and foot. Exclusively marine.

Sinistral: see Dextral.

Species: A group of individuals possessing a number of characters in common. Scientific writers are not agreed on the exact definition of the word but the above will serve as a rough description. (see also *Genus*).

Teeth: In the Pelecypoda the hinge is thickened in certain spots and these thickenings are called teeth. They are not the same in the two valves but are complementary, fitting together closely in such a manner as to allow the valves to open. They give solidity to the valves and regulate the direction in which they open. They are of two kinds: cardinals or pseudocardinals and laterals.

Umbilicus: In snails, the opening directly opposite the tip of the spire. Its width depends on the tightness of the coils and thus it may be almost as wide as the shell itself or reduced to a mere chink.

Whorl: In snail shells, one complete turn of the shell. The whorl at the tip (first whorl) is sometimes called the *nuclear whorl* and the last and largest whorl is known as the *body whorl*.

*NOTES ON RARE CANADIAN PLANTS**

By HAROLD A. SENN

*Contribution No. 556, Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada. (Continuing the Series of the former Division of Botany).

IN THE COURSE of checking some collections from southeastern Alberta four species were found which do not seem to have been previously reported from Canada. No sheets of these species were found either in the herbarium of the Division of Botany and Plant Pathology of the Department of Agriculture or in the Canadian collections of the National Herbarium of Canada. The species are not included in Macoun's *Catalogue of Canadian Plants* nor in Fraser and Russell, *List of the Flowering Plants, Ferns and Fern Allies of Saskatchewan*. As there is no check

list of plants of Alberta available it seems worth while to record the occurrence of these species in Canada.

All four species occur in the western United States so that these stations are merely northern range extensions. The region is an interesting one and further collections from it are essential for studies of the phytogeography of the Canadian prairies.

LEGUMINOSAE

Orophaca sericea (Nutt.) Britt. (*Astragalus sericoleucus* A. Gray)

ALBERTA: Manyberries, dry gravelly hill, *Campbell* 43, May 20, 1937. United States range: Nebraska, Wyoming, Colorado.

COMPOSITAE

Chrysothamnus plattensis Greene.

ALBERTA: St. Kilda, stony hillsides in prairie, *Campbell* 55, Oct. 10, 1937.

United States range: Montana, North Dakota, South Dakota, Colorado.

Erigeron canus A. Gray

ALBERTA: Manyberries, dry coulee bank, *Campbell* 64, June 8, 1937.

United States range: South Dakota, Nebraska, Wyoming, New Mexico.

Tetraneuris acaulis (Pursh) Greene (*Gaillardia acaulis* Pursh. *Actinella acaulis* Nutt.)

ALBERTA: Manyberries, Lost River Valley, gap of bank, dry stony river bank, *Campbell* 40, June 3, 1937.

United States range: North Dakota, Idaho, Montana, Texas, New Mexico.

Specimens of each are deposited in the herbaria of the Division of Botany and Plant Pathology and the National Herbarium at Ottawa and of all except the third species in the Gray Herbarium of Harvard University.

BIRDS NOW SELDOM SEEN

By H. E. DOUGLAS

EACH SPRING and Fall I take great delight in watching our feathered friends, in their movements to and from their summer breeding grounds. From boyhood I have always been a keen admirer, and observer, of birds. Needless to say it irks me when I see the diminishing numbers of wild fowl each succeeding spring, as well as the absence of some varieties once common sights to us of the Alberta Plains.

For instance, the Sandhill Crane (*Grus mexicana*) and the Whooping Crane (*Grus americana*). The latter bird now practically extinct, the former very rarely settles to feed in regions in which it was once wont to nest. If it were not for the clamour they make while passing high overhead, I would not know that they still existed.

Another bird I rarely see or even hear of is the lordly Swan, the Trumpeter (*Cygnus buccinator*). Last spring, however, I did hear and see a flight of 5 individuals, the first I had seen for nearly twenty years. The magnificient Golden Plover (*Pluvialis dominicus*) is a bird very rarely seen or recorded anywhere in the west. They are apparently only occasional visitors. On the 10th of May last I saw a flight of thirty, and after going through old records I find that it is only the second time that I have observed them — the other occasion being on the 28th of April, 1913. The Upland Plover is another bird I have seen very little of; last April and May I saw several flights going north, but I have not a single record of them in autumn migration. The Black-bellied Plover (*Squatarola squatarola*) two decades ago was a common sight in both spring and autumn now it is one of our occasional visitors; the last record I have of them is October, 1929, previous to that they were regular members of the migrating legions.

Curlews too have practically vanished from the prairies. *Numenius americanus* was a regular summer visitor a quarter of a century ago, now I believe there are only two districts in Alberta where they regularly nest. One, along the foot of the Porcupine Hills in southwestern Alberta, and two, that tract of country known as the Blood Indian Reservation, and from there south to the International Boundary.

Bitterns (*Botaurus lentiginosus*) and the Great Blue Heron (*Ardea herodias*) are not nearly as plentiful as they were prior to 1916, nor in fact are any of the more common varieties of ducks and geese. For instance: the Blue Bill, the

Greater Scaup Duck (*Marila marila*) (not to be confused with the Lesser Scaup (*Marila affinis*) was quite a common sight previous to 1914: it now ranks with those seldom seen. The last record of them that I have is 19th of April, 1933, near Cochrane, Alta.

I have to admit that the draining of many sloughs and small lakes, has forced ducks and geese to leave time-honoured lines of flight but that has not and does not alter this fact: that indiscriminate shooting in both spring and autumn is the real reason for the scarcity of so many species. I also notice that birds like Coot, Grebe, Snipe, that so many look upon as unfit to eat, and are often shot and left, are with each passing year becoming less numerous. I could go on indefinitely citing first one then another species that has been depleted almost to extinction without accomplishing any material good. What we need to halt the wastage of bird life not only in Canada but in the United States is the wholehearted co-operation of everybody who is able in both of these great countries.

That which is applicable to the water birds also applies to the land birds, they also are not as common as heretofore. In fact a great many varieties once plentiful are now only an oddity. The Sharp-tailed Grouse (*Pediocectes phasianellus*) once found in flocks of several hundred birds, has vanished entirely from a great many places. Divers arguments are raised as to the actual cause of its disappearance, and so far none that I have ever heard was conclusive. There is a reason, and that reason is scouted by a great many—why, I am at a loss to know. The Hungarian Partridge is blamed by those who know nothing about the habits of either, and care less. Still I am at a loss to know why the real cause is not more freely admitted. With the advent of settlers and their plows, came what might be termed the ejection order for the Sharp-tailed Grouse. They being a bird of the Prairies naturally nested there, and as agriculture became more intensive, more nests were annually destroyed in its process. This is a statement of fact that cannot be disproved, or denied. Here in this district the Chicken as they are commonly called are fairly plentiful, the reason being that on both sides of the river (North Saskatchewan) there is a lot of land still unsettled, as well as the Frog Lake and Onion Lake Indian Reservations. In Alberta at the present time there is a closed season on Sharp-tailed Grouse at all times, waiting for them to do the impossible, return to the prairies from which they have been forced to leave, and which as long as intensive cultivation is practised, cannot offer them sanctuary.

With that statement I rest my pen awaiting editorial or public sanction of further articles on this interesting topic.

NOTES ON THE WARBLERS OF THE ROSEBUD DISTRICT, ALBERTA

By W. RAY SALT

THERE SEEM to be few published records of the birds of south-central Alberta, undoubtedly due to the paucity of observers in that region. Since 1928 I have had the opportunity of studying the bird life around Rosebud, Alberta, and have spent much of my leisure time in the field. I venture to offer the following notes in the hope that they will add slightly to knowledge of the avifauna of a very interesting region.

The terrain of this area is such as to discourage hopes of a variety of warblers. It consists mainly of rolling semi-arid prairie, the greater part of which is under cultivation for wheat. Through this in a deep valley winds the Rosebud Creek, a trickle of muddy water augmented in the summer months by irrigation overflow. The clay banks of the valley are mostly steep and precipitous but the northern and eastern slopes, protected from the parching summer sun, often support a growth of poplar, willow, birch, saskatoon, and chokecherry, with an occasional clump of spruce in a particularly steep and shaded spot. Running into this larger valley are many smaller ones popularly termed "coulees" whose shaded slopes are also sparsely wooded.

The warblers mentioned below were found chiefly in the wooded growths along the creek and in the coulees. All the records are substantiated by specimens in my collection. Subspecific determinations in most cases were made by Mr. P. A. Taverner of the National Museum of Canada.

1. *Mniotilta varia* — The Black and White Warbler is a rare migrant. It was encountered

for the first time in the fall migration of 1936, when a few were observed and two immature males collected during the period Sept. 1 - 5.

2. *Vermivora peregrina* — The Tennessee Warbler is an uncommon migrant. I have a few sight records of adult Tennessee warblers in the spring. Immature birds are seen more commonly during the fall migration but the species is never abundant. Extremes of fall migration dates are Sept. 1 and Sept. 11.

3. *Vermivora c. celata* — The Orange-crowned Warbler is common during both migrations. It is the first Warbler to arrive in spring. On April 27, 1935, several were noted feeding in low brush, often alighting on the ground in an inch of snow which had fallen during the previous night. A male was collected. Immatures collected in the fall have decidedly grey heads. They are late fall migrants usually staying until October with the Myrtle Warblers. Extremes - April 27 - May 18; Aug. 30 - Oct. 3.

4. *Dendroica a. aestiva*—The Yellow Warbler is a common summer resident, breeding in all suitable localities. It is the last warbler to arrive in the spring and usually the first to leave. It rarely arrives before May 24 and is gone by the beginning of September. Extremes - May 17 - Sept. 7.

5. *Dendroica tigrina* — The Cape May Warbler is a rare fall migrant. An immature male taken Sept. 8, 1935, and a sight record of an immature on Sept. 11, 1935, are the only records.

6. *Dendroica c. coronata* — The Myrtle Warbler is a common migrant. It appears early in the spring and is usually abundant about May 12. In the fall it returns in increased numbers early in September and the flocks have not gone through until the first week in October. Extremes - May 3 - May 13; Aug. 31 - Oct. 3.

7. *Dendroica a. auduboni* — The Audubon Warbler is an uncommon migrant often found in company with the preceding species. I have never taken it in the fall although I have watched for it carefully.

8. *Dendroica townsendi* — On May 18, 1935, I took an adult male Townsend Warbler in the birch and willow thickets bordering the Rosebud Creek, the only record for the locality.

9. *Dendroica castanea* — An immature male Bay-breasted Warbler was collected from a mixed company of warblers on September 6, 1934, and forms the only record for this species.

10. *Dendroica striata* — The Black-polled Warbler is an uncommon migrant. A few adults migrate through the region in the spring, May 14 - 30. So far I have not taken any fall specimens although I have sight records.

11. *Dendroica p. palmarum*—The Palm Warbler is an irregular fall migrant. I have one or two spring sight records of this species which I have so far been unable to substantiate by collection of specimens. During the migration period, Sept 7-10, 1935, between seventy-five and one hundred palm warblers were observed. In 1936 a bare half-dozen birds were observed on Sept. 7.

12. *Oporornis tolmiei*—The McGillivray Warbler is a regular summer resident, never abundant. This bird frequents tangled thickets in the poplar groves. A male and female attendant upon young were noted on June 27, 1934. Occasional immature birds may be seen among the flocks of migrating warblers during early September.

13. *Geothlypis t. occidentalis* — The Western Yellow-throat is a regular summer resident. Its numbers vary considerably being dependent upon the size and number of marshy spots available as breeding grounds. During the years of my observation in this area there has been a prolonged drought and the yellow-throat as a summer resident has become very local in distribution. During the fall migration immature birds appear in small numbers throughout the territory in company with other warblers.

14. *Wilsonia p. pileolata* — The Pileated is a regular migrant. The fall migration seems to consist of family groups, one or two adults being accompanied by young of the year. They are occasionally seen as late as the end of September. Extremes - May 16 - May 24; Aug. 29 - Sept. 27.

15. *Setophaga ruticilla* — The Redstart is a rare spring migrant more abundant in the fall. An adult male in company with a female was collected May 28, 1931. Another was observed on May 22, 1936. These are the only spring records. The immatures are common the first week in September. In 1936, five adult males were observed during the fall migration. Extremes - Aug. 28 - Sept. 12.

REVIEWS

The Life Story of the Fish, by Brian Curtis. Published by D. Appleton-Century Co. New York. Canadian Agents—Ryerson Press Toronto. $3.50.

This is a popular, but accurate, account of present day knowledge of fish. Much abbreviated, of course, but told in an easy entertaining way and illustrated by line cuts. The author is on the research staff of the California Division of Fish and Game and has extracted from the mass of technical publications those facts that are of interest to the general reader. The result is a highly satisfactory one and, as William Beebe, who writes the introduction, says. "As you read it, you learn and laugh, and learn again". The chapter on sense organs with a discussion of the fish's range of vision, both below the surface and in the air, is especially interesting. The book is printed in good type on uncoated stock. The only colour plate is on the jacket—a Californian Golden Trout. — D.L.

Algae, The Grass of Many Waters, by Lewis Hanford Tiffany, M.Sc., Ph.D. Published by Charles C. Thomas, Springfield, Ill., U.S. $3.50.

Dr. Tiffany is Professor of Botany at Northwestern University and he has been teaching botany, and algology for over twenty-five years. His book contains the answers given to students, the public, and to specialists in other sciences who have asked him questions about algae. It is fully illustrated with plates (some in colour), half-tones, line cuts and diagrams. Both freshwater and marine algae are included. The treatment is easy and clear, the interest well maintained. The various habitats in which algae are to be found both today and in the past are dealt with and the ecological relationship between man and algae is given a separate chapter. Possibly a glossary might have been added with benefit. From the mechanical standpoint the book is excellent. A good glazed stock gives the half-tones every chance to show well, the type is clear and legible, and typographical errors down to the irreducible minimum—D.L.

CHRISTMAS BIRD CENSUS

The Bird Census Committee wishes to remind any interested readers to take a Christmas Bird Census on some day between December 20 and 28, and send a report of it to the Editor as promptly as possible. On account of restricted space available for publication of such reports, Council has, by resolution, expressed the view that hereafter these reports should be published only in reduced form, similar to that now in use for publication of Christmas bird census reports in *"Bird-Lore"* magazine. The reports from Montreal, Ottawa, and Hamilton, published in *"The Canadian Field-Naturalist"* for February, 1938, are examples of this form. Contributors of bird census reports will save much unnecessary editorial revision if they will submit reports prepared in conformity with this view of Council.

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1937-38

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We would ask the Officers, and more particularly the Secretaries, of all the Affiliated Societies to assist us in our task of building up the circulation of this magazine. By securing every member as a subscriber we can truly make this magazine into one of the leading Natural History publications of America.

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